Fungis

Newsletter of the
Far North GIS Users' Group Inc

In This Issue

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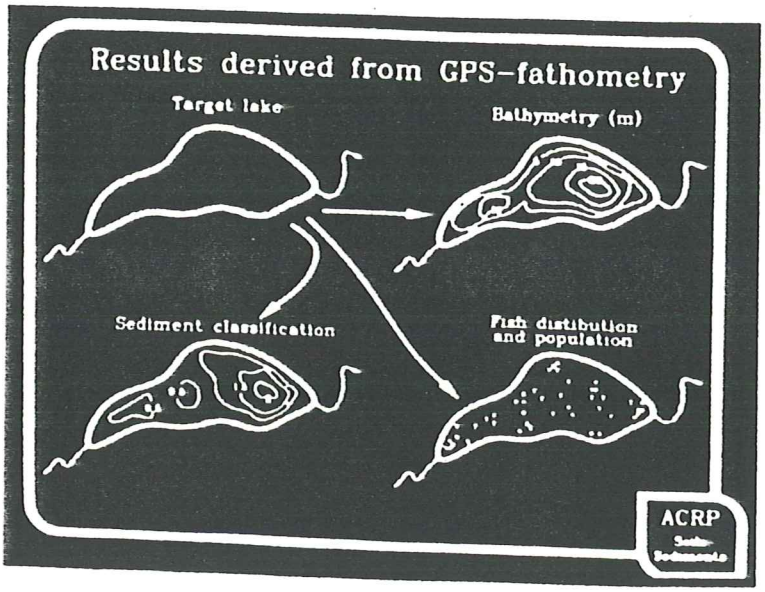
We have a small number of reference Books and texts of general interest to members, that shortly will include Spatial News, a fortnightly publication. It is intended to place these for acess but not removal for all FNQGIS members and the Student body at James Cook University Cairns Campus Library.

Integrating other measuring devices with GPS positions.

The integrating of GPS with other external sensors is perhaps one of the most exciting aspects of GPS technology. With the advent of C/A code based gps receivers that can compute sub-metre positions continuously on a second by second basis, combining GPS position data with external sensor data is now easier and faster than ever. The applications for this GPS/sensor combination are virtually limitless. Hundreds of different electronic sensor devices are in use today, recording parameters as diverse as temperature, radiation, air pressure, pollution levels, salinity and biomass levels. Before the advent of GPS, the location of a sensor reading had to be recorded by hand from maps or obtained with the use of other electronic positioning aids such as Loran or radio transponders.
The major drawbacks of each of these methods were questionably speed and accuracy. Even the electronic positioning methods were not very accurate, and transcribing positions from a map to a file is very slow and subject to transcription error. This pre GPS problem with positioning limited the usefulness of many sensors.

Typical uses of a combined system.
When electronic data is collected in the field, the typical object is the creation of a type of contour map. For example, if elevation is measured at several geographically distributed locations, an isoelevation map of topographic contours can be created. Alternatively, when radiation is measured at a number of lo-



A GPS was connected to a depth sounder, a fish finder and a sidescan sonar in order to collect data on the presence and distribution of lake contaminants. The lake was traversed in a rubber boat while sensor data was collected on the external sensors.

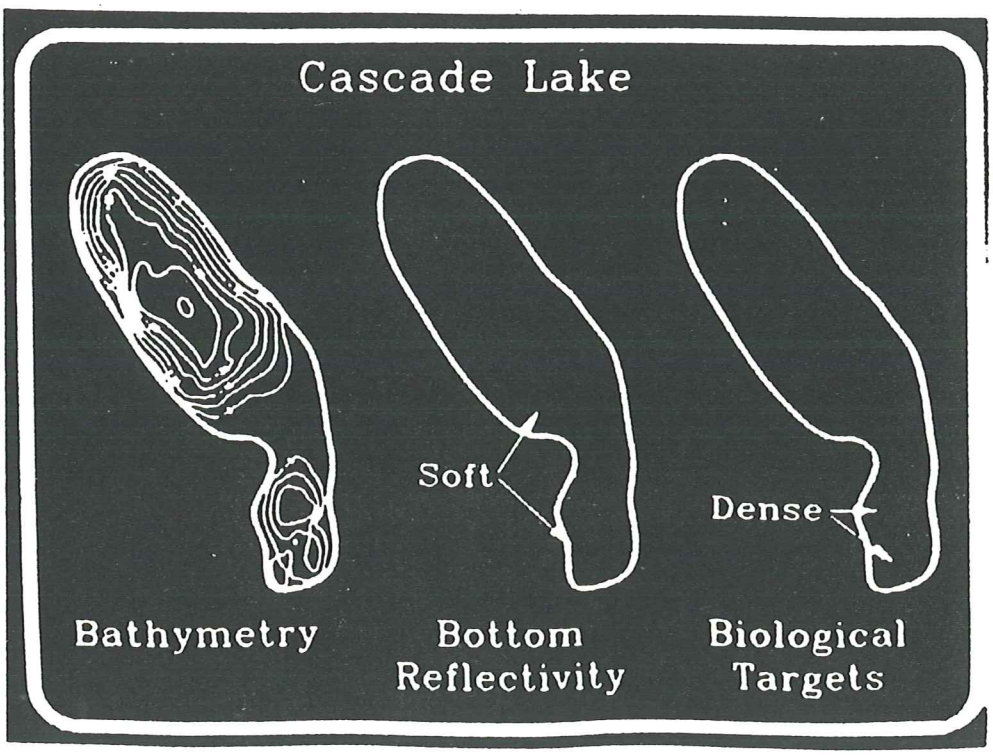
cations, the user can produce an isorad map. No matter how accurate the external sensor data, without accurate positions for matching you may not be able to make an intelligent evaluation of the data collected.

Benefits of combining with GPS.

The principle behind combining GPS with external sensors is simple. If you have two separate devices storing digital data (one external sensor and one GPS receiver), why not store two sets of data in a common file with a common time stamp? The data collection can be done more quickly since you are freed from recording positions with a map and pencil, and the storage of all the data in a digital form eliminates the possibility of transcription errors. In addition the positions derived by a good GPS are more accurate than those marked by hand or computed from other electronic navigation aids. Using GPS time as the common time stamp gives an extremely stable, universally accepted and highly accurate time source. As an added benefit, the GPS data serves as validation that you were at the correct location on the correct data and time.

Choosing a combined system.

To get the most from sensors, you need a GPS accurate enough not to compromise the significance of your external sensor data. Further, the positioning rate of the GPS must meet or exceed the sensor-cycle rate. The speed and accuracy of a GPS are usually related. When choosing a GPS system, you should therefore keep in mind the following points.



Measuring bathymetry, bottom reflectivity and biological targets

⇒ Consider the accuracy required of the GPS positions, particularly if the application requires sub-metre accuracy. Today's GPS receivers are divided between those that compute sub-metre positions on a second-by-second basis and those that may require ten minutes or more to compute a single sub-metre position. The coupling of GPS and external sensors is a viable solution only if the time required for positioning is less than the time required for a measurement cycle on the external sensor.
For example, let's look at the case of a sensor that generates one reading every ten **seconds** and a slow GPS positioning rate of one sub-metre position every ten **minutes**. While gathering samples, you will have over nine minutes of idle time before being able to move on and take the next sensor sample. On the other hand, by having a fast GPS position rate of every second, you can operate continuously at the full capability of the sensor and spend as much time as you wish gathering sensor data.

⇒ Alternatively, the sensor may require a long time for a single reading (Compared to a GPS receiver that computes positions once per second). Look for a system that will allow you to apply the average of all of the positions that were calculated at one location to a single sensor reading. For example, if the sensor requires 30 seconds for a reading, the position that is output for that sensor record should be derived by averaging all 30 of the GPS positions that were stored during the sensor measurement.

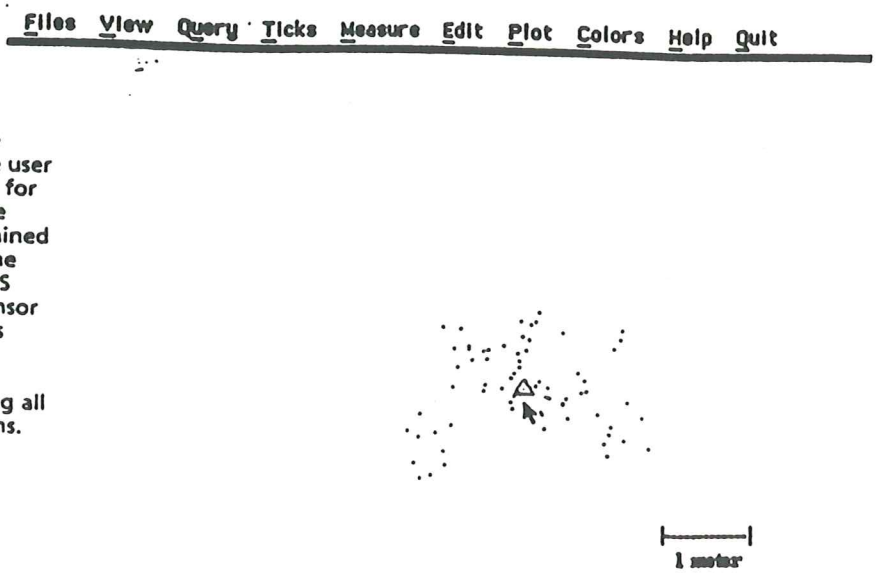


Figure 1: Multiple GPS positions were averaged together to represent one sensor measurement. The user occupied a single location for approximately one minute and during that time obtained one measurement from the external sensor and 70 GPS positions. An accurate sensor location (the triangle) was automatically derived to represent the sensor measurement by averaging all 70 of the raw GPS positions.

⇒ If you use GPS to navigate to the sites where measurements are to be taken, you need a GPS that can perform **real-time differential correction**. If this is not what you require, make certain that your sensor records will not be stripped from the data file by the post-processing software.

⇒ Look closely at the facility that time tags the GPS and other sensor records. In a perfect world, the GPS and external sensor would compute their respective data simultaneously. This however rarely happens.
Synchronising the two devices can be messy and difficult and should not be a requirement. An attractive alternative to synchronisation is interpolation. Look for software that can interpolate the position of sensor records from the GPS positions that were computed immediately before and afterwards. This allows the sensor to work autonomously at it's own update rate. For example, if the sensor generates a measurement at time '0.6983 seconds' and GPS positions were computed at times '0.00 and 1.00 seconds', the location of the sensor measurement is 69.83% of the way between these two position records. A unique position specific to this sensor record is computed by the system software. Some GPS products allow the user to obtain positions via either synchronisation or interpolation.

⇒ Carrying two separate systems into the field can be a physical challenge. In general, the heaviest part of most electronic devices is the power supply or batteries. Look for a system that allows the GPS and external sensors to share a common

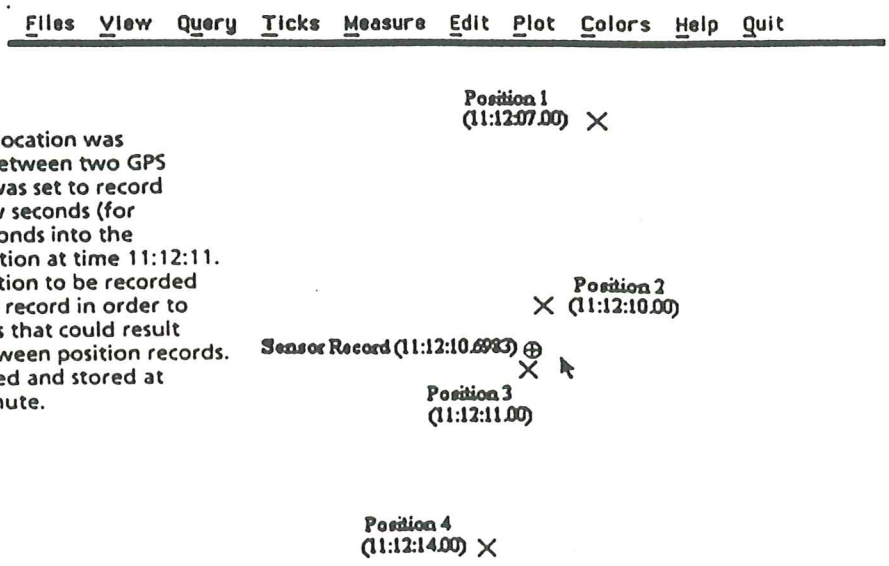


Figure 2: An accurate sensor location was computed by interpolating between two GPS positions. The GPS receiver was set to record positions only once every few seconds (for example, at 7, 10, and 14 seconds into the minute). Note the extra position at time 11:12:11. The GPS forced an extra position to be recorded immediately after the sensor record in order to minimise interpolation errors that could result from an extended break between position records. A sensor record was computed and stored at 10.6983 seconds into the minute.

power source. Similarly, the most convenient systems will record the data from the GPS and the external sensor onto one logging device, preferably one that is designed to withstand the rigours of field use (or abuse).

⇒ Finally the GPS must be designed so that it can accept digital input from a generic sensor device. A well-designed system with this capability will allow you to specify parameters such as dataprefix/suffix, data request/terminate strings and predefined logging intervals for the sensor records. It is important for such a GPS system to be able to accept sensor data in either ASCII or binary form.

Summary.
Once again, the best advice is to test the equipment yourself in your working environment. Make certain that the GPS software can present the sensor data in a usable form, especially after differential processing. Be sure that the accuracy and speed of the GPS is sufficient for your application. In addition, consider portability, ability to use a common power supply and sturdiness to stand up to the rigours of field use.

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Mapping Awareness.
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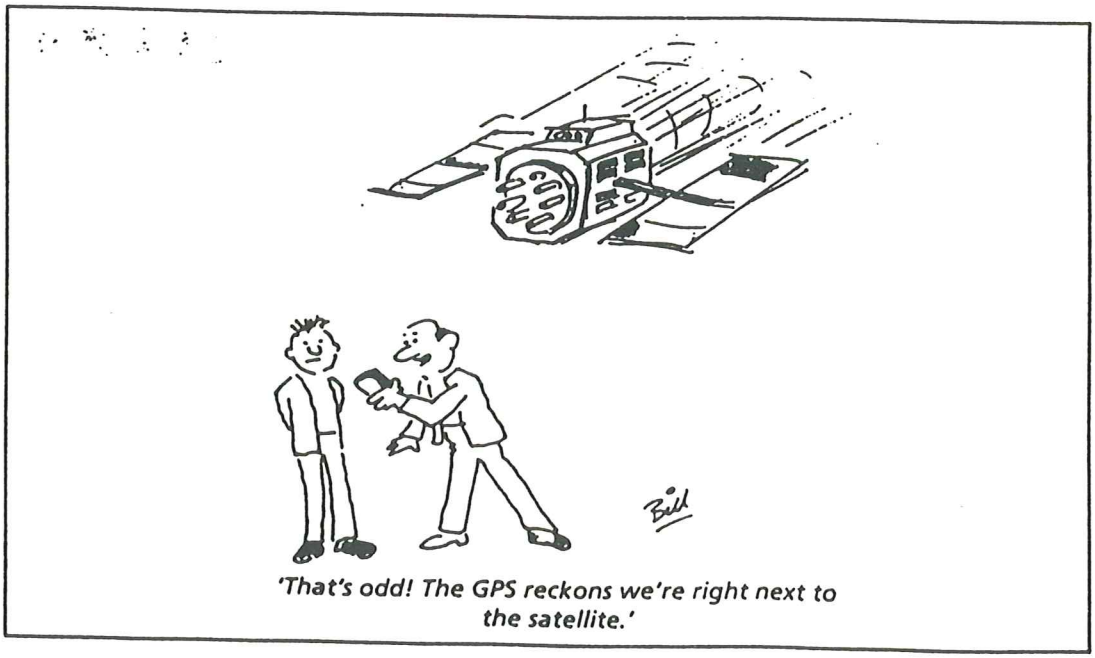
extracts from an Irish Medical Dictionary.

Impotent: Distinguished, well known.
Rectum: Bloody near killed em.



'That's odd! The GPS reckons we're right next to the satellite.'

Bits and Pieces.

For all who like something for nothing.
SURFACE
This is a freeware program written for Windows 3.1 which will read in a set of scattered data points (x, y, z) which represent a surface. The program will generate a regular grid from this data and then display the surface as a contour map, or as a grid viewed from an arbitrary viewpoint, optionally with hidden lines removed. Output can be via the clipboard or saved as a DXF file.
you want it?

ftp://ftp.coast.net/SimTel/win3/gis/surface2.zip

ImageNet.

Earthware Systems in Canberra is promoting a system called ImageNet supplied by Core Technologies in California. ImageNet is an on line image, vector and spatial data search and preview system. Data in the archive currently includes products from EoSat, SPOT, Sovinformsputnik (Russian space imagery) and Etak (US street addressing data). It's mostly North American data, but worth a look anyway. After previewing a low-resolution image on-line, any dataset can be ordered directly from Core Technologies. Core will provide all the necessary software to make the system work.

Call in on Core at
http://www.coresw.com

thanks to netnews in GIS User 15

On the home front.
Cairns Datascan are providing **Compact Disk Archival.**
It is now possible to have your archived drawings scanned to raster images and stored in a database for instant viewing, editing or hardcopy out retrieval.Using Viewbase software allows stored images to be viewed and plotted. It works for Autocad, spreadsheet, database and graphic files.
Once your plans have been scanned they are transferred to CD for storage, a capacity of around 600 drawings per CD is normal.
Contact Cairns Datascan at 8 Scott St. Cairns.
Ph. 070 411 656
Fax 070 521 634.

Redcliffe City GIS.

Mark Billing's crew at **ESRI** Brisbane have pulled Redcliffe City Council into the fold. The Council has just awarded a $210,000 contract to ESRI for the supply of GIS software, hardware, training and consulting services.
Redcliffe with a population of approximately 50,000 is just north of Brisbane. The Council will use the GIS for local Government applications such as asset management, counter inquiries, land parcel management and planning purposes. They are installing ArcInfo and ArcView software on Digital Alpha hardware.

Mark commented " Municipalities with expanding populations and complex planning issues are adopting GIS to extend the capabilities of their existing IT services. New technologies such as ArcView that integrate sophisticated GIS functions and desktop applications with existing databases are contributing to the increasing popularity of GIS ".

ArcView 2.1

Mark took advantage of advising me of the Redcliffe deal by passing on some information on ArcView 2.1 I feel it will be a significant improvement for stand alone users and those propellor heads that will use Avenue the object oriented scripting language which is now bundled at no additional cost. Also included is a library of more than 90 custom utility scripts, providing a wide range of capabilities from Shapefile (the basic data format for ArcView) editing to enhance thematic mapping that can be plumbed into the users application.
ArcView for Windows can read AutoCAD drawings DWG files and Interchange DXF files in their native format, these can then be integrated into projects and users perform all of the same operations on these themes as on ArcView themes without translation.
Support for Dynamic Link Libraries DLL, and enhanced support for Dynamic Data Exchange DDE, is provided.
Mark tells me that these extensions provide the ability to enhance ArcView using standard application development tools like Visual Basic or C++.

Mark Billing`s address is

Esri Australia.
Northern Region.
Ph. 07 3831 3210
Fax 07 3831 3214.

Ophra Winfrey virus: Your 500mb hard drive suddenly shrinks to 329mb, and then slowly returns to 500mb.

Here comes BLIN

Lands are about to turn this product loose on the general public. **BLIN** will allow access to key Department of Natural Resources (Lands) Data Bases.
When fully established, **BLIN** will provide entry to key databass from each of the Department`s 34 Offices, or alternatively will provide access by direct link to a client`s personal computer in their own office.

Froth and Bubble.

I spent a morning at the GIS section DPI Mareeba recently. Now I know why Terry Webb always has a beatific smile on his face. He is surrounded by a bevy of ultra smart ultra glam ladies. They go under the collective name The Froth and Bubble Section. Anyway thanks go to Seonaid the ringleader.

MapInfo Pro.

MapInfo Corporation has released version 4.0, otherwise known as MapInfo Pro. It is fully compliant with all the standard architectures such as the various flavours of Windows, Unix and Macintosh OS. It is a 32 bit application so it is able to take full advantage of the facilities of Windows NT and Win`95. It is OLE2.0- and ODBC compliant.
This last - Open DataBase Connectivity - is a feature long on the wish list of corporate users. It means MapInfo can acess all the common desktop databases like Oracle, Informix, Access and so on. Furthermore when MapInfo accesses the database it creates a link between the MapInfo database and that database, such that any updating of either will result in the transfer of data.
This makes it possible to use MapInfo in multiuser environments - essentially the database will take care of all read/write priority problems.
The significance of OLE compliance is that MapInfo objects (typically a map graphic) can be placed inside other applications on the desktop. For instance, a map might be included in a word processor document or a spreadsheet.
A third major new feature of this release is what MapInfo calls integrated mapping. This is essentially the ability to create applications using Visual C++ or Visual Basic and include Mapinfo functions within the application.

Phillips AVL.

Phillips Mobile Communications has developed an Automatic Vehicle Location `Starter kit` for people who wish to get into tracking and control of remote vehicles. The kit makes it possible to set up an AVL system with minimum cost prior to ordering a larger customised system.
The system consists of a Phillips PRX80 compact base station kit, a GPS receiver and two digitext modems. The starter kit also includes a customised version of MapInfo with an integrated AVL interface and road centreline data.
To make a practical AVL system you would also need two PRM80 radios, a computer running Windows 3.1 and licences giving access to appropriate parts of the radio spectrum. This equipment is not included in the starter kit because many potential customers will already have radio systems installed.
The kit is designed for the MPT1327 trunked mobile radio networks. It could, however, be used on any radio system with some simple reconfiguration.

Enquiries to Phillips on +61 3 9574 3666.

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Robert Crossley Reports.

Far North Sugar Industry.

Many cane farmers throughout the far north will receive maps of their farm produced by a GIS for the first time this year. These maps will be produced using a product called **FarmMap**, a MapInfo application specifically developed for the Sugar Industry.

The FarmMap product is written using MapBasic (MapInfo`s programming language), and is designed to automate tasks which the sugar mills do annually. It has tools to enhance MapInfo`s core functionality to capture and edit farm data, and to automate the production of high quality maps of each farm at the end of the season.

FarmMap has been acquired by 3 Mills in the north this season, Mulgrave, Babinda and South Johnstone. Now the crushing season is over, these mills are going all out to implement the digital system to produce the farm maps for the 1996 Season. They will join Tully Mill who already use a similar MapInfo product called Tully Map and Mossman who use ArcInfo to make the far-north sugar industry one of the most innovative in adoption of new technology. South Johnstone Mill will also join Tully Mill in using Global Positioning System technology to map the extents of some of it`s farms and should be able to track it`s cane trains in real time in the near future.

FarmMap was originally an ERSIS product, developed for Mills in the Mackay area nearly 3 years ago. It`s development has been taken over by Robert Crossley & Associates, a Cairns based company.

"The software has served it`s original purpose well for 3 years now, but needs enhancements to be used with the new version of MapInfo." says Crossley. " Enhancements are needed to take advantage of the significant advances that MapInfo has made in the last few years, such as display of registered raster image for heads-up digitizing, enhanced editing features and enhanced external database connectivity."

" I did not want to be a middleman having to negotiate for changes with a development team in Brisbane when I knew that the Mill staff are going to be on my back for these changes immediately. I have negotiated an agreement with ERSIS to allow me to take over upgrading the FarmMap source code myself. I worked for a period with ERSIS as a programmer, so they have some confidence in my ability to do so. This will allow me to resolve those inevitable undocumented features of the software very quickly. Also I will be working with the

cane-inspectors who are doing the mapping at present, so I can identify ways to make the process even easier."

Crossley also has some ideas on the future prospects for FarmMap for using GIS for productivity and management applications. He says " My technical training is in agricultural science. It is sort of deja-vu as the original reason I got into computing some 10 years ago was to develop farm management software for the Land Management Branch of the QDPI. Back then I was using expert system software and became very excited about the power of combining decision software with spatially referenced data contained in a GIS. I believe we were one of the first in the world to link an expert system with a GIS back in 1989."

" For the moment, however, the main priority is simply to get the maps of each farm out. Maybe then I`ll do some navel gazing and look at future enhancements or perhaps at other industries which could use similar software.

More information on FarmMap can be sourced from :
Robert Crossley,
PH 070 314 877
or 0419 640 662.

Please Note.

We have filled all slots for papers at our upcoming annual Seminar which is schedulled for Monday 3rd. and Tuesday 4th. June 1996. The venu is the new James Cook University Campus.

The 1997 NARGIS Seminar dates are from Tuesday 28th. April thru to Friday 2nd. May. The venu is again the James Cook University Cairns Campus. We have received several expressions of interest in delivering papers but are looking for many more. So dob in a friend or even yourself. You can contact Les Searle at phone/fax 070 392 935 or Alan Stafford phone/fax 070 981128 home or work 070 981 400. Email taimalan@msn.com.

Lonely heart.

We have an addition to our Email listing, he is a Primary school teacher who would like to know more about GIS. He has been on the net for about 3 weeks and has only ever received junk mail, so, come on gang fill his hard drive.
normanlockwood@msn.com
is his address.

Lay some copy on me.

We have had a few enquiries about **Idrisi** both Dos and Windows and also **ER Mapper 5.1** both PC and Workstation versions. Anyone among this Newsletters readers having some experience of these Software packages might like to write an article reviewing same and submit to the Editor, prefer a 3.5 floppy in MS word.

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