Report on IAG Sub-commission 1.3

Regional Reference Frames

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1.3C : Regional Sub-commission for North America (NAREF)

Chairs : Michael Craymer (Canada), Richard Snay (USA)

This sub-commission has 3 active working groups. The following summarizes the activities of each.

SC1.3c-WG1: North American Reference Frame (NAREF)

The objective of this WG is to densify the ITRF and IGS global networks in the North American region. Work continued on the production of weekly GPS coordinate solutions for nearly 800 continuously operating ITRF/IGS densification stations in North America. These solutions are a combination of six different regional solutions using four different GPS processing software. The combined solutions are being submitted to the IGS, together with weekly processing reports, with a latency of approximately 4 weeks. Most recent improvements since 2003 have been the incorporation of a weekly regional solutions for over 560 US CORS stations using the PAGES processing software, and for over 180 stations from MIT's official daily combinations of the Plate Boundary Observatory solution. The preliminary Plate Boundary Observatory solution from Scripps was also expanded from 50 to 75 points with plans to include all primary US CORS and all CGPS sites in Canada beginning with GPS week 1400. Currently, submissions have been delayed since GPS week 1400 while some regional processing centers update their software and processing procedures for the new IGS processing strategy, including precise orbits based on absolute phase centers. Cumulative solutions have also been computed based on the weekly combinations up to week 1399 to provide velocity estimates for all sites with a data span of at least one year. This solution is being contributed to the ITRF2005 densification effort.

SC1.3c-WG2: Stable North American Reference Frame (SNARF)

Significant efforts began under this newly created joint working group with UNAVCO, Inc. in support of the EarthScope project. The goal is to define a plate-fixed regional reference frame for North America stable at the mm-level to provide a standardized and consistent reference frame in support of geodynamics studies throughout the continent. Seven workshops to define the reference frame been held since 2004. The frame is being defined via a no net rotation condition for a set of stable frame sites with respect to the ITRF. A novel technique has been used to assimilate GPS velocity solutions together with a geophysical model of glacial isostatic adjustment to model both horizontal and vertical intra-plate motions. The first version of the reference frame was released at the UNAVCO Annual Meeting in June 2005. An updated frame based on improved GPS velocity solutions and ITRF2005 is expected by the end of 2007. Reference frame products includes coordinates and velocities (with uncertainties) for all frame sites, a model for glacial isostatic adjustment, and rotation rates with respect to ITRF2000. Further versions will follow as the reference frame is improved. More information about the working group is available from the UNAVCO web site (follow the links at <http://www.naref.org/>).

SC1.3c-WG3: Reference Frame Transformations

This sub-commission is concerned with the definition and maintenance of the relationships between international and North American reference frames/datums. This primarily involves maintaining the officially adopted (in Canada and the U.S.) relationship between ITRF and NAD83. The later is now defined in terms of a fourteen parameter transformation from ITRF96. Transformations from/to other subsequent versions of ITRF are obtained by updating the NAD83-ITRF transformation with the official incremental fourteen parameter transformations between ITRF versions as published by the IERS. In 2006 the transformation was updated with the introduction of ITRF2005.