

3.5.6 Global Geophysical Fluids Center (GGFC)

The Global Geophysical Fluid Center (GGFC) of the International Earth Rotation Service (IERS) was originally formed to provide the geodetic community with models of geodetic effects (rotation, gravity, and deformation) driven by the temporal variation of the Earth fluids. The fluids include fluid motions within the earth such as the core and mantle as well as the motions of surface fluids e.g. oceans, atmospheres, and continental water.

Since its creation and until 2009 the GGFC was composed of 8 Special Bureaus (SBs). Six of the SBs were defined by the fluid which was being modeled. The SB Loading and SB Gravity were different in that they provided loading effects due to time variable atmospheric pressure and geocenter observations respectively. While this structure worked well for many years, in 2008 it was found to no longer be adequate for addressing the needs of the geodetic community. In 2008, the IERS Directing Board began considering a restructuring of the GGFC with the goals of: 1) improving the reliability of products deemed necessary for IERS Product, Technique, and Combination Centers; 2) allowing for the incorporation of new and valuable datasets for these Centers; and 3) improving the ease of use of the GGFC products by the greater GGFC user community.

The biggest motivation for the reorganization came from the fact that some GGFC data sets were and still are routinely required by the IERS Product, Technique, and Combination Centers. Data sets deemed fundamental for the work of other IERS Centers needed to be promoted to the status of an operational product. Changing a product's status to operational imposes requirements on the product's reliability in time and precision that may or may not have been accepted by the present SB Chairs.

Another argument for reorganization was the problem with finding the correct 'home' within the old GGFC for new data sets that are required by the geodetic community. For example, the precision of many geodetic products rely on the regular estimates of tropospheric water vapor (TWV), making TWV a reasonable product to be provided to the community via the GGFC. However, given the old structure it was not obvious how this product should be incorporated. There were no obvious homes for a TWV product within the existing GGFC structure. SB Atmosphere is concerned with providing atmospheric angular momentum models. And SB Loading focuses on loading effects. There are no obvious homes for a TWV product within the current GGFC structure. Additional examples of data that were/are required by the community and which should have been made available through the GGFC but which did not fit into the old structure include global grids of temperature

and pressure, sea surface height, sea surface temperature, etc.

In response to these new requirements, a new structure for the GGFC was proposed. The GGFC was first broken up into an Operational and a Non-operational component. The operational component would house data required for other IERS (non-GGFC) product Centers to generate their products. The Non-operational component, entitled GGFC Science and Support Products, would consist of products and/or models (environmental fluids or solid Earth) that do not change frequently, e.g. ocean and solid Earth tide models, or models of post-glacial rebound.

Figure 1 graphically represents the GGFC reorganization. The GGFC Operational Product Centers represent groups of operational products that are provided operationally and reliably, perhaps by many different individuals or teams. Each product center would be organized and maintained by a Coordinator. The Coordinators would be responsible for the overall operation of the Center, including unifying the formats, assessing the accuracy of the products, insuring the reliability of the products, etc.

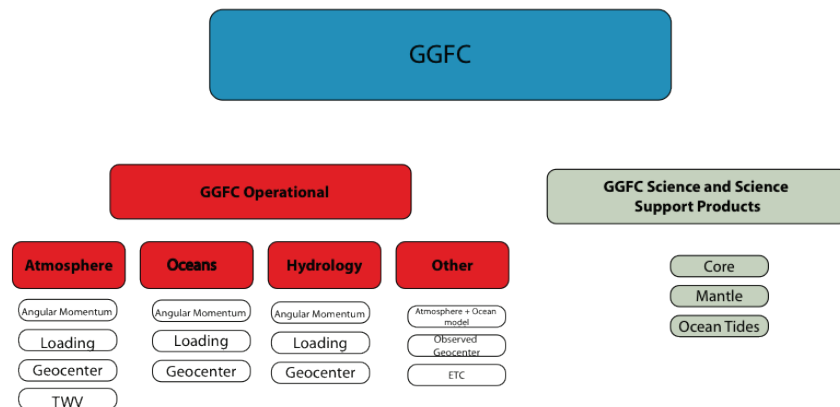


Fig. 1: The new structure of GGFC

The SBs Atmosphere, Hydrology and Oceans were already firmly established in the previous GGFC Structure. A new operational SB, Combination Products (identified as „Other“ in the figure), was established to house the new data sets that model the mass movement of combined environmental fluids such as oceans+atmosphere.

One primary goal of the restructuring was to make the GGFC more operational. To reach this goal, the DB agreed to a plan whereby a product would be accepted into the GGFC as a provisional product for a period of 2 years. During this time the submitting institution must demonstrate the reliability (precision, delay,

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availability, etc) of the product. At the end of this pilot phase, the performance of the institution providing the product is evaluated based on a report. If the review is negative, justifications can be given and a second trial period of 1 year can be granted. If the review is positive, the product becomes an official IERS operational product and the institution becomes an official IERS associated product center (APC).

If a product relevant to the IERS has already been produced on an operational basis for more than 2 years, the pilot phase to demonstrate the performance of the operational product generation can be skipped. The institution just has to submit a proposal for the accreditation of operational product containing:

- Description of the product
- Availability of data for generating the product
- Reliability and accuracy of the product
- Delay in making the product available operationally
- Person that is responsible for the product generation (who will be head of the associate product center (APC), if the product is accepted)
- Length of the commitment made by the institution generating the product(s).

If the proposal is declined, justifications can be given and a trial period of 1 year can be granted. If the review is positive, the product becomes an official IERS operational product and the institution becomes an official IERS associated product center (APC).

The DB also decided that the same product may be proposed by more than one institution. Such products will be coordinated by the corresponding SB chair.

Once the new structure and the process whereby products would start as provisional and would evolve into operational products was approved by the IERS DB, a Call for Special Bureau Chairs and Products was made (January, 2009).

All proposals were sent out to 5 reviewers for review. Proposals to Chair the 4 Special Bureaus were received by J. Chen (SB Hydrology), D. Salstein (SB Atmospheres), R. Gross (SB Oceans), and T. van Dam (SB Combination Products). Proposals for all the chairs were positively reviewed and accepted by the IERS DB.

Proposals for existing operational products were submitted by:

- J. Chen
 - Mass change from hydrological models and GRACE
 - hydrological angular momentum
- D. Salstein
 - atmospheric angular momentum (AAM) and related quantities from four major meteorological centers
 - NCEP

- the Japan Meteorological Agency (JMA)
- the United Kingdom Meteorological Office (UKMO), and the European Centre for Medium-Range Weather Forecasts (ECMWF)
- long-term series derived from atmospheric reanalysis efforts
- R. Gross
 - ocean angular momentum
 - excitation derived from different ocean models.

All proposals for existing products were positively reviewed.

Proposals for new products were also received:

- Maik Thomas (GFZ)
 - atmospheric angular momentum from OMCT (Ocean Model for Circulation and Tides)
 - hydrological angular momentum from OMCT
 - oceanic angular momentum from OMCT
- Johannes Boehm
 - Vienna Mapping Functions
- Tonie van Dam
 - NCEP (National Center for Environmental Prediction) atmospheric loading
 - ECCO (Estimating the Circulation and Climate of the Ocean) non-tidal ocean loading
 - GLDAS (Global Land Data Assimilation System) hydrological loading
- Frank Flechner
 - GRACE dealiasing mass products

All proposals for new provisional products were positively reviewed. In October 2009, all institutes submitting proposals were informed of their proposals being accepted. The chairs of the appropriate SBs, which would be hosting the new products, were also informed. The provisional period for the new products began at this time.

In addition to the restructuring of the GGFC, a new web site was also developed (<<http://geophy.uni.lu/>>). The web site is currently still under development.

Tonie van Dam