



**IDS AWG**

## **Roadmap for ITRF2020**

Jun.07, 2019

**Distribution:**

Participants and AWG IDS list

***Written by:***

Hugues Capdeville and Petr Štěpánek

## 1.1. Objective

---

This document presents the roadmap to be followed by the IDS Analysis Centers and Combination Center for the next ITRF solution (ITRF2020). They have to work on 4 following essential items:

- Modeling improvement. Attempt to mitigate the non-conservative force model error on satellites (draconitic signals).
- Adopt and evaluate the new models/standards (TVG, HF-EOP model, ocean tides, ...).
- SAA compensation.
- Scale (Elevation cut off and data downweighting).

Each topic will be led by one IDS member with one of the analysis coordinators. First, the responsible of each topic will propose and follow the work made by the ACs and CC. Second, he will present a synthesis at the next IDS AWG planned on 30th September and 1th October @CNES in Paris.

## 1.2. Topics for the preparation to the next ITRF

---

### **Modeling improvement**

#### **Attempt to mitigate the non-conservative force model error on satellites (draconitic signals)**

##### **Led by Frank Lemoine and Hugues Capdeville**

The analyses associated with ITRF2014 as well as subsequent work have demonstrated that the DORIS products contain signals at distinct tidal, TOPEX/Jason-draconitic, semi-annual, and annual periods. These signals point to potential problems in force and measurement modeling, potentially associated with the tidal EOP modeling and with the modeling of non-conservative forces on some satellites. ACs have to improve SRP modeling to reduce draconitics, in particular for TOPEX/Jasons satellites by using measured attitude for the body and solar panels, by estimating SRP coefficient, by improving the macromodels.

To mitigate the non-conservative force model error on TOPEX/Jasons serie (draconitic signal at 59/118 days) some ACs have used quaternions for both the s/c body and solar array. The 59d signal was reduced but is still present in particular in the radial differences with GPS-only orbits from JPL.

#### **Adopt and evaluate the new Models and Standards recommended by IERS**

##### **Led by Jean-Michel Lemoine and Petr Štěpánek**

ACs have to implement the new linear mean pole model but not until reprocessing has started, otherwise a velocity discontinuity will be introduced into their time series. They have to adopt a Time-Variable Gravity (TVG) model (using GRACE + SLR + GOCE + geophysical fluid models for full space geodetic era) compatible with the linear pole model. They are awaiting the High Frequency (diurnal-subdiurnal) tidal EOP model recommended by the IERS working group led by J. Gipson. They also have to use the last ocean tidal as FES2014.

### **South Atlantic Anomaly compensation**

#### **Led by Guilhem Moreaux and Hugues Capdeville**

The objective is to mitigate the SAA effect on DORIS USOs for Spot-5 and Jason series. For Spot-5 and Jason-1, ACs can use the DORIS2.2 data corrected by the models available at CDDIS and IGN Data Centers. Note, for Jason-1 the corrective model is also available. For Jason-2 and Jason-3, ACs can adjust at least a bias+drift by pass for SAA stations in their POD processing. We could use better corrected frequency model for Jason-2 and Jason-3 USO when Belli et al. will demonstrate their efficiency and will be made them available.

We can also use the strategy to add single satellite solution affected by the SAA in the multi-satellite solution. This method was tested and adopted for Jason-1 for the ITRF2014. Before combining single satellite solution affected by SAA to the other single satellite solutions, we rename the SAA stations (and all their adjusted parameters) so these SAA stations from this single satellite do not contribute to the realization of the combined solution. A note which describes all these solutions will soon be available.

### **Scale (elevation cut off and Data downweighting)**

#### **Led by Petr Štěpánek and Sergey Kuzin**

For the ITRF 2014 reprocessing, different elevation cut off and data downweighting were used by individual ACs. Elevation cut off and elevation downweighting affect the scale (confirmed result). According to GOP AC results, the downweighting improves the station repeatability (Štěpánek and Filler, 2018, GOP AC report, this meeting). IDS could drive experiment before the ITRF 2020 data reprocessing recommendation for data downweighting and elevation cut off.

About the Hy-2A scale, Analysis coordinators recommend to ACs to use the initial position of the CoM for Hy-2A from Chinese project (<ftp://ftp.ids-doris.org/pub/ids/satellites/DORISatelliteModels.pdf>) and to do their own preprocessing if they use DORIS2.2 data (true for all satellites).

The SPOT-5-only scale clearly showed a pattern with sawtooth breaks. The discontinuities are of the order of -20 mm, so they are significant. Although no obvious cause has been found, efforts to understand these variations should continue, in particular to understand if something intrinsic to the SPOT-5 DORIS USO might be the cause.

### **DORIS RINEX data processing and introduction of the new satellites in the IDS combined solution for All ACs. And priority to RINEX if both formats available?**

The Jason-3, Sentinel-3A and Sentinel-3B satellites have to be added in the DORIS processing chain of IDS ACs. Currently, only 4 ACs (ESA, GSC, GOP and GRG) could do that because they are able to process RINEX data format. The other ACs have to complete their DORIS/RINEX data processing including introduction of these new satellites. If this is not possible, ACs should inform that their contribution will be limited by processing IDS 2.2 format only. About the priority to RINEX if both formats available, ACs have to choose either RINEX or IDS 2.2 format, but not to switch between the formats for one satellite.

## **1.3. IDS preparation and processing schedule proposal for the next ITRF**

The first phase will be devoted to the preparation of individual ACs and CC. The responsible of each previous topic will propose work to ACs and associated ACs. The responsible have to participate and follow work and write the synthesis. Then, he will present a synthesis at the next IDS AWG planed on 30th September and 1th October @CNES in Paris.

After this test phase, ACs could start their reprocessing. We could divide the IDS reprocessing in 4 periods: [1992-2001], [2002-2008] (+sp5+env+ja1), [2008-2015] (+ja2), [2016-2020] (+ ja3+s3a+s3b). ACs could start their reprocessing at the end of 2019 (November) by the first period [1992-2002]. IDS Combination Center could start its combination of the first period at the beginning of the year 2020. IDS ACs could continue at the beginning of year 2020 their reprocessing with the second period and provide their solution to IDS CC, ...