Summary of the DORIS Analysis workshop

IDS Workshop, Biarritz 14 June 2002

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SUMMARY

The discussions dealt with the following issues.

- The DORIS observations: preprocessing, formats;
- the Analysis Campaign: the results submitted and their analysis. Preview of future IDS products and their analysis.

DORIS OBSERVATIONS

J.P. Berthias (CNES) presented a comprehensive description of the preprocessing of the DORIS data by the DORIS Orbitography Service (SOD/CNES), in charge of delivering the DORIS data to the IDS Data Centers. The transparencies are available on the IDS Analysis Coordination website.

Three key points may be noted concerning the time-tagging of observations:

- An independent specific time determination preprocessing is necessary to translate the DORIS data from onboard time scale onto TAI (time tag model).
- The onboard ultrastable oscillator (USO) long term bias is estimated from the timing polynomial (derived from master beacons). Short term onboard and ground station USO frequency biases have to be estimated for each satellite pass (only the difference is actually significant).
- Because of the relatively poor stability of the daily DORIS data timing solutions, the TAI timing provided in the formatted files delivered to the IDS Data Centers (CDDIS, IGN) has to be generated during the POD (precise orbit determination) process on long (10-day) cycles. Long term consistency of the timing is thus achieved.

Two exchange formats were discussed (see J.-P. Berthias's transparencies for the description of the files content):

- the 1.0 format used up to now to distribute the data is acceptable only for the pre-Jason receivers. Times t1 and t2 (start and end of observations) are given in TAI. The Doppler count is converted from cycles to mm/s based on frequency values that are the best estimates (polynomial model for the onboard USO, pass by pass solutions for ground beacons) derived in the POD process;

- the 2.1 format is currently used for the restricted circulation of the Jason-1 data (starting with 15 Jan 2002) with the following characteristics. Times t1 and t2 are in TAI. The Doppler count is converted from cycles to mm/s based on the timing polynomial for the onboard frequency and nominal values for the ground beacons. (Note: in the intermediate 2.0 format the reference time scales and frequencies were different. This format was used only for a short time and should have disappeared from the Data Center).

The 2.1 format better fits the analyst's needs, in particular in the context on multi-satellite solutions. It was decided that a DORIS data set of a few recent cycles will be delivered to the Data Centers under format 2.1 for all satellites. Analysis Centers will then have three months to test it before a final decision is taken. The new format will apply to data for all satellites starting with 15 Jan 2002.

The future definition of a RINEX-type format was briefly discussed. Two remaining difficulties were mentioned: 1. it is not convenient to include raw phase and pseudo-range in the same file, and 2. there is no field for editing information.

IDS PRODUCTS AND THEIR ANALYSIS

The IDS products may be prepared under several forms, depending on their further uses. The standard geodetic solutions with variance-covariance information (Sinex files) are complete except for the orbits, which are available separately. In addition, it may be convenient to prepare time series of the parameters that vary in time. It is recognized that an effort should be made at the Analysis Centers and Analysis Coordination levels to improve the technical information on the methods and the references used in the products computation.

Geodetic solutions with variance-covariance information

These solutions may be global, or monthly, weekly, daily, etc. They include global geodetic parameters such as station positions, station velocities (in the case of global solutions), Earth orientation parameters, coordinates of the terrestrial reference frame origin, and local parameters, such as troposphere, ionosphere or clock corrections. An internationally agreed format is available for the exchange of these solutions: the Sinex format, which version 2.0 was recently adopted by IERS after being discussed with IGS, ILRS and IVS (see alpha.fesg.tu-muenchen.de/iers). The compatibility of the Sinex 2.0 format with the DORIS results configuration should be checked.

The IERS is running a combination campaign based on such solutions obtained form GPS, SLR, DORIS and VLBI data. To date, one DORIS solution was provided for this campaign. The Analysis Coordinator encourages additional submissions.

Orbits

After being contacted by the IDS Analysis Coordinator and by GPS and SLR groups, H. Boomkamp (ESOC) proposes to compare the Jason orbits obtained by the three techniques. Comparison of the Spot and T/P orbits obtained by various DORIS analysts is also needed.

Except for the altimetric missions, the orbit is not considered as a scientific product. However, to meet requests for a DORIS reference orbit in, e.g., ionospheric studies it was proposed that the daily orbits (Medium precision Orbit Ephemeris) from CNES/SOD be delivered to the IDS Data Centers for all satellites. The sp1 format is preferred.

Time series of terrestrial reference frames (TRF)

At the IDS Workshop session, J.-J. Valette presented an overview of the comparison and combination of time series of TRFs provided by five Analysis Centers. The transparencies are available on the the IDS Analysis Coordination website. This work should be continued at the Central Bureau, and extended to EOP and geocenter – see hereafter.

Time series of Earth orientation parameters and of TRF origin

These parameters are closely related to the estimated terrestrial reference frames and should be treated accordingly by the Central Bureau.

Troposphere

The potential uses of DORIS-derived zenithal tropospheric corrections as input meteorological data are very limited even with the combination of the receivers. The access to Met data is not real time or near real time. Met data are restricted to several sequences of a few minutes a day. So Met should not be considered as an IDS product. However, the estimated troposphere parameters may be useful in the study of systematic errors. A test campaign could be considered. The IGS and IVS groups working on this subject should be contacted for possible collaborations.

Ionosphere

The SOD routine Doppler corrections files will be delivered to the IDS Data Centers.

INFORMATION AND DATA CENTERS

The Data center organization was briefly discussed by E. Gaulué, in charge of the IDS data center at IGN. It is urgent to finalize and adopt final data center structure and filenames, and to organize the collaboration between CDDIS and IGN.

The Analysis Coordination website should be further developed for stabilizing working nomenclatures, e.g. the lists of DOMES number at sites with antenna displacement due to equipment degradation (Ottawa, Amsterdam,...) or geophysical deformation (Arequipa, Soccorro,...).

FUTURE MEETINGS

The IERS Workshop devoted to global combination based on Sinex files and to the activities of the Global Geophysical Fluids Centers will be held in Munich, 2002 November 11-14.

The IGN proposes to host a DORIS Analysis Workshop in Paris, in the first half of 2003.

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