JASON-2 POD STATUS

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Contents

- Status of Jason-2 D/L/G POD processing at CNES
  - Consistency of different tracking techniques
  - Comparison with orbits from other groups (GSFC, ESOC)
- JASON-2 Doris Phase Center Offset
Comparison of Doris and GPS only orbits with respect to D+L+G POE

- Good radial consistency between the standard GDR POE (D+L+G) and orbits from intermediate processing steps (Doris only, GPS only), < 1 cm RMS per cycle
SLR Residuals on D+L+G GDR orbit

- Post-fit SLR residuals at 1 cm level on reference stations (LPOD05v11)
  - Below 1 cm, where most measurements are performed
- Dependency of SLR residuals from elevation is not very significant
Surface forces models

- Amplitude of along-track 1/rev error is similar to that found on Jason-1 (GDR-C model)
- The model was initially scaled to 1.0 according to results on cycle 1-3. The behavior seems to have changed with time
- No major impact expected on the orbit
- Further analysis is needed to better calibrate the model
Z Centering

- Clear trend in the Z shift between Doris and GPS orbits: part of annual signal?
- GDR orbit (D+L+G) is between the two

Doris-based orbits with respect to reference D+L+G POE

- Following slides:
  - Radial, Along-track, Cross-track comparison of various Doris based orbits with respect to CNES reference orbit (DLG POE)
    - CNES Doris-only orbits (RINEX based)
    - ESOC *.ja2.v2.sp1
    - GSFC gsfc_ja2_poe_dor_std0809.*
  - SLR analysis
Doris-based orbits with respect to reference D+L+G POE

- Good radial RMS consistency between different orbits (< 1.5 cm RMS)
- CNES Doris closer to CNES D+L+G (similar modeling)
Doris-based orbits with respect to reference D+L+G POE

- Significant radial signal in the mean difference of ESOC orbit wrt to other orbits at 120 days period

![Graph showing radial mean CNES D+L+G - other](image)
Doris-based orbits with respect to reference D+L+G POE

- Drag coefficients of CNES Doris only solution more constrained along-track from cycle 16 for test purposes

Along track RMS CNES D+L+G - other

Maneuvers on cycles 5 and 17
Doris-based orbits with respect to reference D+L+G POE

- Along track bias of CNES Doris orbits with respect DLG POE orbit is below 1 cm
  - Based on current analysis, no time-bias needs to be applied in Doris processing
Doris-based orbits with respect to reference D+L+G POE

- Higher cross-track dispersion of GSFC Doris only orbit

Cross-track RMS CNES D+L+G - other

CROSS TRACK Difference RMS

Maneuvers on cycles 5 and 17
Doris-based orbits with respect to reference D+L+G POE

- Cross-track mean shows 120 signal
  - Typical of differences in SRP modeling

![Graph showing cross-track mean differences between CNES D+L+G and other methods.](image)
Doris-based orbits with respect to reference D+L+G POE

- SLR residuals on reference stations (LPOD05v11) clearly reflect the differences previously shown in the various solutions.
Jason-2 Doris Antenna offset

- Follow-up of the discussion initiated by N. Zelensky during last meeting in Nice (~ 13 cm offset along Z axis)
- Estimation of the offset over Jason-2 cycles 1-17
- RINEX as input data, attitude from quaternions
- Using either Doppler (phase increments) or direct phase measurements
- Cut-off: measurements rejected below 10 degrees
- With 2 different troposphere models
  - Saastamoinen for dry vertical delay + GPT/GMF (wet delay estimated)
  - CNET for a priori + GPS STANAG (tropospheric correction currently present in DORIS files)
- Meteorological data from beacons not used
- Method
  - By directly estimating the offset using a fixed GPS orbit
  - By estimating a constant radial acceleration during Doris-only orbit determination (cross-validation)
Jason-2 Doris Antenna offset

- For cycles 001, 006, 012, 015 estimation of a radial acceleration that compensates for the offset
  - The resulting orbit is compared to an independent GPS orbit (blue dots in plot below)
Jason-2 Doris Antenna offset

- Results largely depend on the adopted tropospheric model
  - and very likely on the measurement distribution in elevation (cut-off angle)
- Phase and Doppler don’t observe exactly the same offset
  - More observability using phase measurements
  - Lower impact of clock errors using doppler measurements
- How to distinguish between
  - Tropospheric bias
  - Doris receiver phase center position
  - Unmodeled frequency drifts
  - remains an open issue
- Estimated offset never exceeds - 4 cm (doppler+gptgmf case)
Backups
Jason-2 Doris Antenna offset

- Direct estimation of DORIS offset with either Doppler or Phase measurements, on fixed GPS orbit