

Novel Scientific Products for 2005

Basin-Scale Water Balance

Two significant and novel scientific products were made available in 2005:

- A complete set of data from a series of boreholes drilled beneath all the major ecosystems in a transect between Chihuahuan desert lowland along the Rio Grande and ponderosa pine on the tops of the surrounding mountains. This is the first such transect ever attempted. The basic data accompany a paper submitted to *Water Resources Research*.
- The realization of the prototype Rio Grande Integrated hydrologic Observatory (RIO). At present this observatory consists of heavily-instrumented hydrometeorological/subsurface facilities in the mixed-conifer ecosystem at the Valles Caldera National Preserve (VCNP), ponderosa pine at the VCNP, piñon-juniper at LANL, and Chihuahuan desert at the Sevilleta National Wildlife Refuge. Sampling and monitoring of the Rio Grande itself (through the River Systems Macrotheme) is included.

Integrated Modeling

1. A SAHRA data policy has been developed and implemented.
2. A geo-spatial database has been developed and implemented in the Oracle Relational Database Management Systems (RDBMS) and populated with basic data that characterize the San Pedro and Rio Grande river basins.
3. The PERSIANN precipitation data system has been development and improved.
4. A coarse-resolution water banking model was completed with robust experimental results.
5. A medium resolution water banking model has been developed for the Rio Grande, including: (1) a high resolution (space and time) MMS-PRMS watershed model; (2) an engineering model of the important and relevant operational and river routing features; (3) a high resolution (space) groundwater model; and (4) the behavioral or institutional component at coarse resolution.
6. A parallel-version of the tRIBS land-surface hydrology model and a snow hydrology module were developed.
7. A general integrated water management dynamic simulation system was developed for riparian management, including wastewater treatment modules, conveyance system modules, agriculture production modules, and environmental and recreational benefit modules.
8. An interactive dynamic model for the Middle Rio Grande was developed.
9. The code and documentation of the Farm Package (with new farm processes) went into review in 10/2005 and published by USGS in 01/2006.
10. Low cost flow meter and data logger system have been developed through hardware and software development.

River Systems

- Delivery of a GIS-based tool to estimate the changes in groundwater use as a function of changes in vegetation to the BLM. This tool was used to compute the savings in water by BLM vegetation management along the San Pedro which are being incorporated into the 2006 USPP report to Congress.