AN AIRBORNE REMOTE SENSING EXPERIMENT FOR CATCHMENT-SCALE WATER CYCLE STUDY IN A TYPICAL INLAND RIVER BASIN OF CHINA

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Among the many land surface experiments have been carried out so far, arid and cold regions were paid little attentions. The land surface observations in arid and cold regions, both remotely sensed and in situ, need to be strengthened for a better understanding of hydrological and ecological processes at different scales.

The Watershed Airborne Telemetry Experimental Research (WATER) is a simultaneous air-borne, satellite-borne, and ground-based remote sensing experiment conducted in the Heihe Basin, the second largest inland river basin in the northwest arid regions of China. The WATER is aiming at the research on water cycles, eco-hydrological and other land surface processes in catchment-scale. Data sets with high-resolution and spatiotemporal consistency will be generated based on this experiment. An integrated watershed model and a catchment-scale land/hydrological data assimilation system is proposed to be developed.

The mission of WATER is to improve the observability, understanding, and predictability of hydrological and related ecological processes at catchmental scale, accumulate basic data for the development of watershed science and promote the applicability of quantitative remote sensing in watershed science studies.

The objectives of the experiment will be

1. Observing major components of water cycle in three experiment areas, i.e., cold region, forest, and arid region hydrology experiment areas, by carrying out a simultaneous air-borne, satellite-borne, and ground-based experiment.
2. Developing the scaling method using airborne high-resolution remote sensing data and intensive in situ observations, and improving remote sensing retrieval models and algorithms of water cycle variables and corresponding ecological and other land variables/parameters.
3. Developing a catchment-scale land data assimilation system, which is capable of merging multi-source and multi-scale remote sensing data to generate high resolution and spatiotemporal consistent data sets in order to improve the predictability of water resources and environmental changes [1]-[4].
4. Using all the available data in the validation, possible improvement and development of catchment-scale hydrological and ecological models as well as decision support tools for water resource management.

The WATER is composed of three experiments, which are cold region hydrology experiment, forest hydrology experiment, and arid region hydrology experiment.

Five kinds of high-resolution airborne remote sensors including radiometer (1.4 GHz, 19 GHz, 37 GHz), scatterometer, hyper spectral radiometer, multi-angle thermal imager, and lidar are going to be flown. Various satellite borne data will be collected.

So far, we have carried out the pre-experiment in the autumn and winter of 2007. The formal airborne experiment will be implemented in March and April 2008 in the cold region and from May to July 2008 in the arid region.