3.5.6 Global Geophysical Fluids Center (GGFC)

The International Earth Rotation and Reference Systems Service (IERS)'s Global Geophysical Fluids Center (GGFC) provides the geodetic community with models of geodetic effects (earth rotation, gravity, and deformation) driven by the temporal redistribution of the Earth geophysical fluids. These include fluid motions within the Earth system such as the core and mantle, as well as the motions of surface fluids (e.g. oceans, atmospheres, and continental water).

The GGFC is composed of four operational entities: the Special Bureau for the Atmosphere (SBA, Chair, D. Salstein), the Special Bureau for the Oceans (SBO, Chair, R. Gross), the Special Bureau for Hydrology (SBH, Chair, J.-L. Chen), and the Special Bureau for the Combination Products (SBCP, Chair, T. van Dam). The Atmosphere, Hydrology and Oceans SBs have been firmly established since the creation of the GGFC in 1998. The operational SB, Combination Products, was established in 2009 to house the new data sets that model the mass movement of combined environmental fluids such as oceans+atmosphere. There is a GGFC non-operational component, the GGFC Science and Support Products. This component serves as a repository for models and data used regularly in data processing but that do not change often. The GGFC is still actively searching for a Chair for this component.

Up to the latest realization of the International Terrestrial Reference System (ITRS), namely ITRF2008 (Altamimi et al., 2011), technique contributions were requested not to include non-tidal loading models in the geodetic data processing. Attempts have been made to consider non-tidal loading corrections as a posteriori corrections to construct a multi-technique combined reference frame (Collilieux et al., 2010). However, the improvement, while conclusive at some stations, has not been systematically observed. In the meantime, more and more scientific studies have included NT-ATML a priori corrections as a standard, as currently done by the International VLBI Service (IVS) for their operational products. Thus, the question is raised whether the application of NT-ATML corrections alone could improve the determination of the Terrestrial Reference Frame (TRF). Indeed, while some published studies quantifying the effects of NT-ATML corrections on positions and velocities can be found for most of the techniques, NT-ATML corrections have never been applied over the same period of time for the four techniques using the same model. While results have been supplied recently for a combination of GPS and SLR data (Sośnica et al., 2013), the impact on a combined coordinate dataset including all technique measurements has never been studied.

In addition, software and technique specific induced effects were never fully investigated regarding this specific issue. Following a recommendation of the Unified Analysis Workshop 2011 that took place in Zurich, the IERS decided to launch a campaign to assess the effect of NT-ATML corrections on the TRF. Space geodetic solutions, i.e. sets of station coordinates, EOPs, additional parameters and their covariances were requested over a period of five years. The GGFC and the various analysis centers contributed data with NT-ATML applied and not applied to the ITRF to evaluate the impact of NT-ATML corrections on estimated station positions, velocities and EOPs as a result of a combination of multi-technique solutions. The issue of applying mean daily/weekly NT-ATML corrections to solutions versus using the loading model at the observation level in the data processing was also revisited for the four space geodetic techniques. This method of correcting co-ordinates after the observation adjustment has the advantage of not requiring a full data reprocessing. Such a comparison has already conducted for VLBI and GPS only.

The results have not yet been compiled. These will be reported on in the 2014 annual report.

As always, proposals for new GGFC provisional products are being solicited. The procedure for certifying the products requires an analysis of the latency and reliability over a two-year period. In 2014, the original two-year validation will be complete and the provisional products will be upgraded to GGFC Operational Products.

These and all other GGFC Operational and Provisional products can be found through the GGFC website: <http://geophy.uni.lu/>

For information on submitting proposals for GGFC operational products, please go to <http://geophy.uni.lu/ggfc-about/to-submit-new-proposals-for-products.html> or contact T. van Dam (tonie.vandam@uni.lu).

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