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Title

From Sensor to Scientist Emissary and Cyberinfrastructure for Sensor Networks in Terrestrial Ecological Research

Permalink

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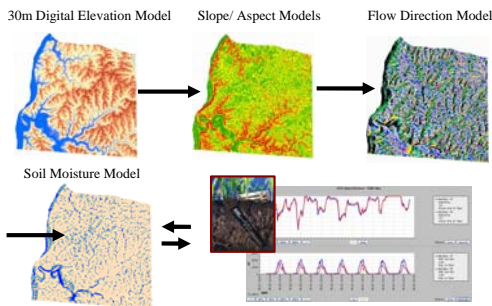et al.

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FROM SENSOR TO SCIENTIST: EMISSARY and CYBER-INFRASTRUCTURE for Sensor Networks in Terrestrial Ecological Research

Terrestrial Ecology Observing Systems at the James Reserve - www.jamesreserve.edu

S. Askay, D. Estrin, E. Graham, R. Guy, M. Hamilton, V. Rivera Del Rio, P. Rundel

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Emissary: *In situ* visualization and modeling of real-time sensor data and multimedia

30m Digital Elevation Model   Slope/ Aspect Models   Flow Direction Model

Soil Moisture Model

A field-portable interface for advanced data visualization, modelling, and data exploration of sensor micronets

Geographical Information Systems (GIS) and a Graphical User Interface (GUI) are combined to expand our understanding of data collected from sensors in the field.

Emissary supplies real-time access to current and archived data and data models. It also provides field guidance and facilitate the process of sensor configuration, calibration, testing and debugging.

Emissary: Scientists, students, and technicians visualizing data and conducting experiments

Digital imagery in 2D and 3D

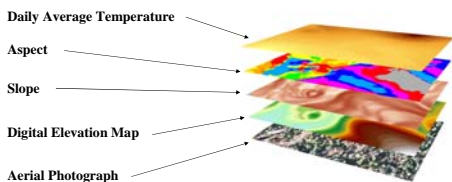Past and real-time sensor data

An accessible library of models
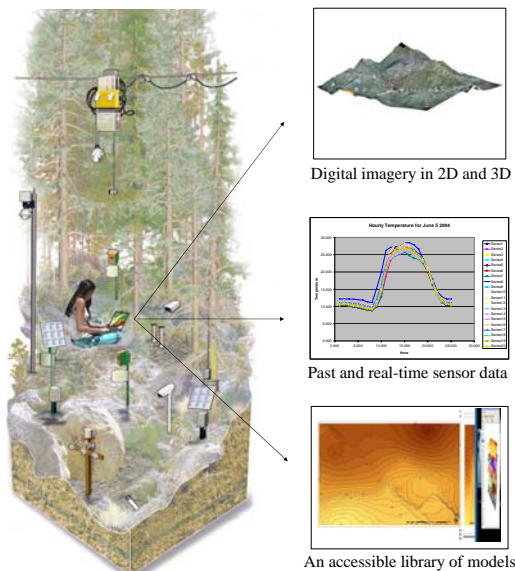
In the field:

Through the use of a PDA or laptop computer Emissary provides researchers the ability to:

- Connect wirelessly to mote-class devices (sensor nodes), networked data-logging instruments, WAN/LAN, and the Internet.

- Localize themselves accurately within the James Reserve (or within any deployed sensormicronet array) with the use of an on-board Global Positioning System (GPS).

- View the landscape surrounding them in both two dimensional (2D) and three dimensional (3D) representations: photographs or computer models.

- Access past and real-time sensor data from the James Reserve database (both micrometeorological, imagery, and specialized sensors) through a simple interface for database queries.

- Query a library of previously established micrometeorological models and test those models in the field with hand-held or portable sensors.

Daily Average Temperature
Aspect
Slope
Digital Elevation Map
Aerial Photograph

Geospatialized data layers derived from digital terrain models, remote sensing classifications, and interpolations will be available via the map server to an Emissary user.

In the lab and office:

Emissary provides researchers with the capability to produce models using past and real-time data for hypothesis testing and experiment planning. Data integrity can also be examined and the performance of sensors in the field, calibration, and maintenance of sensors is facilitated. Combining models and information on sensor performance, future deployments and improved and refined experiments can be better planned.

On-going Development of the User Interface: Online web tools
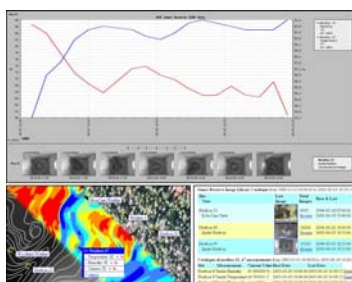
Current capabilities:

- Browse, display, and download data from lists of sensors and multimedia catalogs of archived and real-time data sources.

- Plot simultaneous sensors values and corresponding captured images for comparisons, data analysis, and debugging purposes.

- Examine area maps and choose sensor and video image capture locations from physical locations.

- Display of digital models, topography, and aerial photos in relation to locations of existing sensors and video image capture locations.

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