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Relative Hispanic Population By County
New Standard Object Selection Process
Computed Fields in LegendView Labels
Floating North Arrow in 3D Simulation
LegendView in Feature Mapping
New Languages Available

All previous MicroImages MEMOs starting with the release of the **TNT** products **V4.00** are available at www.microimages.com. You can use your web browser to easily look up details that you recall were mentioned in a previous MEMO or to search for more information on a specific topic. All earlier MEMOs back 13 years to **V0.90** in 1986 are available upon special request.

Introduction

MicroImages is pleased to distribute **V6.20** of the **TNT** products, which is the 47th release of **TNTmips**. A count of 234 new feature requests submitted by clients and MicroImages' staff were implemented in **V6.20** processes. The master list now contains 1991 requests for new features. The following major features have been added.

- **Display:** Two or more monitors can now be used at any licensed **TNT** display resolution.
- **Navigation:** A new dialog for navigating through directories, files, Project Files, and objects now uses an intuitive, Windows-like procedure.
- **Layouts:** Any window containing an attribute table or summary table can be saved as a CAD object with styling for use in a map layout.
- **Help:** Context sensitive help is now provided throughout.
- **Getting Started Booklets:** All 50 booklets are current with the features in **V6.20**. Two new booklets are available.
- **Mac:** Performance has been significantly increased by improved buffering in the **TNT** products, and MacOS 9.0 is supported.
- **Feature Mapping:** Completely updated to current standards using LegendView and the addition of new features.
- **Datums:** Many new datums now supported.
- **HyperIndex:** Links from index areas can now be made to a URL to open an Internet browser and site.
- **Languages:** Arabic, Hebrew, and Korean are supported.
- **SML:** Scripts can now include other script files. A total of 27 new functions, primarily mathematical, and 28 import/export classes were added. **SML/W** now provides all the same import/export classes as **SML/X**.
- **TNTserver/TNTclient:** Graphical layer controls, legends, measurement tools, and attribute retrieval have been added.

Moving

During the next several months, MicroImages is planning to relocate to new offices. This move is prompted by the completion of a 10 year lease in the current location. While our current facilities are attractive and comfortable, they were purchased several years ago by a negligent landlord with little regard for its tenants. This has resulted in many problems in the operation of MicroImages' high-technology business in these quarters. For example, the basement offices occupied by some software engineers have been flooded numerous times and have never been remedied. The last straw was poorly managed construction in an adjacent building owned by the same landlord that

resulted in 3 expensive power/phone outages in the last 3 months (1 of 12 hours and 2 of 24). It has not been difficult to conclude that moving to a new building will be less trouble than continuing to deal with these problems.

USB Key

A USB key is now available for W95, W98, and NT platforms. It is small and thus particularly useful with new portables. You can now request that a USB key be supplied for new orders for **TNT** products used on these platforms. This USB key is not an option for the Mac, LINUX, or UNIX platforms.

Platform Specific News

HPUX.

As you may be aware, HP is fading from the general purpose UNIX platform market and concentrating this product line on general purpose file servers. At the same time, they are tightly integrating their 64-bit architecture with Intel's Itanium chip (formerly code-named "Merced"). There have been no requests for quotes for the **TNT** professional products or downloads of the HPUX version of **TNTlite**.

NOTE: MicrolImages proposes to discontinue production of the **TNT** products for HPUX with **V6.20** or with **V6.30**. If this will cause you consternation or difficulty, please notify MicrolImages as soon as possible.

Solaris 1.x.

As previously announced, the **TNT** products are no longer available for the Sun Solaris 1.x operating system, which is not Y2K compliant.

Windows 3.1.

As previously announced, the **TNT** products are no longer available for the Windows 3.1 operating system, which is not Y2K compliant.

NT for Alpha (Compaq or DEC).

Most of you using the Alpha chip, which Compaq purchased from Digital Equipment Corporation, know by now that it will not be provided with future Windows NT support from Compaq or from Microsoft. NT4.0 will be the last version of 32-bit Windows NT for this 64-bit processor. Systems based on the Alpha chip coupled with NT will not be able to upgrade to W2000. The following press releases document this new situation.

from *INFOWORLD*, August 30, 1999, page 12.

"Compaq's dump of NT on Alpha may help Linux"

"Users and employees who were banking on the success of Windows NT in Compaq's Alpha processor appear to be the losers of Compaq's decision to halt development of Windows on Alpha, but the move could further open the enterprise for Linux."

"Because of Compaq's decision to end Alpha support for 32-bit Windows NT 4.0, as well as 64-bit Windows projects, Microsoft last week followed suit and dropped its Windows development effort for the Alpha architecture."

“Compaq dropped its NT Alpha support one week after ending development work and laying off more than 100 employees. Dwindling revenue numbers, coupled with the introduction of high-powered eight-way Intel-based servers, combined to bring about the demise of NT on Alpha.”

from PC WEEK, August 30, 1999, page 9.

“Microsoft bags NT on Alpha”

“Microsoft last week announced that the 64-bit version of NT, release date unknown, would not support Compaq’s Alpha platform.”

“The announcement came about a week after Compaq decided to pull the plug on 32-bit Windows [in other words, current Windows NT] support for Alpha. Compaq will instead focus on Alpha-on-Linux and Tru64 Unix [formerly called DEC OSF/1 then DEC UNIX] software.”

“The decision will not affect a large number of customers, since NT-on-Alpha sales were tiny—so tiny that a Dell exec last week characterized it as ‘not even a pebble on the beach’.”

Those using **TNT** products on NT/Alpha platforms need to indicate their future plans for migrating to new operating systems and should inform Microlimages as soon as possible what they plan to do.

NOTE: Microlimages would like to plan ahead to cease distribution of the **TNT** products for NT-based Alpha platforms. If you are using NT on your Alpha based platform, you need to let Microlimages know how much longer this will continue.

Please remember that the **TNT** products are available at the same price for the Tru64 (the current name of the 64-bit UNIX operating system for Alpha-based platforms). At the present time, Microlimages does not plan to support Alpha for use with LINUX unless it is contracted as a custom task.

SGI IRIX.

Those using the **TNT** products with SGI IRIX can now create, read, and write Project Files greater than 2 gigabytes. As most of you have read, SGI is selling itself off in pieces, but the fate of their workstations and IRIX is yet to be determined.

Windows 2000.

Microlimages’ tests and preliminary client reports indicate that **V6.00** and later versions of the **TNT** products work without modifications with Windows 2000 (formerly Windows NT5).

LINUX.

There are no special activities to report in connection with the use or preparation of the **TNT** products for LINUX. At least for the moment, the race to see who can change the kernel the fastest is on hold.

Macintosh.

The following comment was received from a client using **TNTmips 6.1** on a Mac using MacOS 8.x.

"The G3 Mac is [now] no different from Windows in performance, no complaint for speed. G3 seems fast indeed."

This client is in for a surprise, as **V6.20** of the **TNT** products is significantly faster on the same Mac platform using MacOS 8.x due to the improved read/write buffering adjustments in **MI/X**. Furthermore, early unverified results indicate that changes introduced in MacOS 9.0 improve the operation of the **TNT** products. **V6.20** of the **TNT** products has been checked and operates without a problem with the new MacOS 9.0 operating system.

Editorial and Associated News [by Dr. Lee D. Miller, President]**Late Again But Worth It?**

I hope you will agree with my opinion that **V6.20** of the **TNT** products is the best version ever in 13 years of effort. It does not provide as many new features as the last several releases. Every now and then we have to catch our breath and consolidate our gains. A portion of the effort in preparing this and several of the recent releases has been placed on improving how beginners can easily accomplish complex geospatial analyses. In addition, in this release we have stressed reliability and the quality and currentness of the tutorial booklets, on-line help, and the on-line reference manual. **V6.20** was delayed at least 6 weeks due to the desire to have all 50 tutorial and other booklets current. This meant that many minor errors were uncovered and repaired. The checking and rewriting of all these tutorial booklets turned up many subtle errors in the internal beta versions of the **V6.20** products. Their correction caused delays but resulted in the most error free version of the **TNT** products.

On your CD, 46 of the 50 booklets are current with the features in **V6.20**. If you take the time to download the 4 recently revised booklets (see Getting Started Section below) from microimages.com to replace the 4 installed from the CD, you will have all 50 booklets current with **V6.20**. This is the first time since the creation of this series of booklets that they all match the current version of the **TNT** products.

All the important sections of the massive on-line documentation are also current with **V6.20**. This was handled by other scientific writers. These writers had the responsibility of adding on-line quick help throughout the **TNT** products. They created the equivalent of about 152 single spaced printed pages of quick reference help that was integrated throughout **V6.20** with the new HTML-based on-line help process introduced in **V6.10**. In the past, the **TNT** products have been criticized for the lack of quick help. This is the first time help has been available throughout the **TNT** products. As part of the activity to create help for each process, the associated on-line manual sections were revised to match **V6.20**, and the software and documentation errors encountered were fixed and checked.

To Err is Human!

TNT Errors.

These and other technical complications delayed the release of **V6.20** by 2 months, but it is the most thoroughly-checked version of the **TNT** products ever released. It is also the most thoroughly coordinated version where all the parts: features, tutorials, quick help, and on-line reference manual, all go together.

After all of this, does **V6.20** still have errors? Of course it does, and any vendor of software who tells you otherwise is not being truthful. Coordinating and checking a massive base of software across many platforms supported by 3700 pages of written materials is not a trivial task, and errors will occur that cause frustration for you and me. However, MicroImages still stakes its reputation on the precept: "It is how they get fixed that really counts!"

Errors in General.

A detailed computer-related feature column appears weekly in the *Wall Street Journal*. Its author recently published a detailed list of the serious errors he encountered in creating his column in a single week with Microsoft Windows and several standard applications such as Word and Lotus Notes. Most of these common applications were in the Microsoft products. He had 12 serious errors that cost his time and lost his work: hangs requiring rebooting, files not saved, and all the others quirks we are unfortunately familiar with, and all this using primarily standard Microsoft products. This author provided no means such as email or an address for his readers to contact him. In a subsequent column, he started off noting that he was overwhelmed with responses by various indirect written means. He published some of the 500 responses he had received. Only one written response defended the situation, and that was from a Microsoft Vice President. A second suggested a switch to a Mac, noting that while it may not do as much (for example, lacks true multitasking), it is more reliable at what it does. To punctuate this, the United States just lost a multi-hundred million dollar Mars probe because of a simple programmer error. It is also pretty clear at this point that the failure of other even more expensive space and ground mega projects fail and have high costs in lives and damages due to software errors. Y2K anyone?

Driving Errors are Fatal.

I am beginning to think that we are all expecting too much of software engineers. We use automobiles, which are simple to learn to drive. Many can even do it (albeit with increased risk) with several noisy kids in the car or while talking on a cell phone. However, if we accidentally turn the wheel 1 degree to the left or right, depending on the country, we and several others may be dead in a few seconds. Automobiles are easy and reasonably safe to use if we use them within tightly prescribed limits. They are even flexible and could be used for a while to do things for which they were not designed, such as driving across a field pulling a plow. But would you do that with your car?

Extending this analogy to software, it is reasonable that using specific software alone and within prescribed design limits is the equivalent of driving on a road with no oncoming cars and is usually reliable. But, it is when we use many software products in unusual ways that problems occur, even when all the software is from a single vendor. The one thing that Microsoft, and to a lesser extent MicroImages, cannot do, is point the finger at other products for many of the reported errors. MicroImages has just finished

checking the 1000 tutorial pages outlining the many ways the **TNT** products can be used. However, a powerful feature of the integrated nature of the **TNT** products is that there are many alternate ways to accomplish many tasks, and many of them will work. Yet, I am continually surprised at how many innovative and unanticipated procedures are reported by you. Certainly, some of these myriad of paths you might take are going to fail. Again, MicroImages stakes its reputation on the precept: "It is how they get fixed that really counts!"

Y2K Errors.

This leads to the discussion of the readiness of the **TNT** products for Y2K. When we set the clock forward on all our different platforms, the first question is: will the operating system work? Windows 3.1, Solaris 1.x, and others will not. MicroImages will have a number of expensive new boat anchors available on 1 January, including our current Sun Internet server. If the operating system works when we set the clock ahead on a platform, the **TNT** products operate. What about the version? Every version of the **TNT** products is different. MicroImages has never been able to check the myriad of ways you would use these previous versions as we released them. It is certainly not feasible to do so now for their Y2K compliance. However, when we switched from the **DOS MIPS 3.31** to **TNTmips 4.0** 7 years ago, the proper conventions were adopted to avoid this abbreviated date rollover problem.

No one can assure you of Y2K compliance no matter what they claim on paper. Why do you think the U.S. Congress passed a law limiting damage claims for non Y2K compliance in July 1999? (See the "Y2K Act" at <http://www/y2k.gov>) How would the **TNT** products be compliant when we depend on the operating system, machine bios, or at the other extreme, upon the way old attribute database fields record the year? Y2K problems in non-life-threatening software applications are simply another source of the continual software problems and delays we must all be prepared to patiently resolve when they occur. Is it going to cost you money? Of course. Is it going to cost MicroImages money? Of course! What really bothers me about the whole Y2K business world-wide is the bleak doom and gloom attitude it has created, foreshadowing everything. We should all be preparing to celebrate entering a new millennium with mankind still around. We should all be optimistically anticipating this human milestone, especially those of us with many decades behind us.

Color Manuals.

New Color Tutorial Notebooks.

Approximately 2 months ago, MicroImages began experimenting with shipping 6" by 9" color notebooks with each new **TNT** product. **TNTmips** is accompanied by 2 of these heavy notebooks containing all the Getting Started tutorials printed 2-sided in color. These notebooks contain about 500 pages, are 5" thick, printed on both sides on a Tektronix 840 color printer that uses a resin based "ink". Every one of the 2400 illustrations that are color, which is most of them, are printed in vivid color. Single color notebooks are also shipped with **TNTedit** and **TNTview** products and currently contain 19 and 11 booklets, respectively.

These kinds of extensively color illustrated reference materials are not provided with competing products. However, we believe that these booklets and the examples they contain are much more useful for self-teaching and subsequent reference than the conventional black and white printed manual. These notebooks are printed at MicroImages

in small quantities as required on the Tektronix 840 color printers on 8.5" by 11" bright, high quality paper. They are then sheared, punched, collated, and assembled. It should be obvious from your costs of color printing that these notebooks are expensive, hand-made products that add significantly to the cost of the production of each **TNT** product. Since this is an experiment, the cost and labor of these additional items may not warrant their value and may be discontinued at any time.

These color notebooks match only the version of the **TNT** product with which they are delivered. Our small quantity printing allows them, for the most part, to be kept current with the current product released. For example, every time a booklet is upgraded, it is immediately substituted into all color printing operations.

We hope that once a new client learns the basics of geospatial analysis using their first version of **TNT** products, they have also learned the value of using the latest version of these booklets provided on-line in color with each new release. You can always follow my advice and use Adobe Acrobat Reader to print out 120% enlarged copies of all the booklets and put them next to your **TNT** station in nice notebooks. However, if you wish to buy the most recent set of notebooks, they can be purchased for US\$300 plus shipping. Notebook sets that correspond to any earlier version of a **TNT** product are not available and can no longer be produced.

Color Printing Problems.

Until last week, MicroImages used the highest quality and resolution settings in the Tektronix 840 printer drivers to produce these color notebooks. This printed every gray-scale image in these booklets using all 4 ink colors. There are many menu and dialog boxes that have this gray background. Over time, we have found that these images gradually shift to magenta as each magenta resin dot "flows" out into the white spaces in the dither pattern's color dots. We have found varying rates of deterioration with every one of at least 10 different kinds of inkjet and laser papers we have tried, from the cheapest to the most expensive. Tektronix (just purchased by Xerox) will not respond to our inquiries requesting information about this problem, even though it is being encountered and publicized by other buyers on the Internet. If your set of color booklets is turning somewhat magenta, then this is the problem. We are now printing the color booklets at a somewhat lower resolution where our Tektronix 840 printer driver prints gray areas (areas of equal RGB values) with only black resin. As a result, these gray areas in illustrations in the latest notebooks will not deteriorate to magenta.

A Geoserver is Born.

Some MicroImages staff and I have spent a significant amount of time in bringing forward the **TNTserver** and its first public domain **TNTclient**. As we introduce this product on the Internet, we are naturally checking out the competition. At this point, we are quite pleased with our results. We are grateful to the members of the MERLIN program, managed by the Maryland Department of Natural Resources (MDNR), for helping to start us in this important direction. They have put 10 years of sustained effort into the use of **TNTmips** for preparing the geomaterials they are publishing using the **TNTserver**. The official launch date of the MERLIN geodata server will be 19 November (World GIS day). At this time, MDNR is completely revising the **HyperIndex** structure of the 60 layers making up the 180 gigabytes of geodata in MERLIN. MicroImages is continuing to add the features required to make MERLIN and any **HyperIndex** stack and all the **TNTatlas**-like features operate over the Internet. More

technical details on the status of this new product are listed in a section below entitled **TNTserver**. I plan to send you a separate MicroImages MEMO outlining these new products after 19 November, when V2.00 of the MERLIN **HyperIndex**, the **TNTserver**, and **TNTclient** are officially published and publicized on the Internet.

TNT product Reviews.

This year, *GEOWorld* and its companion publications such as *GEOEurope* et al. began a series of valuable review articles on commercial geospatial analysis products. These articles are designed to acquaint their reader with the currently available products and provide an introduction into what they do. As a result, in aggregate, they deal with the emerging reconstitution and integration of image processing, GIS, GPS, Web Servers, and so on, into the more widely recognized methodology called geospatial analysis. Fortunately, each review has covered **TNTmips** or its brand new companion, **TNTserver**. No other company has products reviewed in all of these interrelated reviews, as they are only now becoming interested in the holistic or system approach to geospatial projects.

Each of these articles has been published in the printed magazines *GEOWorld* and *GEOEurope* as well as in summary form as appropriate in other GEOTEC Media publications, such as *Business Geographics*, *GEO Asia Pacific*, and so on. MicroImages has already provided you references to, summaries of, and comments on, some of these articles in MicroImages MEMOs distributed with previous versions of the **TNT** products. As always, all previous MicroImages MEMOs and illustrations are maintained on-line at www.microimages.com.

Each of these articles is also now available in its entirety in the Internet on-line versions of the appropriate magazines. This is very helpful, as many of you around the world do not have direct access to these publications. MicroImages highly recommends printing out a copy of each of these articles in color or ordering a reprint from this site for detailed review.

Here is a brief reference to each of these articles and its URL address on the Internet:

Image Analysis Products (including **TNTmips** and **TNTlite**):

Image Processing Software: System Selection Depends on User Needs, by W. Fredrick Limp, Director, Center for Advanced Spatial Technologies, 12 Ozark Hall, University of Arkansas, Fayetteville, AR 72701; email: fred@cast.uark.edu. This article appears in the May 1999 issue of *GEOWorld*, pages 36 to 44, in the May 1999 issue of *GEOEurope*, and now at www.geoplance.com/gw/1999/0599/599srev.asp.

The 6 image processing products discussed in this article are **TNTmips 6.0** (including **TNTlite**), ENVI 3.1, ERDAS IMAGINE 8.3.1, ER Mapper 6.0, Image Analyst 7.0, and PCI 6.3.

GIS Analysis Products (including **TNTmips**):

NT-Based GIS Software Is on the Rise. *NT-based GIS packages are abundant in today's marketplace. Here's an overview of the products and features offered by 21 NT-based GIS vendors in North America and Europe.* By Lee A. Graham, Senior GIS/Remote Sensing Specialist, Houston Advanced Research Center, 4800 Forest Research Drive, The Woodlands, TX, 77381; email: lag@harc.edu. This article appeared in the July 1999 issue of *GEOWorld*, pages 34 to 41, the July 1999 issue of *GEOEurope*, and now at www.geoplance.com/gw/1999/0799/799gis.asp.

Choosing a Web server for Geodata (Part 1 including **TNTserver**):

Mapping Hits Warp Speed on the World Wide Web. *Selecting a Web-based mapping software is difficult at best. To help users choose the package that's right for their applications, GEOWorld examines criteria for selecting a Web-based mapping product and assesses how available software "measure up."* By W. Fredrick Limp, Director, Center for Advanced Spatial Technologies, 12 Ozark Hall, University of Arkansas, Fayetteville, AR 72701; email: fred@cast.uark.edu. This article appeared in the September 1999 issue of *GEOWorld*, pages 36 to 44, the October 1999 Issue of *GEOEurope*, and now at www.geoplace.com/gw/1999/0999/999tec.asp.

The 7 geoserver products illustrated in this article are MicrolImages' **TNTserver**, Bentley's ModelServer Discovery, Intergraph's GeoMedia Web Map, ESRI's Web mapping software, Autodesk's MapGuide, MapInfo's MapXtreme, and Caliper's Web mapping product.

Web-based Geoserver Products (Part 2 including **TNTserver**):

The November issue of *GEOWorld* and December issue of *GEOEurope* will complete the 2 part geoserver review by reviewing available commercial products such as the **TNTserver**.

Wavelet Image Compression.

Periodically, MicrolImages receives questions about the potential use of wavelet transformations in the **TNT** products. The following legal posturing and JPEG 2000 information further substantiates that a conservative approach is warranted. The speed of access and management of large rasters in our Project File has proven quite suitable. The new **TNTserver** quite efficiently sends JPEG images over the Internet to the **TNTclient**. Thus, MicrolImages has been able to take a wait-and-see attitude, looking forward to JPEG 2000. It is more appropriate for a technology company such as MicrolImages to concentrate on technology. It also seems prudent not to involve our clients in the use of a licensed technology that might be out-of-date or tied up in legalities. None of us wants to reformat hundreds of gigabytes of rasters.

from http://biz.yahoo.com/prnews/991007wa_lizardt_1.htm

Thursday October 7, 6:48 PM Eastern Time

Company Press Release

SOURCE: LizardTech Inc.

LizardTech Sues Earth Resources Mapping for Patent Infringement

"SEATTLE, Oct. 7 /PRNewswire/—LizardTech Inc. has filed suit against Earth Resources Inc., based in San Diego, Calif., claiming that Earth Resources Mapping's products contain LizardTech patented technology."

"The lawsuit, filed in U.S. District Court in Seattle, alleges that Earth Resources Mapping's ('ERM') image compression software known as 'ECW', which is integrated in ERM's ER Mapper 6.0 geospatial image processing software, infringes on LizardTech's patent for MrSID™ technology. The suit is aimed at enforcing LizardTech's patent rights in the United States, which cover the use of seamless wavelet compression and decompression for raster images. The suit also alleges copyright infringement and breach of contract relating to ERM's unauthorized use of LizardTech's MrSID software, unfair competition claims relating to ERM's dissemination of false and misleading statements about MrSID, and trademark infringement relating to ERM's misuse of LizardTech trademarks such as metatags on ERM's Web site to bait search engines—causing

Internet users looking for information about MrSID to be led to ERM's Web site. Lizard-Tech is seeking unspecified monetary damages and injunctive relief to prevent Earth Resources Mapping from manufacturing, promoting or selling its infringing products and to cease its offending practices."

from http://www.ermapper.com/marktng/prsrel/lizardtech_short.htm

"San Diego, CA—October 14th, 1999, Earth Resources Mapping"

"On October 6, 1999, LizardTech filed a complaint against Earth Resource Mapping (ERM) claiming infringement of a University of California (UC) patent on a tile method of compressing large images used in LizardTech's MrSID product and other allegations."

[Note, University of California now operates the Los Alamos National Laboratories, who developed the UC pending patent application licensed by LizardTech.]

*"The ERM patent-pending Enhanced Compression Wavelet (ECW) invention **does not infringe** on the UC patent used by MrSID."*

"ERM has recently developed and owns technology that utilizes the discrete wavelet transform (DWT) in a novel way to achieve dramatically quick compression of image data with a minimum of processing and RAM resources. Unlike older DWT processes that break images into tiles for compression, ECW performs the DWT on the entire image using a line-by-line pipeline recursive multilevel approach. The ERM method is faster and more efficient, and is the subject of a pending patent application."

"By comparison, the U.S. patent filed in 1995 describes a DWT process that compresses image data much more slowly and with a higher utilization of processing resources. ERM's products utilize a much faster, state-of-the-art, and more efficient technology."

"ERM is confident that it can demonstrate that the allegations are without merit. Furthermore, ERM is applying to the court for a summary judgement to have LizardTech's claim dismissed. The action by LizardTech appears to be a competitive reaction to strong industry support of ECW."

extracts from <http://webreview.com/pub/1999/08/13/feature/index3.html>

JPEG 2000—More Than New Millennium Buzz

by Derrick Story, Aug. 13, 1999

"Highlights of JPEG 2000 format

- *Uses new 'wavelet' technology for improved compression (20% better) and less degradation than current Jpeg's.*
- *Level of interest access—user controls how much resolution to download. Loss-less saves will be possible too.*
- *Increased capacity for color information. Can embed the full ICC profile for accurate rendering across platforms.*
- *Improved metadata capability—information can be added to the metadata blocks without having to rewrite the entire file."*

"The JPEG image format has proven to be one of our most enduring friends. From its conception more than a decade ago, it has provided a means for compressing and moving continuous tone pictures with amazing quality results."

“Technology has changed the face of communications since JPEG’s inception, however. Imaging has become a more valued aspect of our online interactions. Many felt the time had come to revise the JPEG (Joint Photographic Experts Group) format and create a system-oriented standard that’s on par with our text-based technologies. In part that’s the reasoning behind the JPEG 2000 initiative, which is officially called: ISO 15444, the ‘JPEG 2000: Image Coding System’.”

“Since August of 1998, a team within the Digital Imaging Group (DIG) has been developing a rich file format for JPEG 2000. This effort has led to a collaboration between the DIG 2000 and ISO JPEG 2000 working groups. The shared goal of these groups is to standardize a new format that expands our ability to manage and transport continuous tone images without noticeable loss of quality. As you can guess, the JPEG 2000 teams endeavor to provide more compression options, render better pictures and expand functionality while maintaining its current svelte file size.”

“Wavelet technology”

“Wavelet technology is a core strength of the format. The current compression used for JPEG’s, DCT (Discrete Cosine Transformation), compresses the image into 8x8 blocks and places them in the file one after the other. This algorithm discards frequency information in order to achieve compression. The more you compress the image, the more frequency information is discarded. Radical compression leaves only the most important information, which conveys the essentials of the image, but loses much of the subtlety that makes for a pleasing continuous tone image.”

“Wavelet compression on the other hand, converts the image into a series of wavelets that can be stored more efficiently than pixel blocks. Also, wavelets have rough edges that better render pictures by eliminating the square artifacts that are common with DCT compression.”

“The differences between DCT and wavelet compression can be difficult to grasp. To get a better handle, visualize DCT compression as a long wall of blocks. When you compress an image, various square holes are knocked out at one end of the wall. When you push the end of the wall to compress it, many gaps remain that need to be spackled. Sometimes we notice these ugly square spackled patches and call them ‘artifacts’.”

“Wavelet compression, on the other hand creates gaps that have rough uneven edges. When you push one end of the wall, these edges mesh together better creating fewer noticeable gaps. Hardly any spackle is required resulting in a much smoother look.”

“This over-simplified explanation is obviously a little rough around the edges itself. The point is, eliminating artifacts is a good thing—regardless of how it’s done (or explained).”

“Wavelet technology also provides for a continuous download stream of data that allows the user to control the amount of image resolution desired. If this sounds a little like [Kodak’s] FlashPix functionality, you’re right. The primary difference is that FlashPix has distinct levels of resolution and JPEG 2000 is a continuous stream. Designers will have the capability to control how much image resolution they want to make available for download, and end users can decide how much of that resolution they want to use.”

“The function could be enabled in various ways. Designers could incorporate various resolutions into their layouts calling out lower resolutions for overview pages with thumbnails and higher rendering for detailed sections. For users, their image controls could be as elegant as right mouse button clicks on the image to choose various resolu-

tions, or it could be something as simple as hitting the 'stop' button when enough information is displayed in the browser window. Regardless of how the image is ultimately viewed on the screen, the data for all of these various renderings are contained within a single JPEG 2000 file."

"One last resolution note. Image authors will also have the option of saving the picture in lossless format for archival storage. Saving images in different formats (such as TIFF) to meet different needs will no longer be required."

"Improves color handling"

"Rendering color accurately on the Web has also become an important issue. The JPEG 2000 specification includes up to 256 channels of data. This means it opens the door for CMYK (Cyan, Magenta, Yellow and black—typical model for offset printing) descriptions and full ICC (International Color Consortium) color profiles that will help to ensure consistent display across platforms."

"Another innovation is that a new standard, 'sRGB' will be the default colorspace for this format. In the current JPEG standard, there is no notion of default colorspace. This lack of precision contributes to inconsistent JPEG color rendering. For JPEG 2000, all nonspecified RGB color will be assumed to be sRGB. And specified colors, such as an ICC profiles, will override the sRGB default when present. Either way, color becomes more accurate because it is always being defined by a standard."

"Speaking of ICC color profiles: We discussed them extensively in our last issue of Web Review on color calibration. As you may remember, by embedding these profiles in JPEG 2000 format data, your monitor and printer can interpret downloaded files correctly and render the image as it was intended by the author. You can create a profile for any device, and many devices now include profiles in the bundled software."

"Expanded metadata capacity"

"Distinguishing between various types of file data is a dangerous hobby. For example, the JPEG file itself is nothing more than data. But in addition to the actual image data, something needs to be in place to describe the file to the device reading it. We call that metadata, and yes, it's data that describes other data."

"That being said, you can begin to see how important accurate file descriptions are for images. The JPEG 2000 format contains a vast improvement in metadata management. We've already mentioned that ICC color information can be included, but other details can be included as well. For example, the type of digital camera used to record the image can be included in the metadata. If that information is important to your display or output device, it can make additional requests for things such as exposure or white balance settings. A capable metadata catalog can efficiently manage a multitude of these types of requests."

"The JPEG 2000 standard for metadata also provides for extensibility of the metadata properties. In other words, new functionality can be added without having to rewrite the standard. And speaking of adding information, the metadata catalog can be modified without having to rewrite the entire image file. These abilities make for a very nimble, adaptable image file format."

[It will be logical to use these features to develop a GeoJPEG 2000 format.]

"Will JPEG 2000 happen in the year 2000?"

"The ISO group that is developing the JPEG family of imaging coding standards is ISO/IEC JTC1/SC29/WG1, and they will be meeting in December to finalize the basic

standards. If all goes as planned, the official schedule for implementation will be released in January 2000. As these events occur, you'll begin to hear more news about JPEG 2000 format."

"As we all know, releasing a schedule does not equal implementation. There are many hoops to jump through including unified browser support. But like our old friend, the current JPEG, if you get it right, it could be around for very long time. Let's hope they get it right."

[For more information on the activities of the JPEG 2000 Initiative, see www.jpeg.org.]

AUW11

As previously announced, AUW11 will be held in Lincoln the first week in February (1 to 4 February 2000). Another copy of this announcement you have already received is being mailed to you.

MI/X (Microlimages' X Server)

New Features.

MI/X 2.0 for W95, W98, and NT has replaced the earlier version distributed with **V6.10** of the **TNT** products. It contains several new features. The most obvious is the much improved method dialogs added to control its setup as an X-server and particularly when it is being used for remote access to a **TNT** product or some other software.

Version 2.00 of **MI/X** for Windows products contains the following new features:

- Supports shape extensions
- Moves **MI/X** preferences from Setup/Preferences/**MI/X** directly into **MI/X**
- Shows IP address in "About..." box
- Creates install system using InstallShield and adds an "uninstall" feature
- Sets up new download system that uses a single easy download via a zip or self extracting executable
- Creates a version numbering system
- Adds copy protection via FlexIm
- When downloaded, allows a test period of 15 days before payment required (Continued use after 15 days requires purchase of an authorization code.)

No Longer Free.

Effective with the release of **MI/X 2.0** at \$25 to replace **MI/X 1.0**, which was free, downloads of the 15-day trial version decreased from an average of 8000 per month to 6000. As yet, only a small fraction of those testing **MI/X 2.0** are moving on to purchase it at this very low cost. It will take time and the addition of new features to penetrate the world-wide successful use of hundreds of thousands of users of the free version of **MI/X 1.0**.

One unexpected consequence of the release of the new "not-free" version was the realization that many organizations were downloading **MI/X** once and spreading and using it across whole organizations. This site-wide penetration was unknown to Microlimages, as few take time to describe how they are using a free product. However, after **V2.00** was released, organizations began to call about our site license cost for 1000s of users. For example, IBM has requested a quote for an unlimited, corporate-wide license, while a university asked about a campus-wide license ranging up to 5000 units to replace the

current campus-wide use of **MI/X**. This university said it has students use X rather than a browser, as it made its campus computers much less vulnerable to hacking. To date, these are only inquiries, and even with the low quotes provided, they may find that they can get along well enough for the time being continuing to use **MI/X 1.0**. However, several low volume multiple unit floating site licenses of **MI/X 2.0** have been sold. These site-wide uses of **MI/X** may indicate that similar wider use of **TNTlite** may be taking place than the actual direct distribution and download numbers indicate.

TNTsdk[®] 6.2

The use of **TNTsdk** has been growing in popularity. A number of groups are regularly requesting assistance developing applications.

The following C++ compilers are used for **V6.20** of the **TNT** products and were the same as those used for **V6.10**:

Windows 95 (with Intel)	use Microsoft Visual C++ 6.0
Windows NT (with Intel)	use Microsoft Visual C++ 6.0
Windows NT (with Alpha)	use Microsoft Visual C++ 6.0
UNIX platforms	use latest version of C++ from GNU
Mac (with PPC)	use Code Warrior Professional 4.0

TNTlite[®] 6.2

Workbooks.

Introductory Course.

Dr. Jack Paris has revised and reorganized his **TNTmips Project Workbook: From Start to Finish** to be concurrent with **V6.20** of the **TNT** products. This illustrated workbook has 170 pages and 37 sections. It is designed to be used in an introductory course in Applied GIS, GPS, and Remote Sensing taught at the Sophomore/Junior level in a university. It is supplied with a CD containing all the geodata needed to work all its exercises within **TNTlite**. Each exercise refers the student or self learner to the appropriate Getting Started tutorial booklet for additional exercises and materials on each topic. This workbook and CD, **TNTlite**, and the tutorial booklets provide the basis for teaching a state-of-the-art academic course in geospatial analysis that integrates these technologies or to conduct a self-taught activity in this area. A flier is enclosed that you can use to order this workbook directly from its author for US\$45.

Advanced Course.

Dr. Jack Paris has committed to writing another workbook to be used in a second, follow-up course. His early publicity indicates that it *“will focus on such advanced topics as quantitative multispectral data analysis, analysis of multitemporal data, use of soils data with the watershed process outputs to model erosion in a watershed, RADAR data analysis, and hyperspectral analysis. This advanced workbook will also deal with the processing steps necessary to prepare data for users who are dealing with other geospatial software packages.”* If you are interested in this additional workbook, when you order the current workbook, please ask Jack to place your name on his list for future information on its availability.

Image Analysis in Geology.

The 3rd edition of Dr. Steve Drury's popular hardcover book entitled Image Interpretation in Geology is on schedule for publication in early 2000 by Blackwell. As with previous editions, it is designed as a textbook for the many introductory courses taught around the world with his 2nd edition. However, with the rising popularity of digital image interpretation, the 3rd edition will include extensive new material on this topic. It will also provide the basis for the laboratory or home assignments for the course by providing at least 12 exercises to be completed in **TNTlite**. As a result, it will be shipped with a CD containing **TNTlite** and the special geodata sets Steve has prepared for use in each of his exercises.

Distribution.

Downloads so far this year exceed those of 1997 (the first complete year for downloading **TNTlite**) by approximately 10 times and those of 1998 by 4 times. The breakdown of this distribution is about 5% for the Mac, 5% for LINUX, 1% for all the UNIXes, and the remainder for W95, W98, and NT. These downloads went all over the world except for some nations in East Africa, former USSR states, and island nations. This accelerating use of **TNTlite** is attributed to your assistance in spreading the word, the increased availability of the tutorial booklets, and increased publicity on the Internet and in magazines.

In addition to the above free downloads, another large group of **TNTlite 6.1** CDs were sold by MicroImages directly or purchased and distributed by authorized dealers. An approximately equal number were distributed for **V6.00**.

MicroImages' recent experiences with beginning to sell the previously free **MI/X 2.0** product (see above) indicate that there may also be a significant multiplier at work, where a single CD or download can be shared among several or many users. It is simple enough to pass a CD around to friends or to place **TNTlite** on a LAN for easy transfer with instructions on how to install it. But, accounting for only direct distribution, at the present pace, about 7500 individuals give **TNTlite** a try per year.

The price of the **TNTlite** kit containing the CD and printed versions of all 50 booklets (~1000 pages and ~2500 illustrations) is now increased from US\$60 to US\$75, which includes shipping by airmail in the United States and DHL express anywhere else in the world.

TNTatlas[®] 6.2

Connections to Other Applications.

A **HyperIndex** stack can now be linked to many other applications. When setting up your links, you can now navigate to and choose some other kind of datafile or program (such as DOC, PDF, MPG, ...). You can provide a link to a DOC file used by Microsoft Word. When that area of the **HyperIndex** view is selected, that link will function just as if you selected that Word file with the mouse, and the document will open Word. You can then do what you wish within this new application. When you are finished and that application is closed, you will re-enter the **HyperIndex** stack and current view just where you left it. Links can be made to Adobe Acrobat Reader files containing maps or reports. Links can be made to start MPEG movies of specific positions in the current **HyperIndex** view. The simplest kind of application of this new feature might be to link hundreds of land leases to their respective geographic positions on an image. No boundaries need to show or vectors overlaid unless desired. Simply select an area, and the link to the software product used to create the lease will open for viewing and/or modifying the lease.

Remember, an atlas distributed on CD that has such links assumes that these other software products are available and installed. Fortunately, there are free viewers available for most popular products' data files. There are free runtime versions of Word (DOC), Acrobat Reader (PDF), many movie viewers (MPG), and many other products available that could be installed along with any **TNTatlas**. This is just the same as your option to install the free Adobe Acrobat Reader 4.0 from the **V6.20** CDs so that every **TNT** product can directly access and view the color Getting Started tutorial booklets.

Connections to URLs.

A **HyperIndex** stack can also be linked directly to Internet URLs (Uniform Resource Locators). When the **HyperIndex** accesses this link and the browser can be located, it starts a new window and connects to the designated site. URLs can also be set up to communicate control information to a site designed to receive it. These are the long, extended URLs you often see that penetrate into a specific location at a site and supply it with a specific request (for example, a request for a quote on particular stocks). Using this new feature, either a desktop user of a **HyperIndex** stack via **TNTatlas** or a user on a network using **TNTserver** can now connect to and conduct many other kinds of activities. The simplest example might be linking to a site with the current weather RADAR image of a specific location on the image viewed, filling a shopping basket to order the objects from sample images and maps in the **HyperIndex**, recording data into a form at another location, and many, many more. **HyperIndex** used via **TNTatlas** or **TNTserver** simply provides a geographic index or "front end" to many other kinds of activities that would start by directly locating the area of interest.

Assembly Wizard.

Widening Use.

Publishing a **TNTatlas** is a unique feature of the **TNT** products. No other competing commercial product offers this capability for freely distributing geographically linked materials in a navigable atlas structure. Recently, many more clients have become interested in publishing their own **HyperIndex** stacks on CD for limited distribution with the

free **TNTAtlas** process. Large amounts of georeferenced images and maps have now been prepared with **TNTmips** or other systems, and these now provide the basis for publishing unique atlases in the form of **HyperIndex** stacks. Low-cost CDR devices are finally available worldwide at prices ranging from US\$100 to \$200. Also, the latest line of Hewlett-Packard Pentium-based desktop computers priced from \$800 to \$1600 all contain standard, built-in CDR drives. Blank CDR media is now available from discount stores at less than US\$1 each, and the price is rapidly declining due to mass consumption.

Bringing Components Together.

It is easy to prepare a **HyperIndex** stack to make up an atlas once the geodata are available. It is also easy to use this CD or hard drive-based **HyperIndex** stack on a **TNT** equipped platform or by manually installing the **TNTAtlas** software onto a platform. Prior to **V6.20**, it was not easy to get all the components of this stack, the **TNTAtlas**, and the installation programs assembled onto a CD for mass production. A number of steps were required to assemble a complete, self-contained, CD-based **TNTAtlas** with all the required geodata, programs, and installation files. Simply transferring the **HyperIndex** stack to the CD may not be so simple, because when it is being used from a hard drive, it can be made up of Project Files that are scattered all over the local drives or network file servers.

A new process has been added into **TNTmips** to assist you in publishing your complete **TNTAtlas** on CD. It is found at Support/**TNTAtlas** and uses a Wizard approach to guide you through the steps of producing your temporary master of a **TNTAtlas** on some read/write media such as a removable or fixed hard drive. After this master is assembled, all that remains is to copy it to a CDR master for the stamping plant or to as many individual CDRs as needed.

The step-by-step use of this new process is described in detail in an enclosed MEMO entitled Producing a Distributable **TNTAtlas**. Subsequently, this MEMO will be integrated into the Getting Started tutorial booklet series. As you proceed through this new process, it will assist you in verifying that your **HyperIndex** structure is complete by tracing out all the geolinks and identifying any objects that are missing. It will assist you in the location and selection of all the files needed to assemble the stand-alone version of the **TNTAtlas** process. Next, it will help you select the program(s) to be placed on the CDR to install or to run the **TNTAtlas** and associated **HyperIndex** stack(s) from the CDR or mass-produced CD. Finally, the process will copy all these geodata and program files to your designated master cartridge or hard drive as an exact copy of what will be transferred to CDR. When completed, all you need to do is use your CDR support software to transfer the contents of this temporary drive to your blank CDR.

Validating Connections.

Only **HyperIndex** stacks published with the **TNTAtlas** process on CDs are restricted to the capacity of the CD. Hard drive-based **HyperIndex** stacks can be any size, with the actual geodata scattered across many Project Files, local drives, networked file servers, and even the Internet. If you are assembling a **HyperIndex** for use directly, over a private LAN, via a virtual private network (VPN), or on the Internet, it can be any size. Interconnected **HyperIndex** stacks that have already been assembled for use with the **TNTserver** range up to 180 gigabytes. Under these circumstances, it is very difficult to manually check every link to make sure it is still connected to a valid object. Linked files

get moved or deleted, object or Project Files are inadvertently renamed, or the **HyperIndex** chain gets broken for other reasons. The validation feature in this new wizard process can be used at any time to trace through any **HyperIndex** stack and identify any broken links and missing parts.

Direct Internet Use.

The **HyperIndex** structure now has even wider appeal as it can also be used to publish the same stack without alteration for public access on the Internet using a **TNTserver**. **V2.00** of the **TNTserver** and the **TNTclient** will be finished by 15 November and will provide the same functionality when used with a **HyperIndex** stack as the current stand-alone free **TNTatlas** process: similar navigation, measurement tools, metadata, legends, multiple levels, and so on (see subsequent section on the **TNTserver**). A **HyperIndex** published with **TNTatlas** on a CDR requires no alterations for Internet publication via a **TNTserver**. The reverse is not true for use with the **TNTclient/TNTserver**, as the Project Files do not need to be all together on a single storage media. This is just the same as if you are using an installed version of the **TNTatlas** process to access a **HyperIndex** on your desktop machine or network.

Other Changes.

Almost everything added this semester to **TNTmips** and the other **TNT** products also improves the utility of the **HyperIndex** stack and therefore its use in the free **TNTatlas**. This ranges all the way from the support of hot keys and dual monitors in display to the improvements in the **TNTclient** and **TNTserver** to provide interchangeable **HyperIndex** stacks among various distribution media. All these new features are explained in detailed descriptions provided in the **TNTmips** New Features section below and in the attached color plates. These improvements include:

- dual or multiple monitor support
- many new datums
- new coordinate systems—especially the Military Grid Reference System
- concatenation of repeated style entries in LegendView
- use of any attribute, including computed fields as a legend label

Installed Sizes.

Loading **TNTatlas 6.2** processes onto your hard drive (exclusive of any other products, data sets, illustrations, Word files, and so on) requires the following storage space in megabytes.

	<u>for V6.10</u>	<u>for V6.20</u>
PC using W95, W98, or NT	23 MB	23 MB
PC using LINUX (with Intel) kernels prior to 2.0.36	24 MB	25 MB
PC using LINUX (with Intel) kernel 2.0.36	22 MB	23 MB
DEC using NT (with Alpha)	23 MB	29 MB
Mac using MacOS 8.x	40 MB**	42 MB**
Hewlett Packard workstation using HPUX	23 MB	32 MB
SGI workstation via IRIX	27 MB	28 MB
Sun workstation via Solaris 2.x	23 MB	24 MB
IBM workstation via AIX 4.x (with PPC)	25 MB	26 MB
DEC workstation via Tru64 UNIX (with Alpha)	26 MB	27 MB

** The Mac installed size includes the JAPAN1.OF font of 10.4 MB that is automatically installed. Delete this font if you do not require the use of Japanese.

TNTview[®] 6.2

TNTview has begun to grow in popularity because wherever it is given a chance, it proves to be a more complete product than ArcView or MapInfo. Those who say they use ArcView to provide the same features are actually ending up with the much more expensive combination of ArcView, Spatial Analyst, Image Analyst, 3D Analyst, and some GPS add-on.

Changes.

Almost everything added this semester to **TNTmips** also directly benefits **TNTview**. These improvements are detailed below as new **TNTmips** features and include:

- new object selection dialogs
- many new datums
- new coordinate systems—especially the Military Grid Reference System
- concatenation of repeated style entries in LegendView
- use of any attribute including computed fields as labels in LegendView
- additional file import formats

*** Modifications since V6.20 CDs.**

There have been many requests in the past to hide some features from initial users of **TNTview** who would, based upon their backgrounds and limited experience with geo-spatial analysis, be intimidated by the feature-rich **TNTview**. The display and other windows in **TNTview** can now be immediately customized by anyone. The same modifications that can be made in these **TNTview** functions can also be made in all the other **TNT** products as well, as they all share the same processes. These modifications to **TNTview** were made after the **V6.20** CDs were duplicated and are available for downloading and will be released in **V6.30** where they will be explained in more detail.

The procedure uses a setup file and control window, and each icon in the top menu bar of the display and other processes can be hidden. Additional features in other windows can be controlled. For example, in the Select Object window, only the raster object icon can be shown if the user is only going to be using rasters. Furthermore, when this icon is selected, all raster choices except the types of rasters to be processed (for example, single rasters—gray scale or color composite) can be hidden. Hiding features in this way does not delete the process from the generic **TNTview** that has been installed. It merely creates a reference file to determine which features the user requires and has access to. Think of it as a series of reference files. One is the locked factory default that provides all the possible features. It can always be restored if the user is allowed to do so. Another is the locked file that specifies how the organization delivers and wants its staff members to see and use **TNTview**. Finally, it is possible to allow the user to create a temporary file with features of their own choice.

Upgrading.

If you did not order **V6.20** of **TNTview** and wish to do so now, please contact MicroImages by FAX, phone, or email to arrange to purchase this upgrade or annual maintenance. Entering an authorization code when running the installation process allows you to complete the installation and immediately start to use **TNTview 6.2** and the other **TNT** professional products it provides to you.

If you do not have annual maintenance for **TNTview**, you can upgrade to **V6.20** via the elective upgrade plan at the cost in the tables below. Please remember that new fea-

tures have been added to **TNTview** with each new release. Thus, the older your current version of **TNTview** relative to **V6.20**, the higher your upgrade cost will be.

Within the NAFTA point-of-use area (Canada, U.S., and Mexico) and with shipping by UPS ground. (+50/each means \$50 for each additional upgrade increment.)

<u>TNTview Product</u>	<u>Price to upgrade from TNTview:</u>					<u>V5.60</u> and earlier
	V6.10	V6.00	V5.90	V5.80	V5.70	
Windows/Mac/LINUX	\$175	275	400	500	555	+50/each
DEC/Alpha via NT	\$250	350	500	600	700	+50/each
UNIX single user	\$300	475	600	675	725	+50/each

For a point-of-use in all other nations with shipping by air express. (+50/each means \$50 for each additional upgrade increment.)

<u>TNTview Product</u>	<u>Price to upgrade from TNTview:</u>					<u>V5.60</u> and earlier
	V6.10	V6.00	V5.90	V5.80	V5.70	
Windows/Mac/LINUX	\$240	365	465	545	605	+50/each
DEC/Alpha via NT	\$300	450	550	650	750	+50/each
UNIX single user	\$350	550	700	800	850	+50/each

Installed Sizes.

Loading **TNTview 6.2** processes onto your hard drive (exclusive of any other products, data sets, illustrations, Word files, and so on) requires the following storage space in megabytes.

	<u>for V6.10</u>	<u>for V6.20</u>
PC using W95, W98, or NT	36 MB*	30 MB*
PC using LINUX (with Intel) kernels prior to 2.0.36	36 MB	28 MB
PC using LINUX (with Intel) kernel 2.0.36	31 MB	25 MB
DEC using NT (with Alpha)	31 MB	29 MB
Mac using MacOS 8.x	45 MB**	44 MB**
Hewlett Packard workstation using HPUX	35 MB	36 MB
SGI workstation via IRIX	44 MB	31 MB
Sun workstation via Solaris 2.x	32 MB	26 MB
IBM workstation via AIX 4.x (with PPC)	38 MB	29 MB
DEC workstation via Tru64 UNIX (with Alpha)	40 MB	30 MB

* W95, W98, and WNT installed size also includes the native **SML 6.2** interpreter for Windows.

** The Mac installed size includes the JAPAN1.OF font of 10.4 MB that is automatically installed. Delete this font if you do not require the use of Japanese.

TNTedit™ 6.2

Changes.

No special changes were made to **TNTedit**. However, almost everything added this semester to **TNTmips** also directly benefits **TNTedit**. These improvements are detailed below as new **TNTmips** features and include:

- new object selection dialogs
- many new datums
- new coordinate systems—especially the Military Grid Reference System
- concatenation of repeated style entries in LegendView

- use of any attribute, including computed fields as a legend label
- additional file import formats

Upgrading.

If you did not order **V6.20** of **TNTedit** and wish to do so now, please contact MicroImages by FAX, phone, or email to arrange to purchase this upgrade or annual maintenance. Entering an authorization code when running the installation process allows you to complete the installation and immediately start to use **TNTedit 6.2** and the other **TNT** professional products it provides to you.

If you do not have annual maintenance for **TNTedit**, you can upgrade to **V6.20** via the elective upgrade plan at the cost in the tables below. Please remember that new features have been added to **TNTedit** with each new release. Thus, the older your current version of **TNTedit** relative to **V6.20**, the higher your upgrade cost will be.

Within the NAFTA point-of-use area (Canada, U.S., and Mexico) and with shipping by UPS ground.

<u>TNTedit Product</u>	<u>Price to upgrade from TNTedit:</u>			
	V6.10	V6.00	V5.90	V5.80
Windows/Mac/LINUX	\$350	550	700	800
DEC/Alpha using NT	\$500	750	950	1100
UNIX single user	\$650	1000	1350	1600

For a point-of-use in all other nations with shipping by air express.

<u>TNTedit Product</u>	<u>Price to upgrade from TNTedit:</u>			
	V6.10	V6.00	V5.90	V5.80
Windows/Mac/LINUX	\$500	750	950	1100
DEC/Alpha using NT	\$600	900	1150	1400
UNIX single user	\$750	1200	1550	1850

Installed Sizes.

Loading **TNTedit 6.2** processes onto your hard drive (exclusive of any other products, data sets, illustrations, Word files, and so on) requires the following storage space in megabytes.

	<u>for V6.10</u>	<u>for V6.20</u>
PC using W95, W98, or NT	56 MB*	47 MB*
PC using LINUX (with Intel) kernels prior to 2.0.36	59 MB	53 MB
PC using LINUX (with Intel) kernel 2.0.36	50 MB	45 MB
DEC using NT (with Alpha)	51 MB	50 MB
Mac using MacOS 8.x	55 MB**	55 MB**
Hewlett Packard workstation using HPUX	57 MB	76 MB
SGI workstation via IRIX	74 MB	62 MB
Sun workstation via Solaris 2.x	51 MB	46 MB
IBM workstation via AIX 4.x (with PPC)	64 MB	56 MB
DEC workstation via Tru64 UNIX (with Alpha)	68 MB	59 MB

* W95, W98, and WNT installation size also includes the native **SML 6.2** interpreter for Windows.

** The Mac installed size includes the JAPAN1.OF font of 10.4 MB that is automatically installed. Delete this font if you do not require the use of Japanese.

Getting Started Booklets

All Booklets. [50 booklets on **V6.20** CD]

The following booklets are provided on the **V6.20** CD and can be installed for use in Adobe Acrobat Reader PDF format. Using them on-line in Adobe Acrobat 3.x or 4.x will provide good quality access to the 2477 color illustrations they contain. They can also be downloaded in either Adobe Acrobat Reader PDF or PageMaker formats from <http://www/microimages.com/getstart/>.

Introduction to GIS	Georeferencing
Navigating	Theme Mapping
Displaying Geospatial Data	Mosaicking Raster Geodata
Feature Mapping	Making Map Layouts
Operating the 3D Simulator	3D Perspective Visualization
Editing Vector Geodata	Image Classification
Editing Raster Geodata	Surface Modeling
Editing CAD Geodata	Filtering Images
Editing TIN Geodata	Getting Good Color
Importing Geodata	Building and Using Queries
Exporting Geodata	Creating and Using Styles
Combining Rasters	Sketching and Measuring
Interactive Region Analysis	Pin Mapping
Vector Analysis Operations	Network Analysis
Managing Relational Databases	Making DEMs and Orthoimages
Rectifying Images	Using CartoScripts
Spatial Manipulation Language	Using Geospatial Formulas
Digitizing Soil Maps	Managing Geoattributes
Introduction to Map Projections	Changing Languages (Localization)
Introduction to Hyperspectral Imaging	Analyzing Hyperspectral Images
Acquiring Geodata	Constructing a HyperIndex
TNT Technical Characteristics	Introduction to TNTlite
UNIX: Installation and Setup Guide	Macintosh: Installation and Setup Guide
Windows 3.1: Optimizing Windows 3.1x	Style Manual
Windows 3.1x, 95/98, and NT: Installation and Setup Guide	
Sharing Geodata with other Popular Products	

New **V6.20** Booklets. [2 new booklets added to **V6.20** CD, total now 50]

Included in the above list are the following 2 new booklets.

Operating the 3D Simulator	Introduction to GIS (completed)
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Updated Booklets. [50 units]

It took 2.5 years to complete the important core group of the Getting Started tutorial booklets. Unfortunately, during that time period, the updating of the previously completed booklets could not be addressed, and MicroImages had to ignore this and proceed onward to create important new booklets. This decision was based upon the assumption that a somewhat out-of-date booklet was better than no booklet at all.

Checking Booklets. Concurrent with the shipment of **V6.10**, the important Getting Started Booklets existed. Thus, the 3 professional writers (Dr. Merri Skrdla, Dr. Randall Smith, and Keith Ghormley) who created all the Getting Started tutorials reviewed, up-

dated, and sometimes expanded the booklets they had written. This was done near the end of the preparation cycle for **V6.20** to catch all the previous and new revisions for this release.

As a check on the update activities, a 15 year old high school student was employed to go through each older or revised booklet if it was available. In 6 weeks, he completed the exercises in the booklets with some help from MicrolImages' software support staff and identified discrepancies between the booklets and the corresponding processes. Of course, he also found errors in the software, which he reported and which were corrected. All software has errors, it is how they get fixed that really counts.

This is an exceptional student who had no trouble dealing with the concepts and tutorials involved. However, he had little previous or life experience of how or where these procedures might be used. Even then, as an independent project, he was able to apply **TNTmips** to preparing a layout for a map for a high school freshman Spanish class. His results are attached as a color plate entitled Relative Hispanic Population by County. He was also able, after this exercise, to converse fluently about **TNTmips** and geospatial concepts and how they could be applied to other complicated hypothetical projects.

Training New Staff. The above student experiment indicates how an organization should proceed with a new technician or professional hired initially to operate **TNTmips**. This experiment, and similar experiences reported by other clients, establish that the operation of most of **TNTmips** can be learned directly from these tutorial booklets by an intelligent motivated person with a little outside help and the time to do so. This procedure works well if they have no prior experience with GIS, image processing, GPS, or **TNT**.

If your new hire has already operated some other GIS or image processing "piecemeal" products and projects, the procedure is the same but requires even more management discipline and control. Indeed, it may go faster if the new hire is already familiar with the concepts of raster, vector, RDBMS, TIN, and so on. However, it is often easier to deal with someone who has no prior experience but a good professional grounding in the application area(s) to be addressed. Without careful guidance and control, the new hire experienced with a suite of other products tends to spend the 6 weeks hunting for how to do something in a random manner, rather than proceeding to learn how it is done in **TNTmips** by conscientiously going through the tutorials in a logical order.

Getting new, bright people to operate **TNTmips** and contribute to ongoing projects now requires only that management be willing to allocate approximately the first 6 full-time weeks of uninterrupted time, general guidance, and motivation to learn geospatial analysis. MicrolImages and other clients have found that it works best to control the process by having a chart or spreadsheet set up at the onset of the self-training period, showing the booklets to be covered and the order. The trainee is required to keep this chart up-to-date daily, post it in a public area (management by peer pressure), and is verbally quizzed once a week in a conversational mode to see that the chart is being accurately maintained. They should also be encouraged to ask others in the office or MicrolImages if they get stuck or if errors occur. MicrolImages operates its free software support on the premise that "the only dumb support question is the one that is not asked". And, of course, after these 6 weeks are over, management must also know or have vicariously learned enough about **TNTmips** to assign and guide the newcomer to accomplish meaningful projects.

Out-of-Date Booklets. [4 units]

All but 4 of the 50 tutorial booklets on the **V6.20** CDs were current when the **V6.20** CDs were shipped to the duplication plant. The following 4 booklets were updated after the **V6.20** CDs were reproduced.

- Managing Geoattributes
- Managing Relational Databases
- Constructing a **HyperIndex**
- Feature Mapping

Please download these 4 in PDF format from <http://www.microimages.com/getstart/> to replace these 4 booklets installed from your CD.

Possible Future Booklets. [20 possible units]

New booklets will now be coming at a slower rate, as priority will be given to maintaining the currentness of the existing booklets. This is a major task when the **TNT** products experience major alterations in the interface (for example, LegendView, Layer Control panel, Select Object dialog, and so on). However, MicroImages plans that as many as 3 new booklets could be issued in each future semester.

High Priority. [5 possible units]

- Integrating with a GPS Unit
- Watersheds and Viewsheds
- Developing an Enterprise-Wide Capability for Geospatial Analysis: MERLIN as a Case Study
- Introduction to Remote Sensing
- Introduction to **TNTserver**

Lower Priority. [15 possible units]

- Enterprise Installations
- Surface Analysis Operations
- Using the Electronic Manual
- Using the Software Development Kit
- Introduction to APPLIDATs
- Introduction to Hazard Modeling
- Introduction to RADAR Interpretation
- Introduction to Digital Photointerpretation
- Introduction to Automatic Mosaicking via GGR
- Introduction to PseudoDOQs from 35 mm Slides
- Introduction to Creating Management Zones for Precision Farming
- Scanning
- Vectorizing Scans/Rasters
- Extracting Geodata
- COGO

On-Line Reference Manual

Status.

The Reference Manual this quarter has 2539 single spaced pages distributed as follows:

• Basic System Operations	197 pages	• Display	731 pages
• Edit	291 pages	• Process	1115 pages
• Support	90 pages	• Glossary	94 pages
• Appendix	21 pages		2539 total

The HTML version of the Reference Manual installs into 35 MB with the illustrations or into 7 MB without them. The Microsoft Word version of the Manual is 68 MB. Last minute supplemental sections that do not occur in the on-line HTML version or Microsoft Word version were created for new processes and features. These sections were completed for **V6.20** after the master CDs were created for the reproduction process. These 8 additional pages are included in supplemental, printed form as follows.

- CAD Snapshot (2 pages)
- Merging TIN Objects (2 pages)
- Combining Database Tables (4 pages)

On-Line Help

On-line quick help is now provided throughout the **TNT** processes using the Help system introduced in **V6.10**. If the help text were printed out, it would yield about 152 single spaced pages. This context sensitive help can now also be linked into the HTML-based on-line reference manual, the Getting Started PDF booklets—including starting the Adobe Acrobat Reader, or any other file, and open its application.

New TNT Features

* Paragraphs or main sections preceded by this symbol “*” introduce significant new processes or features in existing processes released for the first time in **TNTmips 6.2**.

System Level Changes.

*** Dual Monitors.**

Can I use them?

Any **TNT** product can now be used with dual (or more) monitors. A modification has been made to all licenses so that **TNTmips** will operate across multiple monitors (**TNTedit**, **TNTview**, and **TNTatlas** already operated on multiple monitors). This applies automatically to W98 and Mac-based platforms. The Mac platform has supported the spanning of multiple monitors for years. W98 provides support for multiple monitors via its display drivers. W95 does not provide such a feature and never will. NT4.0 does not support multiple monitors but W2000 (alias NT5.0) does. UNIX and LINUX platforms can also be used with dual monitors if they have an appropriate X server and display board setup.

There is one limitation still imposed on **TNTmips** by the license level you purchased for W98 and W2000. When using dual or multiple monitors, the display resolution must be set to the size permitted by your license (**D35**, **D40**, **D45**, **D50**, or **D60**). For example, if your **TNTmips** license permits maximum operation at 1024 by 768 pixels (a **D40** product), then you must set the display resolution of each monitor in Windows to 1024 by

768 pixels. This would provide an effective display area for **TNTmips** of 2048 by 768 and greatly increase your productivity. However, if you set up W98 or W2000 to operate any of the monitors at larger than 1024 by 768 pixels, **TNTmips** will operate on only that monitor. **TNTmips** for the Mac, for a **D60** level for W98 or W2000, LINUX, or UNIX can be used at any display resolution spanning multiple monitors. **TNTedit**, **TNTview**, and **TNTatlas** can now also be used on any platform supported at any display resolution spanning multiple monitors.

Why add this feature?

You will be very surprised at how much more productive the **TNT** products and other products are when operated on dual monitors. When W98 was first introduced with this feature 2 years ago, it was expensive to acquire the needed equipment: dual boards, dual monitors, more memory, and a faster processor to make it all work. Today, all of these financial impediments are significantly reduced.

Processor/Memory. Typically, the use of dual display leads to the simultaneous operation of several software products. Similarly, a **TNT** product needs a lot of display area and processing horsepower. These are now available.

Monitors. 17" monitors are commonly used with **TNTmips**. They are now inexpensive at an average of about \$250 each. Today, 2 can be purchased for the same price as 1 when W98 was released with this feature.

Display Boards. Appropriate, inexpensive dual display boards are the final and most recent development. Boards are now available that can support this dual monitor concept at a very low price. Several years ago, high resolution, fast boards that could be used in tandem ranged from \$1000 to \$2000 each. Today, a single display board can handle 2 monitors for \$200. An alternative is to purchase 2 inexpensive display boards. It is important to make sure before buying them that the 2 boards selected will work together. Many display boards will not work if matched in tandem with a duplicate board or where 2 different boards require a fixed memory address that cannot be altered.

MicrolImages was prompted to permit wider dual display use at no additional cost by the release of a specific new display board. Namely, the Matrox G400 that is now shipping for the video game industry. There is one variant of this G400 for \$200 that has 2 connectors for 2 display monitors on the single board. Since it is a video game board, it has a very fast display processor and 32 MB of on-board memory (AGP bus only). It comes with Windows drivers that span both monitors at varying resolutions of up to 1280 by 1024 by 24-bit color each. Thus, for \$200 for the board and \$500 for a pair of matched 17" monitors or \$700 for 2 of the newest SONY 17" matched monitors, you can double or triple your productivity. More technical details on this Matrox product can be found at http://www.matrox.com/mga/products/mill_g400/features.htm.

Map Projections and Coordinate Systems.

More Accurate Datums. The datum transformation used in the **TNT** products in **V6.10** and earlier has been acceptable to most clients. However, 1 meter satellite images, 1 foot resolution color orthophotos, geolocated building plans, local use of GIS anywhere in the world, and other site-specific applications of geospatial analysis require increased accuracy in such areas as datum transformation. **V6.20** provides higher accuracy datum transformation by implementing the 7-parameter Bursa-Wolfe or "Similarity" transformation for all datums supported in the **TNT** products. Fortunately, the United States National Image and Map Agency (NIMA) just published these parameters as well as

many new and revised datums (see below). You can obtain a copy of this information on these datums and transformations from www.nima.mil where you should choose "Maps and Geodata". This page has several "geodesy" links to various documents containing lots of information about datums.

Additional Datums. The following additional datums are supported in **V6.20** of the **TNT** products.

European 1987 (North Sea)	Samboja (Indonesia)
Pulkova 1942 (Eastern Europe, Russia)	NTF (France)
Potsdam Rauenberg (Germany)	KKJ (Finland)
Amersfoort (Netherlands)	Camacupa (Angola offshore)
Moznet (Mozambique)	RT90 (Sweden)
DHDN (Western Germany)	Hungarian 1972 (Hungary)
Indonesian 1974 (Indonesia)	LKS94 (Lithuania)
Manoca (Cameroon)	Nord Sahara 1959 (Algeria)
Segora (Indonesia)	Voirol (Algeria)
Australian Geodetic 1984 (official conversion to GDA94)	
Beijing 1954 (Peoples Republic of China)	
Kalianpur (Bangladesh, India, Nepal, Pakistan)	
MGI (Bosnia/Herzegovina, Croatia, Serbia, Slovenia)	
Campo Rodriguez/Tete (Mozambique)	
OSGB36 (United Kingdom, Bursa-Wolfe form)	
WGS 1972 Transit Broadcast Ephemeris (Worldwide)	
European Terrestrial Reference System 1989 (Europe)	
Greek Geodetic Reference System 1987 (Greece)	

If your datum and/or its transformation to other datums is not supported in the **TNT** products, it can be added if you can locate and provide the necessary parameters.

Military Grids. The Military Grid Reference System (MGRS) used for many military maps around the world is available for coordinate reports in spatial views and in the map calculator. If you are not familiar with this system, a typical coordinate in California would be 10SAF2168568177 where 10 is the UTM zone and "SAF" specifies a 1 degree grid cell. The "S" is the alphabetically-ordered position running north to south in 8 degree increments, "A" is the east to west alphabetically-ordered position within the 8 degree cell, and "F" is the north to south position of the 100 km grid square. The numeric coordinates in meters are measured from the southwest corner of this 100x100 km "SAF" cell and are 21685 meters north and 68177 meters east.

Polar Regions. The Universal Polar Stereographic coordinate system is now provided for use in polar regions.

Miscellaneous. The names of the coordinate system built into the **TNT** products can now be localized (translated).

The New Zealand Map Grid coordinate system is now supported.

Raster Extract.

An option to use “averaging” when pyramiding the output data is now available. This feature has previously been available in other processes.

Project File Maintenance.

A Project File “folder” can now be copied to a new location. All the objects in that folder are copied as well.

TNT Benchmarks.

A new APPLIDAT can be installed that provides a means to compute benchmarks to compare some of the typical **TNT** activities between platforms of varying design, speed, or operating systems. For example, one test is the multiple display of a standard raster using the **TNT** geospatial rendering engine. This APPLIDAT benchmark, written in **SML**, is exactly the same program on every platform and comes with its own built-in standard test data. Thus, it will provide a good intercomparison if other applications are shut down as advised during its test operation.

NOTE: This Benchmark APPLIDAT may show an error on some Mac systems within the image classification test. Please contact software support for instruction on how to download a revised version for use with the MacOS.

Object Selection Dialogs.

Why Change Them?

New Windows-like object selection dialogs are now used throughout **TNTmips** and all the other **TNT** products. They replace the UNIX-like selection procedure that has been used in the **TNT** products since **V4.00** was released in 1992. Those already familiar with navigation and selection procedures in other popular Windows products will find that it carefully mimics 1 of the 2 commonly used procedures for file selection. What is unique about the use of this paradigm in **TNTmips** is that it extends this idea. It provides transparent navigation to and from drive and directories seamlessly into the powerful **TNT** Project File structure and on into the single or multiple geodata objects. This includes subobject selection where required. This seamless blending of the powerful Project File concept with the directory structure now extends the **TNT** products’ management of geodata beyond that of competitive products, as illustrated in the attached color plate entitled New Standard Object Selection Process.

From an overall viewpoint, this important improvement makes Project Files look as if they are part of the directory structure that all desktop computer users must grasp to operate most popular software. Professional Mac and UNIX users are forced by necessity to have a passing acquaintance with Windows machines and software. As a result, they will also easily adapt to this new approach to navigating in a big or small geodata base. Mac users have long used and demanded the easiest and most standardized graphical directory, file management, and data object selection procedure. As a result, Mac users have had the hardest time of all to adapt to the UNIX-like Project File management procedure previously provided in the **TNT** products.

A newcomer to **V6.20** of the **TNT** products will find this approach either intuitive or easily learned. Clients familiar with the procedure used through **V6.10** will find it a pleasure to

unlearn or simply forget the older quixotic method. Since the new procedure is intuitive and generally familiar, it will not be necessary to present a great deal of detail here about how to use it. You will simply want to ask MicroImages “why did it take you so long to come up with this?”

Easy Operations?

Navigating In. When you navigate into a directory, it will show any subdirectories and Project Files it contains. Project Files use the conventional file icon with the red letters “MI” on it. By default, when you have selected a Project File, only **TNT** objects and their associated icons will show if that is all that the **TNT** process can use. However, if the **TNT** process can use other files, they will show with icons in the list (for example, in the General File Maintenance process and dialog). Similarly, if you navigate into the Project File, any file folders are listed with a file folder icon with the red letters “MI” on it. When navigating in these new dialogs, a single click on the leading icon in the list or a double click on the name and description selects the drive, directory folder, Project File, or folder. This is how you move down into the directory and Project File structure to the object list.

Selecting an Object. After you have selected a Project File in these dialogs, the objects in it will appear in the list. Each object name is preceded by the familiar **TNT** color icon that identifies the type of geodata the object contains (for example, raster, vector, CAD, TIN, database, layout, ...). A single click on the object type icon will add it to the list of selected objects for use in the **TNT** process. A double click on the object name or description will add it to the list. A single click on an object name or description and a click on the “Add” icon will also add it to the list. To add all the eligible objects in the list to the selected for action list use the “Add All” icon.

An options menu labeled “Objects of Type ...” permits you to show geodata objects of all types or only those objects suitable for selection within the process you are using. The default is set to show only the kind of geodata object(s) that can be used. When toggled to show all objects in the Project File or folder, those types that cannot be used in the current process have names and descriptions in gray text. In either case, the types of objects eligible for use in the current process have black names and descriptions.

Sorting a List. The list of objects in the Project File can be sorted alphabetically using the new “Sort Objects By” icon. The sorting choices are: Creation Time, Creation Time (reverse), Modification Time, Modification Time (reverse), and None. The sorting method selected is retained as your default preference.

Deleting Selections. An object or subobject can be removed from the selected for action list by using the “Remove” icon. Repeated use of the “Remove” icon will remove multiple objects in the reverse order in which they were added to the selected for action list. A “Remove All” icon is also provided so that you can easily remove all selected objects and start again.

Navigating Out. Jumping backward anywhere up the current path all the way to the drive level uses a popup menu labeled “Look In”. Moving backward only one level is accomplished with the “Up One Level” icon. A “Look In” icon provides a popup selection list to allow you to go to recently-used directories, Root, any available drive, home directory, or enter a specific path.

New Project Files. The NT and UNIX operating systems provide sufficient flexibility to permit the immediate direct creation of new files and contents from within these new Ob-

ject Selection dialogs. Three icons (“file folder” and 2 “page” icons, each with an asterisk on them) are provided in this dialog. They are gray and not active if you are using any other operating systems. But, when in NT or UNIX, they are active and allow the direct creation of a new Project File, a new folder, and/or a new object.

IMPORTANT NOTE: Once you have selected a Project File and object, it will automatically become the default for the next selection of that type of object, even if you exit the **TNT** products. This operation has a minor error when used with the MacOS. When you start up, you will find that your default named drive at the top of your hierarchy is represented by “???”. If you simply select your top level drive name and then navigate to, and select an object of that type, the default structure for that type of object will be reset properly for any future operations of your **TNTmips**. You will need to perform this same reset operation separately, selecting first a raster object, then a vector object, a CAD object, and so on. Proper defaults are real time savers, so please take a few minutes to reset them as outlined for the Mac.

Display Spatial Data.

General.

The following hot keys have been added:

- <space> : Recenter at cursor location
- 0 : Redraw at full view
- 1-4: Set zoom to 1-4X relative to image if any

NOTE: These and the many hot keys added in **V6.10** of the **TNT** products are powerful labor savers. The color plate entitled Hot Keys—Reference for TNT products is enclosed separately as a guide for these hot keys. It is not attached to this MEMO so that you can place it near your display screen as a reference for all who use your **TNT** products.

When using the selection tool or selecting elements via the GeoToolbox, if no element types have been enabled for selection and no tables are open, the first non-internal table will be automatically opened for the current layer.

LegendView.

Concatenating Labels.

Depending upon your application, it can be difficult to find or design hundreds of distinct styles for hundreds of different kinds of elements in an object (for example, for soil type polygons in a vector object, for raster data values, and so on). Or, several kinds of elements may be deliberately given the same style, as they are similar in the parameter being styled, or it may provide the best presentation in their viewing. In **V6.10**, this meant that different types of elements with identical styles would each occur in the legend presented in the LegendView mode. When this situation occurred, LegendView displayed duplicate legend entries with differing labels. In **V6.20**, when you style by attribute, if the same style is used multiple times, it will now be automatically concatenated and only appear once in the legend for a particular layer. The label shown for this style will be a composite of the labels for the 1st and 2nd attribute, separated by a comma. If 3 or more labels occur on the line, only the 1st and 2nd are shown followed by an ellipsis (“...”) to indicate that more labels are present.

Label by Combining Attributes.

A powerful option is now provided to interactively create new kinds of legends. You can now choose any attached attribute from any table to be used as the label for the styles in the legend. These new labels are then used as the default label and stored with the object. Using this option, you can quickly change the labels for an object so that they present information, not just text data, about the styled element in the view. Simply choose the legend label from the Vector Object Display Controls dialog.

This concept is not available in ArcView and provides for interactive relabeling of any object with any of its hundreds of attached attributes. The concatenation feature described above will ensure that any duplicate entries in the attribute selected only show once in the legend if they have the same style.

This new capability is most powerful when combined with the use of the computed fields concept provided in the **TNT** products. A computed field behaves just as if it was a real field in an attached attribute table. Thus, a computed field can also be used as a label for styles. A computed field representing a combination of several fields can be used to label an object in LegendView. The attached color plate entitled Computed Fields in LegendView Labels illustrates this for both vector and raster objects.

Labels can be computed from a small model equation on several fields, a combination of string fields and numeric fields, and so on. Soil types mapped in the United States all have attribute tables that predict the kinds of agricultural productivity potentially supported by each soil type. For example, tabular fields are available in all the soil attribute tables to indicate the yield of hay for the soil with and without irrigation. The second example in the color plate entitled Computed Fields in LegendView Labels illustrates a very simple model solution that provides a legend that combines the soil type code with the additional potential yield for irrigating hay on that soil type. The raster example in the plate uses a computed field to label a classification map based upon its raster cell values with the combination of the classified surface material and its area in the classification raster. The area has also been converted from square kilometers recorded in the standard statistics table to acres as part of this simple model.

Using imagination, you can add more complicated models that immediately present useful information in legends in LegendView rather than simply identifying the colors and fill patterns of features in the display. As a result, what appears to be a simple added feature, when combined with computed fields, provides another powerful analysis tool, especially for preparing directly publishable results.

Shutting Off Raster Legends.

An option for raster layers to not show a legend is now available. Simply select the raster layer name with the right mouse button (Mac uses Control + mouse) and choose the new "Hide Legend" option.

GPS.

It is now possible to control the playback speed when using a GPS log file. Controls are also provided to play the log in reverse, pause playback, and restart the log at the beginning. Log files output from other software in raw NMEA and SatLok format can also be played back as overlays to any view.

3D Simulation.

When MPEG movie views are swooping back and forth over terrain, it is difficult for their viewers to orient themselves to the real world. Viewers who have personal experience with the area viewed often must play back the movie several times to get oriented. Those not familiar with the area continue to be disoriented and have difficulty relating the movie to the real world maps, orthophotos, and other geodata directly in their hands. Incorporation of the Plan Pane option added in **V6.10** provides the viewer with a 2D reference view of where they are on the ground. With or without this Pane View, the most disorienting characteristic of a terrain flyby to a new viewer is trying to correlate it with their memory or a map of the real world when they do not know the orientation of the views.

A north arrow with a 3D shape can now be added to a movie. It is inserted directly into each view and appears to float there at a fixed elevation above the terrain. The arrow is oriented at a selected vertical and points north. As the movie progresses, the north arrow continues to point north. Because the arrow is 3D and always points north, its shape and appearance change as each frame's orientation changes relative to north and to the terrain. This north arrow not only provides the viewer with a continuous compass reference but also with clues to the viewing orientation. The attached color plate entitled Floating North Arrow in 3D Simulation and the following examples will help. A sample MPEG movie illustrating the use of the north arrow can be downloaded from www.microimages.com/simulations. These examples are relative to a movie with a first frame view that is horizontal or parallel to the terrain.

- If the movie continues to fly on from the first frame in a straight line, the north arrow floats through the views unchanged.
- If the movie orbits a point with a fixed view angle, the north arrow rotates about its center.
- It is possible that some frames will view the arrow end-on from the front or rear, and it will appear as a parallelogram shape.
- When a looping and hard-to-view path is followed, the arrow twists, turns, and may or may not be helpful.

When using this arrow, it helps the viewer to get oriented at the start if the movie is created with the first frame north or south to provide some initial reference framework. MicroImages is not fully satisfied with the 3D shape of the current arrow, as it is not clear which orientation is actually north. At present, there is no easy way for you or a MicroImages graphic designer to easily change arrow shapes. If you find this north arrow feature useful in your movies and want a different shape, or possibly even control of the shape, please request it.

Raster Resampling.

An option now permits compression of the output rasters as they are created. It is no longer necessary to compress them in a separate operation.

Feature Mapping.

Prior to **V6.20**, the Feature Mapping process used an older and specialized display program. As a result, it did not automatically provide the many new visualization options that have been gradually added to other processes. This notwithstanding, Feature Mapping has remained a concept unique to **TNTmips** and a powerful user-guided tool for the interpretation of multispectral images.

This process has now been completely overhauled to include the standard geospatial rendering engine used in other **TNT** processes. This incorporates many features already available in other **TNT** processes such as LegendView, multiple reference layers, hot keys, view-in-view, transparency effects, histogram and correlation displays, and many more. Combining these innovative visualization tools with the unique concept of Feature Mapping provides an even more flexible and powerful multispectral image interpretation procedure. The new view for Feature Mapping can be reviewed in the attached color plate entitled LegendView in Feature Mapping.

The list of new feature requests was used as the basis for adding more than 20 requests for new features. The output features and categories rasters now have unclassified (0) pixels set to null so they will be transparent when used as overlays. Icon buttons have been added to the toolbar for "Clear Samples and Prototypes" and "Mark All", as these features are frequently used. The right mouse button can now be used when drawing the region of interest, categories, or features to include the area inside the polygon.

The spectral angle mapping process for hyperspectral image analysis has also been incorporated. If a hypercube object is selected as the analysis layer, the decision to include or omit all other cells tested as prototypes of the material of interest uses the spectral angle mapping logic.

Be sure to download the new Getting Started Feature Mapping tutorial booklet if you plan to experiment with or use this process.

Import/Export.

V6.10 provided a period of overlap between the new, rewritten and modernized Import/Export process and the older, more reliable process. The errors reported for the newer process have been fixed, and it is the only version provided with **V6.20**.

Import Raster.

Landsat 7 Import.

The FAST-L7A format is now supported for use with Landsat 7 Enhanced TM+ imagery.

ESRI's Grid Import.

ESRI's E00 Grid rasters can now be imported.

AVIRIS 95 Import.

As noted previously, the format of hyperspectral imagery collected by JPL's AVIRIS program is changed almost every year. Imagery collected in the 1995 flight program can now be imported.

ENVI Type 4 Import.

Hyperspectral images in ENVI's Type 4 format can now be imported.

Hyperspectral Cube Import.

All imports provided for hyperspectral imagery can now create either a compressed hyperspectral cube raster object or a set of separate raster objects (1 raster per band).

IMPORTANT NOTE: MicroImages encourages you to use the hypercube format, which is optimized to speed both display of individual bands and spectral analysis operations.

ASCII-XYZ Import.

An option has been added to use a comma as the separator between ASCII-XYZ values imported from a text file into a raster object.

Export Raster.

BMP Export.

BMP rasters, popular in Windows and associated products, can now be exported.

DTED Export.

Raster objects of terrain elevations can now be exported to the DTED format (Digital Terrain Elevation Data). The U.S. Department of Defense, more specifically NIMA (National Image and Map Agency), uses the DTED format. Reference is often made to DTED files of level 0, 1, or 2. This designation refers to the level of elevation accuracy of the file and thus to its possible military classification. All of these levels are in the same format and can now be imported or exported.

GeoTIFF Export.

TNT rasters to be exported to GeoTIFF can have control points outside the extents of the raster. This often occurs within **TNT** raster objects after a raster has been downsized by an extraction operation. Retaining these points maintains the accuracy of the object's georeference for use in other **TNT** products and is a legitimate feature for a generic GeoTIFF file. However, some other software products cannot use GeoTIFF files containing these control points. As an option, a new affine georeference is constructed and exported for use in such cases.

Import Vector.

Choose Topology Type.

The vector import process now permits the selection of the topology to be created in the **TNT** vector object being created: planar, network, polygonal, and no-topology (spaghetti). For example, if an ESRI coverage file is being imported, if desired, it can be used to create a lower order topology such as planar topology. Similarly, if a lower topology object is imported from a MapInfo file, it can be elevated to a higher order topology that will be created for it as it is imported.

Modifications since **V6.20** CDs.

Sun Raster Import.

The Sun rasters, used almost exclusively with Sun products, can be imported.

GIF Raster Export.

GIF (Graphics Interchange Format) rasters used widely by HTML-based and other web sites for sending images to Internet browsers can now be exported.

Database Operations.

* Saving Tabular Views.

You can now use "Save As" from the Table menu in a Tabular View window to save the tabular view as a CAD object in a Project File. This saves only the styled contents of the Tabular View window and not the entire contents of the associated database table(s). If the Tabular View is scrollable, all its contents will be saved. The CAD object preserves the table's line styles, polygon fills, and fields. You can also select a font for use in the CAD object and control other characteristics.

This new feature is simply stated here; it is a very important and useful feature. A printed supplemental documentation page entitled CAD Snapshots is included with **V6.20** to help you in its operation. First and foremost, as CAD objects, tabular views can now be inserted in map layouts as legends and summary results. Furthermore, they can be edited as CAD objects in the **TNT** Spatial Data Editor or exported for use elsewhere. The enclosed 11" by 17" folded color plate entitled Potential Earthquake Hazards to Highways and Major Arterials—Northern San Mateo County, California illustrates the use of this feature better than can be described here.

* Remove Duplicate Records.

You can now clean up your database tables using the Remove Duplicate Records option in the Database Editor. It is available in the menu that pops up if you right click (command click on a Mac) on the table name. Duplicate records in the selected table are removed, and element attachments are repaired as necessary.

Combining Tables.

Combine Tables (on the File menu in the Database Editor) lets you concatenate to create a third table. For this to work, the two tables should have similar record structures—in other words, the same names and field types, and so on.

Copying Tables.

The window that presents the tree-like relationships or connections in a database has been renamed the Database Editor window because it provides a growing number of editing operations on the connections and component tables of the selected database. In **V6.10**, this tree-like window did not have a specific name and automatically took on the name of the database being viewed. Using the Database Editor window, tables can now be copied in the **TNT** internal relational database, from linked tables, or from linked ODBC sources. Use the File menu to select "Copy". You are prompted to select a database object and a table within that object. If you choose, you can navigate to any Project File, object, or table within that object. Select the table, and the standard Object Name/Description dialog opens so you can name the copy of the table. When you click OK, the process copies the table into the database you are editing. If the table you selected to copy is a link to an external table (for example, a DBASE table or via ODBC), you have the option of creating a link from the new location or copying the data selected into the internal **TNT** database table. You can also link to other tables in a different **TNT** database.

This same copy procedure can be initiated from the popup menu you get if you right-click on the table to be copied in the Database Editor. This procedure skips the navigation to the source table, as it copies the table you selected with the right mouse button.

Relational Tables for Raster Cells.

The raster cell value (Internal.Value) can now be used as a primary key for establishing relationships to other database tables.

ODBC Support.

* Faster Pin Mapping.

Pin mapping a table that is a link to an ODBC table is now about 50X faster than in **V6.10**.

Better Connection Error Diagnosis.

If you get an error importing or accessing a table through ODBC, the error message supplied by ODBC is sometimes cryptic. To help you in this situation, the **TNT** Error dialog now has a "Details..." button. Clicking this button will show you the last SQL query to the ODBC server, the data source you are connected to, the ODBC drive version, the ODBC versions, and so on.

Access.

ODBC provides a data source for "Microsoft Access 97 Database" that does not refer to any specific Access file. If you selected this data source from the list in **V6.10**, you were only given a cryptic error message. Now you are prompted to select the Access file to use.

IBM's DB2.

Fortunately, all vendors have been forced by the competition to provide free trial versions of their products. These versions now almost all contain an ODBC interface. Unfortunately, each database vendor's ODBC support has its own idiosyncrasies that must be overcome. Using IBM's free trial on an NT platform, MicroImages has been able to adjust its ODBC support so that DB2 is now usable with the **TNT** products.

* Map Layouts.

Map layouts can now place, use, and print a CAD object containing any database tabular view in the **TNT** products. All aspects of each table can be rendered in the layout, including style fields, highlight colors, summary records, and so on. The best way to discover what can be accomplished with this simple but powerful new feature is to carefully review the 11" by 17" sample engineering plate included with this release entitled Potential Earthquake Hazards to Highways and Major Arterials—Northern San Mateo County, California. This color plate was created entirely within the **TNTmips** layout process. It was printed on an HP Model 2500 Inkjet Tabloid Printer at an estimated cost for paper and ink of 15¢ per page.

This sample layout illustrates the use of tabular view snapshots into CAD objects to prepare a plate for inclusion in a typical 8.5" by 11" format engineering report. The plate contains a table with color graphical fields that correlate the mapped materials with their descriptions in the table. It also has tables that contain tabular results, including summary records. This sample plate has been folded and punched to fit in a report format with text pages. It can be produced at low cost, so many attractive diagrams and copies of the report can be assembled.

*** X-Y Digitizer Support.**

Clients attending AUW10 (Advanced Users' Workshop 10) placed a high priority on using the WINTAB (WINdows TABlet) driver support for X-Y digitizers. Any X-Y digitizer supplied with a valid WINTAB driver can now be used in the **TNTmips** and **TNTedit** products with the X3 optional product support.

Mosaicking.

Mosaic can now save an optional compressed binary mask raster object with a cell to cell match to the mosaic raster object created. This binary raster is needed when displaying lossy compressed (JPEG) images where null cells at the edge may be mapped into non-null cells and vice versa. It contains a "1" for every cell in the image area and a "0" for cells in the raster that do not contain an image value. It can be used during display of the decompressed raster to mask out all cells that are not in the original irregularly shaped image.

JPEG compresses 8 by 8 groups of cells. When the compression is lossy, the decompression of this 8 by 8 group of cells can contain some cells with values slightly changed from the original. A JPEG 8 by 8 cell can contain the edge of an image that contains some cells with null values representing the area of the raster object outside the image area. When this raster is decompressed, some of the original null cells around the edge of the image will no longer have the specific null value. This is not of particular importance in normal image management, and viewing activities and lossy compressed rasters should never be used in digital image analysis activities.

Mosaics are usually big raster objects, so it is common to compress them as they are created. For many applications, the alteration of the null value cells (in other words, changing to non-null values) along the image edge can be ignored, as irregularly shaped images in raster objects often contain edge artifacts for varying reasons. It is not common to create and save a new mosaic from several previously prepared compressed JPEG mosaics. It is simply easier to prepare a single new mosaic of the larger area of interest from the original raster objects. However, it is common to display an area at the edge of 2 or more mosaicked raster objects containing irregularly shaped images. If these are compressed lossy JPEG rasters, the edge artifacts of decompression will show in the view unless the new mask raster is saved and used during their display.

The Nebraska Statewide Atlas recently assembled by MicroImages as a sample geodata set for the **TNTserver** uses the new mask rasters. This geodata layer contains over 6000 1-meter resolution DOQQs (3.75' by 3.75' each) or 200 gigabytes in uncompressed form. For convenience in handling and management in the **TNTatlas** used by the **TNTserver**, 22 mosaics of 1 degree by 1 degree have been assembled from the 6000 uncompressed DOQQs. The original DOQQs were obtained in compressed form (not JPEG) and decompressed while being mosaicked. Mosaic saves them as large, lossy compressed JPEG raster objects together with the new mask raster object. Each 1 degree by 1 degree lossy JPEG compressed mosaic averages approximately 2 gigabytes. The DOQQ coverage of Nebraska in this form is an easily managed 40 gigabytes. Each 1 degree raster object is fully pyramided and tiled as a lossy JPEG raster object ready for immediate transmission to the **TNTclient** and the Internet browser. Since **TNTserver** uses the same geospatial rendering engine as **TNTmips**, this new binary mask raster is applied to ensure that when a view is at the edge of 2 of these 1 degree cells, the JPEG decompression edge artifacts are masked out.

HyperIndex.

The several important new features added to **HyperIndex** and thus available for use in the **TNTAtlas** and **TNTclient/TNTserver** are detailed above in the section on **TNTAtlas**.

SML for X.

Unless otherwise noted, the following discussion and functions relate to both **SML/X** and **SML/W**. A number of users were pushing **SML** hard this semester to create internal projects. The **SML** functions have been reorganized into 35 smaller groups. These new groups allow you to more easily find and insert the function needed. Printing the function list now prints out an alphabetized list of these new function categories with descriptions.

Including Other Scripts.

SML now includes a preprocessor. The first thing this preprocessor is used for is to allow you to have a script "include" another script (also called script-in-script). These are commonly referred to as include files.

Add Your Own DLLs.

You can now create a Dynamic Linked Library (DLL) containing your own functions and place them in a "plugins" directory under your **TNTmips** directory. Use this DLL approach to easily add functions to **SML** that you create using the **TNTsdk** or C++. You can also use this DLL as a means to add functions from other libraries.

Import/Export.

All the raster, vector, and CAD formats and some of the database formats can be imported and exported with classes in **SML/X** and **SML/W**.

New Functions.

SML/X and **SML/W** in **V6.20** provide 27 **SML** functions and 28 classes, bringing the total number of functions to 834 and classes to 205.

Math Functions. (13)

ConvertPolartoXY

Converts polar coordinates to rectangular (radians).

ConvertPolartoXYd

Converts polar coordinates to rectangular (degrees).

ConvertSphericaltoXYZ

Converts spherical coordinates to rectangular (radians).

ConvertSphericaltoXYZd

Converts spherical coordinates to rectangular (degrees).

ConvertXYtoPolar

Converts rectangular coordinates to polar (radians).

ConvertXYtoPolard

Converts rectangular coordinates to polar (degrees).

ConvertXYZtoSpherical

Converts rectangular coordinates to spherical (radians).

ConvertXYZtoSphericald

Converts rectangular coordinates to spherical (degrees).

CopyArrayElements

Copies a given range of elements from one array into another.

Displacement3D

Calculates the distance, azimuth, and elevation from the first point to the second (radians).

Displacement3Dd

Calculates the distance, azimuth, and elevation from the first point to the second (degrees).

PolynomialCurveFit

Computes an equation of given power that best fits the given points.

RandomGaussian

Computes a pair of random numbers based on a normal distribution.

Object Functions. (2)

ObjectExists

Determines if object exists in Project File.

MakeRVCFolder

Creates a folder in an RVC project.

Raster Functions. (4)

ConvertCompToComp

Converts the color depth of a raster to another color depth.

ConvertRGBToComposite

Converts an RGB raster to an 8- or 4-bit composite.

CreateRasterMask

Creates a raster mask.

Binarization

Calculates a raster binarization on an 8- or 4-bit raster.

Vector Toolkit Functions. (1)

ClosestPointOnLine

Finds closest point on a line to a given point.

Console Functions. (1)

PrintMatrixToConsole

Prints the matrix to the console.

Import/Export Functions. (1)

ExportDatabase

Exports a Database using class derived from MieDATABASE class.

Geodata Display Functions. (4)

ViewCreateSlideViewTool

Creates tool for sliding a view.

ViewCreateZoomBoxTool

Creates tool for zooming in on a view.

ViewZoomFull

Zooms as large as possible and still have everything fit.

DispSetBackgroundColor

Sets the background color for a display.

Additional Import/Export Classes. (27)

MieARCCOVERAGEVECTOR

MieARCE00VECTOR

MieARCGENERATEVECTOR

MieARCSHAPEFILECAD

MieARCSHAPEFILEVECTOR

MieATLASGISCAD

MieATLASGISVECTOR

MieBNACAD

MieBNAVECTOR

MieCSVDATABASE

MieDATABASE

MieDATABASEVECTOR

MieDEMGT0P030RASTER

MieDGNCAD

MieDXFCAD

MieERS1SARRASTER

MieINFODATABASE

MieMIPSEXTERNALDATABASE

MieMOSSVECTOR

MieSIFCAD

MieTEXTVECTOR

MieTIN

MieTMTIPS

MieVPFVECTOR

MieVRMLRASTER

MieVRMLTIN

MieVRMLVECTOR

Hypercube Objects.Direct Import.

The concept of a single lossless compressed hypercube object and its initial implementation in **TNTmips** were discussed in detail in the MicroImages MEMO dated 12 May 1999 entitled Release of V6.10 TNT products. In **V6.10**, it was necessary to use the import process to bring hyperspectral images in as individual spectral bands in a single Project File. These could then be transformed in a separate step into a single hypercube object in any Project File. The import processes in **V6.20** that deal with hyperspectral images in various formats can directly create a compressed hypercube object. You can specify that all or selected spectral bands are imported into this single object. An option is also provided to import all or selected spectral bands into individual raster objects.

Direct Use.

All the processes that deal with a hyperspectral image have now been modified to use the lossless compressed hypercube object or the traditional format of one spectral band per raster object. In the Hyperspectral Analysis process, you will immediately notice one benefit of using the hypercube format: faster initial opening and display of the image. The hypercube form of the standard Cuprite AVIRIS image (224 spectral bands)

displays in about one-sixth the time of the same image in the traditional format. Because the hypercube format is also optimized to rapidly access the spectra of individual cells, the more intensive Hyperspectral Analysis processing procedures also will show a speed boost when you process an image in the hypercube format.

3D Hypercube Display.

You can now view a hyperspectral object as a three-dimensional "image cube". The 3D Hypercube Display provides a quick means of examining individual wavelength bands and visualizing how the boundaries of features vary with varying wavelength. The top and right sides of the image cube show the corresponding image edge cells of each wavelength band, with wavelength increasing toward the back of the cube. The shortest wavelength band is displayed by default on the front of the cube, but a Band Number slider allows you to quickly bring any band to the front of the cube. You can view the cube in the default grayscale mode or apply a color palette to the entire cube to emphasize spectral differences.

Interactive Hyperspectral Analysis.

Feature Mapping is unique to **TNTmips**. It provides a direct visual means for users to interactively select and group surface materials on the basis of their spectral properties and conditions. Feature Mapping now allows you to apply this concept to hyperspectral imagery. Simply select a hyperspectral image in hypercube format to analyze, and use the Define Samples tool to select one cell (or a group of similar cells) to form the starting point for defining a spectral class. Feature Mapping automatically analyzes all of the spectral bands in the image using a Spectral Angle Mapper algorithm to find the set of image cells that are most similar to the designated cells. You can repeat this procedure for other surface materials to build up a set of material classes for the image. (This procedure requires intensive processing, so practical use requires a fast computer).

Updates for Spaceborne Hyperspectral Imagers.

Warfighter (U.S. Air Force).

A press release in *Space News*, June 14, 1999, Vol. 10, No. 23.

"Orbimage Appeals Limits On Hyperspectral Sales."

"Orbital Imaging Corporation (Orbimage) is appealing some of the U.S. government-imposed conditions on its license to sell hyperspectral data from its planned OrbView-4 satellite."

"Orbimage agreed to add the hyperspectral capability to OrbView4 under a cooperative program with the U.S. Air Force."

"The company then was slapped with restrictions that include a 24-meter limit on spatial resolution of hyperspectral data sold to non-U.S. government customers. OrbView-4 is capable of 8-meter-resolution hyperspectral data."

Hyperion (on the EO-1 satellite).

A press release in *Imaging Notes*, Sept/Oct 1999, page 6.

"TRW Delivers Hyperion to NASA."

"Redondo Beach, California based TRW Inc. delivered an advanced remote sensing instrument to NASA's Goddard Space Flight Center. Hyperion will provide hyperspectral images of complex ecosystems, such as coastlines and forests and urban and agricultural areas."

“Using a push-broom data-collection configuration, Hyperion views the Earth in 220 spectral bands, ranging from the visible to short-wave infrared with 30 meter resolution. The imager is one of the three science-grade instruments that will be integrated into NASA’s Earth Observing-1 (EO-1) spacecraft, set for launch in December 1999 from Vandenberg Air Force Base, Calif. EO-1 is the first satellite in NASA’s New Millennium Program Earth Observing series, an initiative to demonstrate advanced technologies and designs that promise to reduce costs and improve instrument and spacecraft quality.”

“Hyperion will be the first hyperspectral instrument in space, ... (and it) will set the standard for this exciting new technology.” says Al Frew, vice president and general manager of TRW’s Space and Technology Division.”

Upgrading.

If you did not order **V6.20** of **TNTmips** and wish to do so now, please contact MicroImages by FAX, phone, or email to arrange to purchase this upgrade or annual maintenance. Entering an authorization code when running the installation process allows you to complete the installation and immediately start to use **TNTmips 6.20** and the other **TNT** professional products it provides to you.

If you do not have annual maintenance for **TNTmips**, you can upgrade to **V6.20** via the elective upgrade plan at the cost in the tables below. Please remember that new features have been added to **TNTmips** with each new release. Thus, the older your current version of **TNTmips** relative to **V6.20**, the higher your upgrade cost will be.

Within the NAFTA point-of-use area (Canada, U.S., and Mexico) and with shipping by UPS ground. (+150/each means \$150 for each additional upgrade increment.)

<u>TNTmips Product</u>	<u>Price to upgrade from TNTmips:</u>					<u>V5.60</u>
	V6.10	V6.00	V5.90	V5.80	V5.70	and earlier
Windows/Mac/LINUX	\$500	750	950	1100	1250	+150/each
DEC/Alpha via NT	\$650	1000	1350	1600	1800	+175/each
UNIX single user	\$800	1250	1650	2000	2250	+200/each
UNIX 2 user fixed	\$950	1550	2150	2550	2850	+250/each
UNIX 3 user fixed	\$1100	1900	2550	3050	3500	+300/each

For a point-of-use in all other nations with shipping by air express. (+150/each means \$150 for each additional upgrade increment.)

<u>TNTmips Product</u>	<u>Price to upgrade from TNTmips:</u>					<u>V5.60</u>
	V6.10	V6.00	V5.90	V5.80	V5.70	and earlier
Windows/Mac/LINUX	\$600	900	1150	1400	1600	+150/each
DEC/Alpha via NT	\$750	1200	1550	1800	2000	+175/each
UNIX single user	\$900	1400	1850	2200	2500	+200/each
UNIX 2 user fixed	\$1050	1600	2200	2600	2900	+250/each
UNIX 3 user fixed	\$1150	1950	2600	3100	3550	+300/each

Installed Sizes.

Loading **TNTmips 6.2** processes onto your hard drive (exclusive of any other products, data sets, illustrations, Word files, and so on) requires the following storage space in megabytes.

	for V6.10	for V6.20
PC using W95, W98, or NT	88 MB*	69 MB*
PC using LINUX (with Intel) kernels prior to 2.0.36	118 MB	114 MB
PC using LINUX (with Intel) kernel 2.0.36	98 MB	94 MB
DEC using NT (with Alpha)	80 MB	81 MB
Mac using MacOS 8.x	74 MB**	75 MB**
Hewlett Packard workstation using HPUX	116 MB	182 MB
SGI workstation via IRIX	157 MB	148 MB
Sun workstation via Solaris 2.x	104 MB	101 MB
IBM workstation via AIX 4.x (with PPC)	130 MB	125 MB
DEC workstation via Tru64 UNIX (with Alpha)	138 MB	132 MB

* W95, W98, and WNT installation size also includes the native **SML 6.2** interpreter for Windows.

** The Mac installed size includes the JAPAN1.OF font of 10.4 MB that is automatically installed. Delete this font if you do not require the use of Japanese.

V6.10 of the HTML version of the Reference Manual including illustrations requires 35 MB and the Word version is 68 MB. Installing all the sample geodata sets for **TNTlite** and **TNTmips** requires 1203 MB. The 48 Getting Started booklets require a total of 70 MB.

TNTserverTM**See a Geoserver in Action?**

TNTserver is a geoserver, which means it is foremost a tool for serving up geographically related materials. It is not an on-line GIS, but may well provide such capabilities in the future as needed. **TNTserver** is designed first and foremost to allow rapid access and viewing of massive collections of geodata: rasters, vectors, CAD, ... with most of the size of the collection being set by its image and raster map contents.

Only a brief reference will be made here to **TNTserver**, as most of you do not yet own or operate this product. Furthermore, it is a web-based product with an operation that is easy to try. While you are trying it, you will find that all pertinent documentation is being kept on the associated web pages. The best way to review the features in the latest iteration of the **TNTclient** and **TNTserver** is to go to www.microimages.com and try the experimental atlases and read the documentation maintained there. Maryland's preliminary MERLIN site can be found at <http://www.mdmerlin.net>. Additions and improvements are rapidly being added to these sites, especially at the experimental test site located at <http://testatlas.microimages.com>, which changes on the average at least once a week.

How Big is a Geoserver?

How big could such a geoserver be? It could be pretty large based upon a new product being sold by Lockheed at a price that is also likely to be "massive".

From a press release entitled RECON WARE in *Aviation Week & Space Technology*, May 31, 1999. page 21.

“Lockheed Martin Missiles & Space has developed and operated the government’s second-generation Imagery Dissemination and Exploitation system (IDEX II) for remote-sensing imagery over the past decade, and is now offering a commercial version for very large collections of files. The Intelligent Library System (ILS) will manage, retrieve and distribute more than 10 million gigabyte-plus files stored in a variety of formats, including tape jukeboxes, on shelves, and redundant arrays of independent disks. The system is intended for image files and will handle medical, computer-aided design and video products as well as geographic images. ILS will automatically archive data for 10 years or more. The system has open architecture and is scalable so customers pay for the size and speed they need. Hardware and software vendors that provide components for ILS include Sun Microsystems Inc., Ampex, Clinton Electronics Corp., Sensor Systems and LSC Inc.”

After reading this, we all need reference to some of the new size suffixes we will soon be using. We can start with the now familiar giga = 10E9 and then progress to tera = 10E12, peca = 10E15, and exa = 10E18. Thus, this ISL geodata is a paltry .01 exabytes.

The largest geodata prepared for use in the **TNTserver** is Maryland’s **MERLIN Hyper-Index** of a mere 180 gigabytes and 60 layers. But, MERLIN is growing, with a potential list of 250 geodata layers identified. As a result, this geodata is likely to grow to as much as 1 or more terabytes in as short as 3 years, simply with the potential addition of 1 foot resolution color digital orthophotos being collected for various counties. How fast it will grow depends on how much commercial data can be licensed for public viewing via this geoserver.

To get things started, in a very progressive decision, SPOT America has just expanded Maryland’s license to include in MERLIN 2 prior years of 10 meter coverage of the entire state. This SPOT license allows free public viewing as long as this imagery is not copied or reused in any other fashion. This means that the Maryland public can zoom in and see the full SPOT resolution coverage of their personal lot or farm and make measurements. They could already do this in MERLIN using the older 1 meter color-infrared DOQQ images of the entire state. However, this kind of viewing of more recent images will actually increase the demand for the purchase of new SPOT image coverage and the digital use of their archived products for larger areas at full resolution. Similarly, Maryland has purchased a license for the whole state to provide for, among other uses, the same public viewing and use via MERLIN of the 5 meter synthetic color images produced from Indian Satellite images of the whole state.

Internationalization and Localization

The **TNT** products now support the automatic use of TrueType font collections (font collection filenames end in .ttc instead of .ttf used in individual fonts). Chinese, Japanese, and Korean use fonts that are organized into these TrueType font collections.

Japanese.

The **TNTclient** can now be localized. All text resources used can be translated and will then be downloaded according to the language used in the network browser. These resource files are quite small and have been translated into Russian and Japanese as test cases.

Thai.

Earth Intelligence Technologies has published a workbook in Thai coordinated with **TNTlite 6.0**. It is organized out of translated copies of many of the Getting Started tutorial booklets. It contains 248 color illustrated pages in an 8.5" by 11" format.

Indonesian.

Citradata Intersystems has published a manual entitled Perangkat Lunak **TNTmips** on the use of **TNTmips**. It contains 74 pages in an 8.5" by 11" format.

Language Support Status Report.

A color plate is attached entitled New Languages Available to show how a **TNTmips** window appears when the resource files available for various languages are used. All resource file kits that are currently available can be downloaded from <http://www.microimages.com/i18n/locales/> or <ftp://www.microimages.com/data3/I18N/locales/>.

Arabic.

Support for Arabic is fully integrated into all the **TNT** products, including the ability to enter text from right to left in the **TNT** editor (see color plate). A full translation of the **TNT** interface resource files into Arabic has been completed by FOCUS Integrated Systems S.A.E. in Cairo, Egypt (a MicroImages dealer).

Russian.

A full translation of the **TNT** interface resource files into Russian has been completed by Dmitry Kochergin in Moscow, Russia (a MicroImages dealer).

Chinese.

A full translation of the **TNT** interface resource files into Chinese has been completed by GEODATEC cc in Grahamstown, South Africa (a MicroImages dealer). Subsequent arrangements have been made to transfer this translation to a dealer in Beijing.

Korean.

Adjustments have been made to the **TNT** products to properly support translation of the **TNT** products into Korean. Arrangements are being negotiated to obtain a translation of the **TNT** products' interface into Korean.

German.

A full translation of the **TNT** interface resource files into German has been completed by the GIS Team, Ingenieurbüro für Geoinformatik in Giessen, Germany (a MicroImages dealer).

Turkish.

A full translation of the **TNT** interface resource files into Turkish has been completed by HAT Geographical Information Systems and Trade, Inc. in Ankara, Turkey (a MicroImages dealer).

Greek.

A full translation of the **TNT** interface resource files into Greek has been completed by KLEOS S.A. in Athens, Greece (a Microlimages dealer).

Portuguese.

A full translation of the **TNT** interface resource files into Portuguese has been completed by Gabor Szakacs in Sao Paulo, Brazil (a Microlimages client).

Spanish.

A full translation of the **TNT** interface resource files into Spanish by SystemeMin, S.A. de C.V. in León, Mexico (a Microlimages dealer) is nearly complete and should be available by the time you read this.

Slovakian.

Internationalization of the **TNT** products has been adjusted so as to properly support Slovakian. A full translation of the **TNT** interface resource files into Slovakian by Geo-complex a.s. in Bratislava, Slovakia (a Microlimages dealer) is nearly complete and should be available by the time your read this.

Polish.

A full translation of the **TNT** interface resource files into Polish has been completed by Slavomir Krolewicz in Poznan, Poland (a Microlimages client).

Finnish.

Arrangements have just been made to obtain a full translation of the **TNT** interface resource files into Finnish. This translation will be provided by GeoSurf in Helsinki, Finland (a Microlimages dealer).

Norwegian.

Arrangements have just been made to obtain a full translation of the **TNT** interface resource files into Norwegian. This translation will be provided by Tor-Gunnar Vagen in Jordforsk, Norway (a Microlimages client).

Hindi and Bengali.

Arrangements have just been made to obtain a full translation of the **TNT** interface resource files into Hindi and Bengali. This translation will be provided by Physical Planning Consultants in Calcutta, India (a Microlimages dealer).

Hebrew.

Support for Hebrew is fully integrated into all the **TNT** products, including the ability to enter text from right to left in the **TNT** editor. No one has been appointed to translate the resource files into Hebrew.

Thai.

No one has been appointed to translate the resource files into Thai.

French.

Despite numerous negotiations, no one has been appointed to translate the resource files into French.

MicroImages Authorized Dealers

Twelve new dealers were added during the past semester. MicroImages' product sales are principally made through our excellent dealers to, or by referrals, from our current valued client base. As a result, new dealers are being aggressively sought, especially in nations without any. Additional dealers are also sought in larger nations where our current dealer(s) have specialized in one particular application area of geospatial analysis. Any MicroImages client or anyone else interested in becoming a dealer, please contact Terry Peterson. Inquiries are welcome from anyone, big or small.

Cali, Colombia—Wilzur Corporation.

MicroImages is pleased to present Wilzur Corporation as a new MicroImages dealer located in Cali, Colombia. This is a brand new company formed by several engineering professionals who have been working in other companies applying Arc/Info, ArcView, AML, and AutoCAD in city management and other application areas. They are also experienced with assembling and servicing computer hardware and networks. Wilzur has been created to supply geospatial analysis service and products in Colombia for municipal systems, infrastructure management, and natural resources. For further information, please contact Willian Sanchez at voice (572)557-2858 or FAX (572)439-6628 or mail at Carrera 37A #8-55 Apto. 4, Cali, Valle del Cauca, Colombia. (email wisanche@netscape.net or web site www.wilzur.com)

Asunción, Paraguay—Paraguay Online/GEOTEC s.r.l.

MicroImages is pleased to announce that GEOTEC, a MicroImages Authorized Dealer located in Bolivia has opened an office in Asunción, Paraguay. This office will also resell the **TNT** products. For further information, please contact Roberto Salinas at voice (5952)142-6400 or FAX (5952)142-6403 or mail at Capitán Aranda 1021 casi Testanova, Barrio Sajonia, Asunción, Paraguay. (email rsalinas@pol.com.py)

Nuremberg, Germany—plan².

MicroImages is pleased to present plan² as a new MicroImages dealer located in Nuremberg, Germany. plan² is a consultancy that is quite familiar from past activities with the application of all the various competing GIS and IPS products, including **TNTmips**, into domestic and international projects. plan² is now expanding their activities to include reselling, training, and support of the **TNT** products and focusing on projects that will employ them. One of their recent international projects was the successful integration of several **TNTmips** systems into the Zimbabwe Forest Service under the sponsorship of GTZ. This project then completed the preparation, production, and mass printing of vegetation maps of all of Zimbabwe at a scale of 1,250,000. For further information, please contact Christoph Dreiser at voice (4991)141-7252 or FAX (4991)141-3297 or mail at 9 Nimrodstrasse, Haus 2, Nuremberg 90441, Germany. (email christoph.dreiser@t-online.de)

Paris, France—Geosciences Consultants S.A.R.L. (GSC).

MicroImages is pleased to present Geosciences Consultants S.A.R.L. (GSC) as a new MicroImages dealer located in Paris, France. GSC is a consultancy specializing in oil and gas exploration, underground storage, urban and environmental planning, and natural resource management. Since 1990, they have completed a wide variety of contracts in Honduras, Nicaragua, Salvador, Colombia, Peru, Philippines, Zaire, Greece, Italy,

Switzerland, USA, and many activities in France. Many of these projects have had a remote sensing and/or mapping component. GSC is now expanding these consulting projects to include reselling, training, and support of geospatial analysis projects as appropriate. For further information, please contact Richard Guillande at voice (3314)664-6060 or FAX (3314)664-6161 or mail at 157 rue des Blains, Bagneux 92220, France [a suburb of Paris]. (email 101626.1445@compuserve.com or rg_gcs@compuserve.com or web site www.geosciences-consult.com)

Toronto, Canada—HyperInfo International Inc. (HII).

MicrolImages is pleased to present HyperInfo International Inc. as a new MicrolImages dealer located in Toronto, Canada. HII is a new company specializing in remote sensing and registered in Canada with offices in Beijing. The principals of this company have been or are active in the Institute of Remote Sensing Applications of the Chinese Academy of Sciences and the National Remote Sensing Center of China building, flying, and testing hyperspectral imaging sensors and analysis software and operating a remote sensing service center. HyperInfo has been organized to offer these and other geospatial information services in China and worldwide. For further information, please contact Jinnian Wang at voice or FAX (416)663-8000 or mail at 40 Fountainhead Road, Suite 1704, Toronto, ON M3J 2V1 Canada. (email hyperinfo@canada.com)

Beijing, China—HyperInfo International Inc. (HII).

The Beijing office of HyperInfo International Inc. is directed by Professor Qingxi Tong, an Academician of the Chinese Academy of Sciences and author of 7th, 8th, and 9th five year plans (1985-2000) for remote sensing and GIS sci-tech development projects in China. This larger HII office will resell the **TNT** products along with their remote sensing data collection and analysis projects and the sale of their airborne hyperspectral imaging system. HII also has a low-cost ground hyperspectral imager in development. For further information, please contact Zhang Bing at voice (8610)6487-0569 or FAX (8610)6488-9210 or mail at 307-3-308 Kexueyuan Nanli, Datun Road, Choyang District, Beijing 100101, China. (email zb@hrs1.irsa.ac.cn)

Harare, Zimbabwe—Spatial Information Solutions Ltd. (SIS).

MicrolImages is pleased to present Spatial Information Solutions as a new MicrolImages dealer located in Harare, the capital of Zimbabwe. SIS is a new consulting firm founded in 1999 to provide geospatial consulting services to government, planning, and environmental agencies. For further information, please contact Paddington Hodza at voice (263)433-4805 or FAX (263)433-4807 or mail at 2 Avondale Flats, 109 King George Road, Avonlea, Harare, Zimbabwe. (email phodza@sirdc.icon.co.zw)

Moscow, Russia—[name to be determined].

Greg Kochergin has been a software engineer working on the development of the **TNT** products for over 3 years. For example, he added the generic WINTAB support for X-Y digitizers to **V6.20** of **TNTmips** and **TNTedit**. Greg has just returned to Russia and is now a MicrolImages Authorized Dealer located in Moscow. Obviously, Greg is intimately familiar with the structure and operation of the **TNT** products. For the time being, Greg can be contacted via MicrolImages until a permanent office address and contact information becomes available.

Athens, Greece—KLEOS S.A.

MicrolImages is pleased to present KLEOS S.A. as a new MicrolImages dealer located in Athens, Greece. KLEOS, established in 1990, specializes in systems engineering and project management. They represent the products of a number of other Greek and international corporations in the aerospace, engineering, and military technologies. Their associates are already experienced in the application of the **TNT** products. For further information, please contact Anastasios Aloupis at voice (301)721-9084 or FAX (301)722-4690 or mail at 22 Vas. Konstantinou Avenue, Athens 11635, Greece. (email kleos@hellasnet.gr)

Riga, Latvia—Envirotech, Ilc.

MicrolImages is pleased to present Envirotech, Ilc as a new MicrolImages dealer located in Riga, Latvia. Envirotech was established in early 1999 as a spin-off company from HNIT-Baltic GeoInfoServisas, the sole distributor of ESRI products for Latvia and Lithuania. Envirotech is providing geodata preparation and service work in the areas of cartography, environmental protection, and for utilities and municipalities. For further information, please contact Janis Dzelzitis at voice (371)721-5220 or FAX (371)721-5158 or mail at 12 Miesnieku iela, Riga 1050, Latvia. (email jdz@envirotech.lv)

Seoul, Korea—OpenGIS Korea Co. Ltd.

MicrolImages is pleased to present OpenGIS Korea Co. Ltd. as a new MicrolImages dealer in Seoul, Korea. OpenGIS Korea was established in 1996 under the name Geo-Plus Co., which subsequently changed to OpenGIS Korea. They are focused on bringing GIS and remote sensing services to engineering and government clients in Korea and have recently been involved in the development of Korea's National GIS (NGIS). OpenGIS Korea has also developed commercial software products for specialized geo-applications in Korea such as PubLand, PubBuilder, and PubStream. For further information, contact Hwasoo Yeo at voice (8223)411-1359 or FAX (8223)411-1322 or mail at 401 Hanwha Store Bldg., 186-17 Kaepo-dong, Kangnam-gu, Seoul, Korea. (email ogk@opengis.co.kr or web site www.opengis.co.kr) (Note: OpenGIS Korea is not affiliated in any way with MicrolImages dealer OpenGIS in Japan.)

Helsinki, Finland—GeoSurf.

MicrolImages is pleased to present GeoSurf as a new MicrolImages dealer in Finland. This is a transfer of an existing dealership to a newly-founded private company to be operated by Pentti Ruokokoski, who was the MicrolImages representative for many years at the previous Finnish dealer, Soil and Water Ltd. You can now contact Pentti Ruokokoski at his new business at voice (358)407-714287 or FAX at (358)940-7774 or mail at GeoSurf, Mechelininkatu 24 A 7, Helsinki 00100, Finland.

Discontinued Dealers

The following dealers are no longer authorized to sell MicrolImages products. Please do not contact them regarding support, service, or information. Please contact MicrolImages directly or one of the other MicrolImages Authorized Dealers.

Atterbury Consultants, Inc. (Bob Wright) of Beaverton, Oregon, USA is discontinued.

Furst Light GeoTechnologies. (Tom Furst) of Longmont, Colorado, USA is discontinued.

Dienekis Information Systems. (Vogelis Rizos) of Athens, Greece is discontinued.

Computers

This MEMO discontinues the long standing practice of recommending a desktop Windows-based computer(s) that would be optimal for use with the **TNT** products. The US\$1000 PC, the latest iMac, or a low cost portable will operate the **TNT** products with excellent results. You can still spend US\$3000 or more on a state-of-the-art PC with beefed up peripherals, a DVD drive, a read/write CDRW, dual 19" monitors, and so on. However, as you all have noticed, major vendors are introducing new configurations every couple of months. In fact, with Dell, Gateway, and Compaq, most machines are being assembled to order, with prices that fluctuate widely. No matter what recommendations were made here, they would be out-of-date by the time you read them and could take action to purchase one. Desktop computers have truly become commodities when their prices fluctuate widely from day to day as they are now doing.

Prices

The price of the **TNTlite** kit containing the CD and printed versions of all 50 booklets (~1000 pages and ~2500 illustrations) is now increased from US\$60 to US\$75, which includes shipping by airmail in the United States and DHL express anywhere else in the world.

All **TNT** product "catch-up" upgrade prices are altered effective with this shipment of **V6.20**. All these pending changes were detailed in a MicrolImages MEMO dated 2 August 1999 and sent to every MicrolImages client. These new prices for individual upgrades to **V6.20** are also reflected in the new upgrade price tables provided elsewhere in this MEMO.

Papers on Applications

* TNT Reviews.

Image Processing from the User's Point of View. by W. Fredrick Limp. *GEOEurope* May 1999. pp. 40 to 46.

"Fredrick Limp provides a comprehensive overview of today's leading image processing packages, along with suggestions for selecting the right product for various applications."

[The 6 image processing products discussed in this article are **TNTmips 6.0**, **ENVI 3.1**, **ERDAS IMAGINE 8.3.1**, **ER Mapper 6.0**, **Image Analyst 7.0**, and **PCI 6.3**.]

NT-Based GIS Software is on the Rise. by Lee Graham. *GEOWorld* July 1999. pp. 34 to 41.

"NT-based GIS packages are abundant in today's marketplace. Here's an overview of the products and features offered by 21 NT-based GIS vendors in North America and Europe."

NT-based GIS rises to the occasion. by Lee Graham. *GEOEurope* July 1999. pp. 34 to 39.

"NT-based GIS packages are on the rise in today's marketplace, proving they're more than just phenomena full of 'hot-air'. Lee Graham presents an overview of the products and features offered by 21 NT-based GIS vendors in North America and Europe."

Mapping Hits Warp Speed on the World Wide Web. by W. Fredrick Limp. *GEOWorld* September 1999. pp. 36 to 41.

“Selecting a Web-based mapping software is difficult at best. To help users choose the package that’s right for their applications, GEOWorld examines criteria for selecting a Web-based mapping product and assesses how available software ‘measure up’.”

[The 7 geoserver products illustrated in this article are MicroImages’ **TNTserver**, Bentley’s ModelServer Discovery, Intergraph’s GeoMedia Web Map, ESRI’s Web mapping software, Autodesk’s MapGuide, MapInfo’s MapXtreme, and Caliper’s Web mapping product.]

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Rewarded Papers.

When GIS Comes to the Neighborhood. A small area takes on a big project. *Planning* July 1998. by Charles Moore. pp. 8-12. Official publication of the American Planning Association.

Aplicacao de Indice Comparativo na Avaliacao do Risco de Degradacao das Terras: Application of a Comparative Index in Evaluation of Land Degradation. by S.B.L. Ranieri, G. Sparovek, M.P. Souza, and D. Dourado Neto. *Rivista Brasileira de Ciencia do Sol.* Volume 22, Number 4. October to December 1998. pp. 751-760.

Change Detection with 35mm Air Photos, Video and GPS: Forest Monitoring in Madagascar Protected Areas. by Kevin P. Corbley and Dana Slaymaker. *GIM International* April 1999. Vol. 13, No. 4. pp. 51 to 53.

A GIS fishing expedition. by Imran Klotz-Shiran. *GeoEurope* July 1999. pp. 32-33.

“The commercial potential of mariculture production in South Africa is beginning to surface and provincial governments have begun to take the bait. Imran Klotz-Shiran explains how geospatial technology is being used to fish out the most suitable regions for sea farming development.”

Protecting Africa’s Protected. by Kevin P. Corbley. *GEOEurope* May 1999. pp. 34 to 35.

“Kevin Corbley explains how satellite imagery and GIS are helping to maintain a balance between the wildlife and livelihood of local people in Ndoki (Congo).”

GIS and Satellite Imagery Track Encephalitis Infection. by Kevin P. Corbley. *EOM* September 1999. pp. 36 to 39.

Publishing Geospatial Data Online to Optimize Rural GIS Resources. by Jason Rader. *Spatial News*, 11 October 1999, 4 pages. (an online publication, see archives at <http://www.spatialnews.com>)

Other Papers.

Multi-layered and Statistically Based Ecosystem Mapping: The de facto standard for land resource planning in the 21st century. by John D. Beckingham, Michael Desilets, Darrin Nielsen, and Frank Johns. *EOM* June 1999. Vol. 8, No. 8. pp. 10 to 13.

PPS Prairie Dog Patrol. GPS Aerial Surveys of Dog Towns. by John G. Sidle. *GPS WORLD* September 1999. pp. 30 to 35.

“The black-tailed prairie dog—a Great Plains necessity or nuisance? As some seek to classify the species as endangered or threatened, others wonder why anyone would bother protecting the little rodent. Government agencies, though, must decide the animal’s status and role in the public lands it inhabits—a decision that will be based in part on aerial survey data positioned using a military grade GPS receiver.”

Promotional Activities

Map of Egyptian Oases.

This enclosed sample map was created as a layout using AVHRR imagery and bathymetry as a raster base. The roads and boundaries are from the Digital Chart of the World. The oases and names were created from a reference map using the Spatial Data Editor.

Appendix: Abbreviations

For simplicity, the following abbreviations were used in this MEMO:

W31 = Microsoft Windows 3.1 or 3.11.

W95 = Microsoft Windows 95.

W98 = Microsoft Windows 98.

W2000 = Microsoft Windows 2000, which is the new generic name for what has been called NT 5.0 up until recently. W2000 is now available in a beta 3 release.

NT or NT4 = Microsoft NT 3.1, 3.5, or 4.0 (3.1 is error prone, and thus the **TNT** products require the use of 3.5 and its subsequent patches). NT4 now has a patch 5.

Mac = Apple Macintosh using the PowerPC 60x or G3 processors and MacOS 7.x or 8.x.

MI/X = MicroImages’ X Server for Mac and PC microcomputer platforms and operating systems.

HSI = Hyperspectral image or imagery. This is imagery simultaneously collected in at least 25 or 30 spectral bands.