Use of GPS technology for the localization and mapping of citrus germplasm

Abate G., Steduto P.

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D'Onghia A.M. (ed.), Menini U. (ed.), Martelli G.P. (ed.).
Improvement of the citrus sector by the setting up of the common conservation strategies for the free exchange of healthy citrus genetic resources

Bari : CIHEAM
Options Méditerranéennes : Série B. Etudes et Recherches; n. 33

2001
pages 91-94

Use of GPS technology for the localization and mapping of citrus germplasm

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The use of GPS will allow to georeference individual trees or orchard fields following a standard map projection system (WGS84) valid worldwide.

The georeferenciation of the biotypes assumes relevance not only for mapping purpose, or for referring to precise climate and soil maps so that the biotype is univocally linked to its pedo-climate (edaphic) environment.

There are many types of GPS available on the market. The precision achieved is quite high (from 2-3 m to few centimetres) depending not only on the instruments but also on the operator and procedure of deriving the coordinates (differential or single).

However, simple equipments but also precise, can be purchased with 200 US$. The best suggestion is to buy one of more elaborated type and many of simple operation. In any case, one GPS is needed for each operator.

Use of GPS technology for the localization and mapping of citrus germplasm .

Gianni Abate

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The GIS Data Life Cycle

Create/Update GIS Data

Validate/Update GIS Data

Different GIS Operations require different technologies ...

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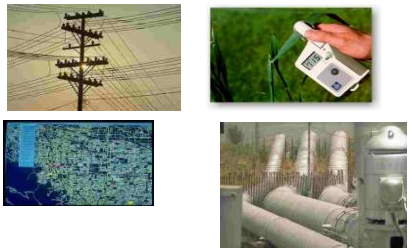
Data in Real Life



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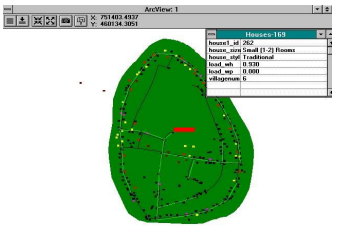
What information in our GIS?



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Creating and updating databases

- **The core of any GIS is data**
  - **Geographic data**
  - **Attribute data**
  - **Cartographic data**
  - **Queries**
- **Updating problem**
  - **Frequency**
  - **New additions**
- **Techniques**
  - **Traditional Vs Innovative**
  - **Cost Vs Efficiency**
  - **Reliability Vs Established procedures**

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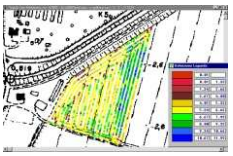
Creating and updating databases

- **Practical problems**
  - **Making GIS data and field data compatible**
  - **Finding again an already mapped element**



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Data dictionary

Feature	Type	Attribute	Type	Value	Step	Date req'd
Tree	Point	Oak	Diam	10-50	10	Yes
			Height	3-20	1	Yes
			Conditions	Good	Yes	
				Fair		
				Poor		
Path	Line	Footpath	Width	1-5	1	No
			Conditions	Good		Yes
				Fair		
				Poor		
Park	Area	Car area	Conditions	Good		Yes
				Fair		
				Poor		

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Sources of data

- **Digitizing from paper maps**
- **Acquisition from Scanner**
- **Traditional topographic techniques**
- **Notepads**
- **Photogrammetry**
- **Remote sensing, and...**
- **GPS**

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GPS is not "new"

- **Has been widely used since at least 10 years**
- **More than 160 different GIS are currently supported**
- **Many utilities have been developed since then**
  - Transformation parameters
  - Map overlay
  - Data Dictionary import/export
  - RINEX exchange format etc...

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New available techniques

- **Real Time DGPS data collection**
  - **Marine MSK radiobeacons**
  - **Local UHF/VHF transmissions**
  - **National Networks (GSM, RDS, LF/MF)**
  - **Satellite corrections**

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Data Collection

- Collection of spatial data
  - Points, Lines, Areas
  - Offset locations
  - 1 to 5 meter precision
- Customized attribute information
  - Menu lists, Text, Numeric, Dates and times
  - Multiple data dictionary support
  - Infield data dictionary creation

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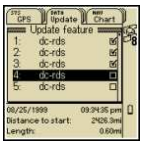
Data Maintenance

- Relocate features graphically
- Verify and update positions and attributes
  - Changes tracked automatically
- Add new features
- Integrate changes back into GIS



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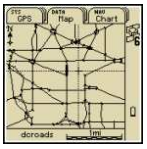
Real-Time Map

- Display features as you map or update them
- Easy zoom control
- Filter by:
  - feature type
  - time
  - update status



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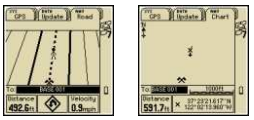
Navigation

- Navigate directly to features
- Use BoB for real-time DGPS precision
- Uses internal digital compass at low velocities or when stationary



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Advanced Data Collection

- Carrier phase logging for submeter precision
- Repeated features
  - rapid data collection of similar features
- Dedicated Pause/Resume button
- Virtual keyboard for text data entry

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Support Module

- Communication made easy
  - permanently attached to office computer
  - simply place the GeoExplorer 3 in the module
  - supports data transfer and battery recharging
- Connection Manager
  - continuously polls support module
  - automatic download, differential correction, export

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New available techniques

- **External sensors data integration on PRO XRS/Power class of instruments**

Radiation measures
Bar codes wands
Laser Distance Measuring
Mag Field Sensors
Gas/Atmospheric analysis
Water quality analysis
Echosounders
Corrosion measureas
IR Thermometre
Mine fields sensors
Inertial Platforms
Sonar

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Conclusions

- **GIS without updated data is useless**
- **New techniques (GPS, external sensors, software tools) help to increase productivity and efficiency**
- **New procedures allow to record reliable and highly descriptive sets of data**

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