Geophysical Research Abstracts,
Vol. 10, EGU2008-A-04267, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-04267
EGU General Assembly 2008

Mapping a shallow, braided river with the Experimental Advanced Airborne Research LiDAR (EAARL)

P. Kinzel (1), C. Wright (2), and J. Nelson (1)

(1) US Geological Survey, Golden, CO, USA, (2) National Aeronautics and Space Administration, Wallops Island, VA, USA

Developing efficient and accurate approaches for simultaneously collecting above and below water topography is necessary for detailed geomorphic, ecological, and hydraulic modeling studies in large rivers. Acquiring these data is especially difficult in braided rivers where fluctuations in river stage can produce large variations in the quantity and distribution of submerged and subaerial barforms and vegetated islands. While a combination of remote sensing techniques could be used to gather this data we have focused on investigating the use of the NASA Experimental Advanced Airborne Research LiDAR (EAARL). EAARL is a hybrid topographic and bathymetric LiDAR that was originally designed to map shallow coastal areas using a relatively low-powered blue-green laser for ranging measurements. The EAARL is operated from an airborne platform whose position is determined with precision GPS and an inertial measurement unit. The system includes hardware and software capable of storing and examining the structure of each laser pulse or waveform. We evaluated the performance of the EAARL instrument and its waveform processing software in a complex riverine environment by conducting two field trials along the Platte River in central Nebraska. We discuss the results of these trials and evaluate techniques for extracting riverbed elevation from waveforms collected in shallow water areas. These areas present the greatest challenge to the bathymetric LiDAR technique due to the convolution of light scattered from the water surface or water column with reflections from the riverbed. Currently, the best algorithms yield a vertical bed elevation accuracy (relative to truth data from GPS-ground surveying) of +/- 24 cm.