Assessment of geodetic products from MGEX analyses for the Onsala site

Periklis-Konstantinos Diamantidis, Grzegorz Klopotek, and Rüdiger Haas
Department of Space, Earth and Environment, Chalmers University of Technology, Gothenburg, Sweden

The emergence of BeiDou and Galileo as operational Global Navigation Satellite Systems (GNSS), in addition to Global Positioning System (GPS) and GLONASS which are already in use, opens up possibilities in delivering geodetic products with higher precision. Apart from ensuring the homogeneity of the derived products, multi-GNSS analysis takes the advantage of new frequencies and an improved sky coverage. This should lead to better phase ambiguity resolution and an improved estimation of target parameters such as zenith wet delays (ZWD), troposphere gradients (GRD) and station positions. The International GNSS Service (IGS) has realised this potential by initiating the Multi-GNSS Experiment (MGEX) which provides orbit, clock and observation data for all operational GNSS. Correspondingly, the multi-technique space geodetic analysis software c5++ has been augmented with a MGEX-compliant GNSS module. Based on this new module and the Precise Point Positioning (PPP) approach using six-month of data, an assessment of the derived geodetic products is carried out for several GNSS receivers located at the Onsala core site. More specifically, we perform both single- and multi-GNSS data analysis using Kalman filter and least-squares methods and assess the quality of the derived station positions, ZWD and GRD. A combined solution using all GNSS together is carried out and the improvement with respect to station position repeatabilities is assessed for each station. Inter-system biases, which homogenise the different time scale that each GNSS operates in and are necessary for the multi-GNSS combination, are estimated and presented. Finally, the applied inter-system weighting is discussed as well as its impact on the derived geodetic products.