David L Nieland

Subject:	PhD student opportunity in Remote Sensing of Alluvial Sandbar Dynamics in Grand Canyon

Funding is available for a PhD student to study alluvial sandbar dynamics on the Colorado River in Grand Canyon. The research objective is to better understand the highly localized nature of eddy sandbar responses to hydrologic regime, at the event scale (such as during floods) as well as longer-term morphodynamics. The project will make use of an extensive data set from 40 autonomously operating digital camera systems ('remote cameras') which have been providing oblique high-resolution color imagery (http://grandcanyon.usgs.gov/giswebdev/sandbarphotoviewer2/RemoteCameraTimeS eries.html), up to 12 times per day, for several years (at some sites, going back to 2008). This wealth of data can be used to explore sandbar responses to flows at a range of timescales (from hours to years) as well as other important aspects of the river corridor such as vegetation encroachment and erosional processes. Additional data sets include (annual or sub-annual) ground-based topographic surveys, and other remote sensing data sets derived from aerial imagery (collected in 2005, 2009, and 2013).
The PhD funding will include full tuition, stipend, and health insurance.
The student will be based at the Remote Sensing and Geoinformatics Lab (https://sites.google.com/a/nau.edu/remote-sensing-lab/), advised by Dr.
Sankey, School of Earth Sciences and Environmental Sustainability, and Informatics and Computing Program, Northern Arizona University. The student will also work closely with USGS GCMRC (Grand Canyon Monitoring Research Center; www.gcmrc.gov) research scientists – specifically Dr Daniel Buscombe, Dr Paul Grams and Dr Erich Mueller - and a large group of academic and government researchers working in Grand Canyon and throughout the Colorado River Basin. The project will involve georectification of oblique imagery into planform imagery using a network of surveyed ground control points at each site. The student will contribute to the development of automated or semi-automated algorithms for the segmentation of sandbars from georectified images, and the continuing development of a novel approach developed at GCMRC to extract 3D topographic data from imagery, thus potentially providing a means to estimate sandbar volumes. The ideal candidate should have, or is keen to develop, skills in a high-level programming language such as Matlab/Python/R/IDL; an interest in image processing/photogrammetry and/or remote sensing; a background in geomorphology, geology,hydrology, engineering, computer science or related discipline. Although this is designed as a PhD position, qualified applicants seeking a M.S degree may be considered. Candidates interested in the position should contact Dr. Sankey at Temuulen.Sankey@nau.edu.