Geophysical Research Abstracts
Vol. 13, EGU2011-13547, 2011
EGU General Assembly 2011

VLBI2010: Next Generation VLBI System for Geodesy and Astrometry

Daniel MacMillan (1), William Petrachenko (2), Arthur Niell (3), Brian Corey (3), Dirk Behrend (1), and Harald Schuh (4)

(1) NASA Goddard Space Flight Center, Greenbelt, MD, United States (daniel.s.macmillan@nasa.gov), (2) Natural Resources Canada, Penticton, BC, Canada, (3) Haystack Observatory, Massachusetts Institute of Technology, Westford, MA, United States, (4) Institute of Geodesy and Geophysics, Vienna, University of Technology, Wien, Austria

Very Long Baseline Interferometry (VLBI) is the unique technique for measuring the orientation of the Earth in inertial space. As such it is an essential element of the Global Geodetic Observing System (GGOS) of the International Association of Geodesy (IAG). The current geodetic VLBI network, developed mainly in the 1970's and 1980's, has achieved extraordinary success. However, a number of factors, including aging infrastructure and demanding new scientific requirements, began to challenge its future sustainability and relevance. In response, the International VLBI Service for Geodesy and Astrometry (IVS) studied the requirements of a next generation geodetic VLBI system. The goals of the new system are to achieve (on global scales) 1-mm position accuracy over a 24-hour observing session, 0.1-mm/yr velocity accuracy, continuous observations, and delivery of initial results within 24 hours after taking data. The challenging nature of these goals requires a completely new technical, operational, and analytical design of the VLBI measurement system. Based on extensive simulation studies, we have developed strategies to improve IVS product accuracy through the use of a more homogeneous global network distribution (with an emphasis on new sites in the Southern hemisphere) of small ($\sim$12-m) fast-slewing antennas. We have investigated improved methods for generating high precision delay measurements and for handling biases related to system electronics. Among other things, we will also need to handle deformations of the antenna structures and radio source structure properly. To test many of the proposed strategies, NASA is sponsoring a proof-of-concept development effort using an IVS antenna near Boston, MA and IVS antennas at NASA Goddard Space Flight Center in Greenbelt, MD. We will report progress on testing of the newly installed 12-m VLBI2010 antenna at Goddard. As of August 2010, the construction of twelve new VLBI2010 sites has been funded and proposals for several more have been submitted to relevant funding agencies. These new antennas will improve current network geometry and provide an important step towards a global VLBI2010 network.