

UTILIZING REMOTE SENSING DATA TO ASCERTAIN SOIL MOISTURE APPLICATIONS AND AIR QUALITY CONDITIONS

In recognizing the significance of NASA remote sensing Earth science data in monitoring and better understanding our planet's natural environment, NASA has implemented the 'Decision Support Through Earth Science Research Results' program to solicit "proposals that develop and demonstrate innovative and practicable applications of NASA Earth science observations and research...that focus on improving decision making activities", as stated in the NASA ROSES-2008, A.18 solicitation. This very successful program has yielded several monitoring, surveillance, and decision support systems through collaborations with benefiting organizations in the areas of agriculture, air quality, disaster management, ecosystems, public health, water resources, and aviation weather.

The Goddard Space Flight Center (GSFC) Earth Sciences Data and Information Services Center (GES DISC) has participated in this program on two projects (one complete, one ongoing), and has had opportune ad hoc collaborations gaining much experience in the formulation, management, development, and implementation of decision support systems utilizing NASA Earth science data. Coupling this experience with the GES DISC's understanding of Earth science missions and resulting data and information, the GES DISC is in the unique position to be able to identify and address challenges that come with bringing science data to decision makers.

Specifically, the GES DISC Agricultural Information System (AIS) provides NASA Tropical Rainfall Measuring Mission (TRMM) precipitation information to the U. S. Department of Agriculture (USDA) Foreign Agricultural Service (FAS) and the U.N. World Food Program (WFP) in support of global crop monitoring. The primary goal of FAS is to improve foreign market access for U.S. agricultural products. The WFP uses food to meet emergency needs and to support economic and social development. (Funded by NASA's REASoN CAN-02-OES-01). In another soil moisture application, by integrating NASA's The Advanced Microwave Scanning Radiometer (AMSR-E) and Tropical Microwave Imager (TMI) soil moisture products into land surface models that provide improved evapotranspiration (ET) data seamlessly to the National Weather Service River Forecast System (NWSRFS), the capability for drought and flood disaster management is greatly enhanced. (Funded by NASA's ROSES 2005 -DECISIONS NNH05ZDA001N, Yao Liang, PI, currently with the Indiana University Purdue University Indianapolis [IUPUI]). In addition, the GES DISC has co-registered heterogeneous datasets for monitoring air quality. Here, the GES DISC created the Giovanni Air Quality Instance for visualization and exploration of remotely-sensed and *in situ* data products related to air quality. For the continental United States, the Air Quality instance features Environmental Protection Agency AIRNow PM_{2.5} data, aerosol and cloud data products from the Moderate Resolution Imaging Spectroradiometer (MODIS) instruments, and aerosol products from the Ozone Monitoring Instrument (OMI) instrument. In each of these cases, challenges were met and overcome not only to be successful in these projects, but also to be taken as lessons

learned when utilizing new mission datasets for future projects (allowing focus on new challenges).

Challenges encountered on GES DISC projects consist of those that can be met within typical science data usage frameworks, as well as those challenges that arise when utilizing science data for previously unplanned applications, such as decision support systems. The purpose of this presentation is to share GES DISC decision support system project experiences in regards to system sustainability, required data quality (versus timeliness), data provider understanding how decisions are made, which leads to the data receivers willingness to use new types of information to make decisions, as well as other topics. In addition, defining metrics that 'really' evaluate success will be exemplified.