Preface

Remote sensing is expanding the ability of scientists to study hydrological processes. With each new technological development, more of the hydrological cycle is revealed. This impacts both the scientific understanding of hydrological processes and of the models used for forecasting. In addition, the ability to improve decision-making processes and other applications are increasing. It is appropriate at this time to review the status of technologies and determine new directions and opportunities for the next step in hydrological remote sensing.

Satellite, aircraft and ground-based systems are the dominant platforms for remote sensing, from the largest to smallest spatial and temporal resolution. Frequently, a remote sensing technology is begun with a ground-based system and migrated up the platform hierarchy as its utility is demonstrated and proven to be feasible. Ultimate satellite platforms that have developed in this way include those for soil moisture, which graduated from tower- and truck-based sensors to aircraft and eventually satellite instruments, such as NASA's AMSR-E and ESA's SMOS. Another method of remote sensing advancement is the co-opting of a system for an additional purpose. NASA's GRACE satellite constellation was primarily a gravity measurement mission, but it was quickly realized that it could also measure water storage anomalies over land, which are equated to groundwater change. The next generations of satellite missions are likely in development now, as either ground or aircraft based sensors, or they are being designed in the imaginations of scientists and engineers.

Among the hydrological parameters being estimated by remote sensing are soil moisture, evapotranspiration, surface temperature, vegetation distribution and characteristics, snow-pack properties as well as mapping of invasive species that compete for water resources. A combination of satellite and airborne instruments have been used to retrieve these hydrological parameters that, when coupled with new techniques such as airborne and ground-based Lidar, and recently developed methods of surface energy balance flux measurements such as scintillometers and eddy covariance systems, have resulted in the advancement of applications and modelling of the hydrological cycle.

These topic areas and the applications that integrate them into decision systems and models were among the sessions included in the program for the Remote Sensing and Hydrology Symposium, in Jackson Hole, Wyoming, 27–30 September 2010. This conference was organized by the International Commission on Remote Sensing of IAHS. The Symposium was attended by over 180 people including 48 students, and there were 152 oral presentations and 51 poster presentations. The key note presentations were given by Dr Christa Peters-Lidard, Branch Head, Hydrological Sciences Research, NASA Goddard Space Flight Center, and Dr Massimo Menenti, Professor and Chair of Optical and Laser Remote Sensing, Faculty of Aerospace Engineering, Delft University of Technology, The Netherlands.

The oral paper presentations were distributed in three concurrent sessions with 20 minute slots. Session topics included: Data Assimilation, Surface Energy Balance and Evapotranspiration Modelling, New Satellite Missions, General Applications, Model Validation Issues using Surface Flux Measurements, GIS Applications, Scintillometry, Lidar Applications, Monitoring Invasive Species, Flood Forecasting and Management, Microwave Applications, Advances in

Thermal Infrared Remote Sensing, Soil Moisture Algorithms, Application of Vegetation Indices for Evapotranspiration Modeling, Glaciers and Snow, and Irrigation Water Management.

This IAHS Red Book is a compendium of papers presented at the Remote Sensing and Hydrology Symposium. The papers were reviewed by an English editor and by peers for technical content and are grouped following the session topics at the Symposium.

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Symposium webpage: http://www.remotesensinghydrology.org/

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