POD configuration for DORIS satellites.

(CNES/SOD – January 2008)

Current configuration (since October 2005)

The CNES precise orbit determination is performed using a configuration defined for the GDR-B altimetry products. This configuration is applied to:
Jason since October 2005 starting from cycle 136;
ENVISAT since October 2005 starting from cycle 41 (arc 171);
SPOT2 since November 2006 starting from arc 606;
SPOT4 since November 2006 starting from arc 357;
SPOT5 since November 2006 starting from arc 170.

The main features of the new pre-processing software implemented in this configuration are:
- polynomial and along-track error adjustment
- Iterative editing on residuals (per pass)
- Min pass size
- Max RMS per pass
At least in the case of Jason-1, the main impact of this pre-processing with respect to the previous one is that less measurements are edited thus allowing more measurements to contribute to the orbit determination. This may slightly increase the post-fit DORIS residuals.

The orbit determination standards of this configuration are:

Reference systems:
   - polar motion and UT1: IERS bulletin C04 with IERS 1996 daily and sub-daily corrections
   - stations coordinates: DPOD2000 reference for Doris Stations, ITRF 2000 with minor corrections for a few SLR
   - satellite reference: Post-Launch value of Mass + variations generated by Control Center, attitude model: Quaternions from control center, completed by nominal Yaw Steering Law when necessary

Force models:
   - EIGEN-CG03C gravity field model
   - IERS 2003 Solid Earth tides
   - FES 2004 (all principal constituents, with admittance) ocean tides
   - Haurwitz & Cowley atmospheric tides
   - Sun, Moon, Venus, Mars and Jupiter third bodies
   - thermo-optical coefficient from pre-launch box and wing model for solar radiation with smoothed Earth shadow model
   - MSIS86 model (ENVISAT), DTM 94(Jason), best available solar activity (unchanged), physical box and wing model for atmospheric drag with 1 Cd adjustment per 2Rev with a priori constraint
   - Knocke-Ries albedo and IR model for Earth radiation
   - 1/rev along-track and cross-track constant per 24 hours for empiricals (12 hours for Jason)

Tracking data:

   - DORIS:
     - Solid earth tides for station displacements
     - Troposphere correction: CNET1 model, vertical bias adjusted
     - Frequency: Bias per pass adjusted
     - Weight: 1.5 mm/s (for Jason : underweighting of the SAA stations)

  - 6.5 microseconds datation bias on ENVISAT in order to cope with a 4.5 cm along-track bias with Laser orbits (6 microseconds on Jason).

  - Laser
    - Troposphere correction: Marini-Murray following IERS 2000
    - Retroreflector correction: Constant radial correction of 5.0 cm (Jason) and 5 cm (ENVISAT) for all stations
    - Bias/Pass: Solved-for for a few stations
    - Weight: Globally 10 cm
    - Solid earth tides, ocean loading (FES99) and pole tide corrections for station displacements

  - GPS (Jason)
    - Constellation ephemeris and clocks (5 min): precise JPL solution
    - Measurements sampling in orbit determination: 5 min
    - JPL Antenna diagram phase correction (Jason receiver)
    - phase windup correction
    - Receiver clock adjusted at every epoch
    - phase ambiguity per pass
    - Weight: 1 cm on phase, 1 m on code

Note that this configuration was also applied in a second step to Jason cycles 1 to 135 in order to have a homogeneous series of Jason altimetry products (GDR-B). Files of data pre-processed with the pre-processing described above were delivered to the IDS Data Centers with a different version number.

Future configuration (2008)

Updated standards will be chosen in 2008 for the upcoming Jason-2 mission. They will also be used for Jason-1 and ENVISAT reprocessing, and for SPOTs routine processing.

Changes to the GDRB orbit determination standards (GDRC) will be:

Reference systems:
  - Polar motion and UT1 from bulletin C04, consistent with ITRF2005
  - Station coordinates from DPOD2005 and LPOD2005

Force models:
  - EIGEN-GL04 static gravity field including seasonal variations up to degree/order 50 (TBC)
  - Atmospheric contribution to the gravity field up to degree/order 20 (TBC)
  - Ocean pole tide consistent with IERS2003 standards
  - Improved optical coefficients (corrected from observations)

Tracking data:
  Doris
  - SAA model applied for Jason
  - Weight: TBC
  Laser
  - Troposphere correction: Mendes-Pavlis
  - Retroreflector correction: for Jason, a ranging correction depending on boresight angle
  - Ocean loading correction updated to FES2004
  - Weight: TBC
  GPS
  - JPL solution at IGS consistent with ITRF2005
  - Updated receiver and emitter antenna phase map correction
  - Weight: TBC