



SEMI-ARID LAND-SURFACE-ATMOSPHERE (“SALSA”) PROGRAM FACT SHEET

THE PROGRAM

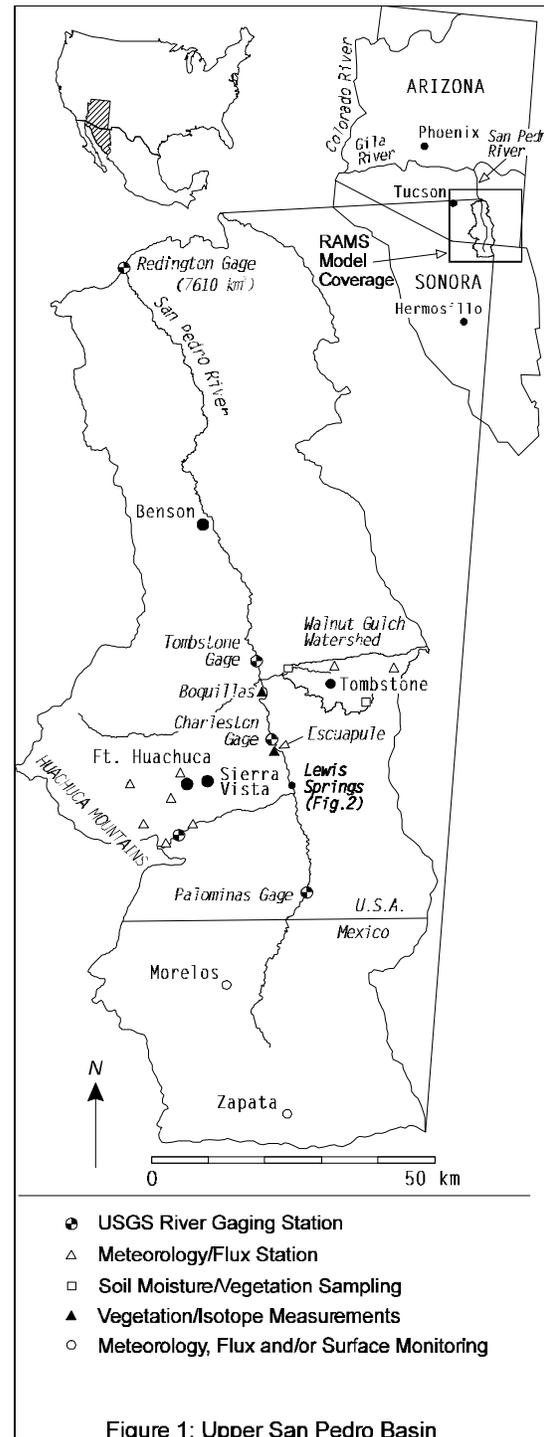
The primary goal of SALSA is to understand, model and predict the consequences of natural and human-induced change on the basin-wide water balance and ecological diversity of semiarid regions at event, seasonal, interannual, and decadal time scales. SALSA is a long-term program whose current research and integrated measurement efforts are focused on the San Pedro River basin which originates in northern Sonora, Mexico and flows north into southeastern Arizona (Figure 1).

STUDY AREA

The Upper San Pedro Basin (USPB) was identified as the focal area for initial SALSA research during an international workshop held in 1995. The riparian system in the U.S. portion of the USPB is the first Congressionally designated Riparian National Conservation Area. The basin embodies a variety of characteristics which make it an exceptional outdoor laboratory for addressing a large number of scientific questions in arid and semi-arid hydrology, meteorology, ecology, and the social and policy sciences. The area represents a transition between the Sonoran and Chihuahuan deserts with significant topographic and vegetation diversity, and a highly variable climate. It is an international basin spanning the Mexico-United States Border with significantly different cross border legal and land use practices. The upper and middle portions of the basin depicted in Figure 1 have a drainage area of 7610 km² at the U.S. Geological Survey gaging station at Reddington, Arizona with approximately 1800 km² in Mexico. Elevations range from roughly 1100 to 2900 m.

Major vegetation communities include desert shrub-steppe, riparian, grasslands, oak savanna, and ponderosa pine. In portions of the basin all of these vegetation types are contained within a 20 km span. The USPB supports the second highest known number of mammal species in the world and the riparian corridor provides habitat for more than 300 bird species.

From a socio-economic perspective, great concern exists regarding the long-term viability of the San Pedro riparian system and ranching in the face of continued population growth. Groundwater sustains the riparian



system in the United States and also much of the ranching industry in the Mexican portion of the San Pedro. The threat of excessive groundwater pumping to this riparian system has prompted the first application of international environmental law within the U.S. via the North American Free Trade Agreement.

ACTIVITIES

The 1997 SALSA activities were part of a longer term (3 to 10 year) effort to address the primary objective developed from initial program goals. The 1997 SALSA objectives focused on priorities established at the workshop and within logistical and monetary constraints; these were:

- 1) To improve the diagnosis of surface fluxes used in atmospheric models with grid spacings of several kilometers and compare remote and *in-situ* observations with real-time model runs;
- 2) To initiate the development and validation of a coupled soil-vegetation-atmosphere transfer (SVAT) and vegetation growth model for semi-arid regions that will assimilate remotely sensed data with several years of observed data;
- 3) To conduct *in-situ* and remote measurements to: a) quantify and develop models for groundwater, surface water, and evapotranspiration interactions on a seasonal basis; b) identify plant water sources; and c) identify plant function and atmospheric controls on a semi-arid riparian system consisting of mesquite, sacaton, and cottonwood/willow vegetation communities.
- 4) To develop and validate aggregation schemes with data over very highly heterogeneous surfaces; and,
- 5) To develop a multi-scale system of landscape pattern indicators using remotely sensed data to estimate current status, trend and changes in ecological condition.

Other factors involved in the selection of the above objectives include the desire to maintain and initiate long term observations and multi-disciplinary research in the San Pedro Basin, and to assist in addressing a number of pressing socio-economic concerns in the region. Long-term monitoring and research is essential to capture a range of both seasonal and interannual climatic variations and their associated impacts on basin water resources and ecology. It is because of the long history of monitoring and multidisciplinary experimentation in the San Pedro Basin and the long-term nature of SALSA that the NASA Earth Observing System ASTER (Advanced Spaceborne Thermal Emission and Reflection Radiometer) team has selected the San Pedro as a regional study and validation area.

Research supporting development and validation of ASTER aircraft simulator data products was also undertaken as part of 1997 SALSA objectives.

PRELIMINARY RESULTS

Preliminary results from the 1997 field season, as well as other information on the SALSA program, can be viewed on the SALSA website:

<http://www.tucson.ars.ag.gov/salsa/salsahome.html>

It is anticipated that the final results will be published as a "special-issue" set of journal articles in early 1999.

FUTURE PLANS

SALSA scientists will continue to integrate and analyze data collected during the 1997 field season, as well as carry on certain long-term monitoring activities. During 1998, the research emphasis will shift to the field studies in Mexico, and the basin-wide landscape change analysis and biodiversity studies.

COLLABORATORS AND SUPPORTERS

Several government agencies, universities, and organizations participate in SALSA. The core group includes the USDA Agricultural Research Service, University of Arizona, and ORSTOM/IMADES (French/Mexican team). Other collaborators include scientists from the US Environmental Protection Agency, US Geological Survey, Los Alamos National Laboratory, Jet Propulsion Laboratory, CIRAD, CESBIO, Utah State University, University of Iowa, Wageningen Agricultural University, Northern Arizona University, and Columbia University/Biosphere 2 Center. Additional support comes from NASA, US Bureau of Land Management, Arizona Department of Water Resources, Cochise County, among others.

INVITATION TO PARTICIPATE IN SALSA

If you would like more information on SALSA, or would like to participate in the program, please contact the program leaders below:

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