# Update of the HY-2A SRP model

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#### Outline



General information

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- Estimation of the SRP coefficient
- Estimation of the GPS phase center
  - Estimation of the DORIS phase center



# **General information**

- DORIS-only and GPS-only orbits (with fixed ambiguities)
- 3-year period : January 2016 to November 2018 (arc 225 to 373)
- Estimation of SRP coefficient with GPS orbits
- Estimation of GPS and DORIS COP with new SRP coefficient

# **GPS Ambiguity fixing**

- Method similar to Jason 3 and Sentinel-3
- Very good behavior of the GPS receiver
- Most days > 98 %
- Measurement gaps or errors in RINEX files



4) © cnes



# **Estimation of the SRP coefficient**

- Estimation on GPS-only dynamic orbits with fixed ambiguities
- Best results during eclipses
- Odd behavior around high β'
- New value : 0.88





## Estimation of the GPS phase center with the new SRP coefficient

- Daily reduced-dynamic GPS-only orbits computed for ambiguity fixing
- No change on the Z direction (radial) with the new SRP
- Initial COP position : (0.349, -0.165, -1.315) m
- Very small and stable bias (-2 mm)



#### **Estimation of the GPS phase center with the new SRP coefficient**

- Y direction shifted by 5 mm
- Strong β' signal still present
- Initial COP position : (0.349, -0.165, -1.315) m
- Bias on entire period :
  -1mm → +7 mm
- Bias during eclipses :

-8mm → -2mm



# Estimation of the DORIS phase center with the new SRP coefficient

- Dynamic DORIS-only orbits
- Initial COP position : (0.850, -0.750, 1.010) m
- Radial direction : no change
- Median : -11 mm
- -45mm seen on previous study with DPOD2008
- +20mm offset in 2017→ current IDS documentation value
- + DPOD update



# Estimation of the DORIS phase center with the new SRP coefficient

- Initial COP position : (0.850, -0.750, 1.010) m
- Entire period :
  - -7.3 mm → -15.4 mm
- On eclipses only :
  -2mm → -8mm
- β' signal





 $\beta'$  angle (degrees)

# **Empirical accelerations on GPS orbits**

- Accelerations as a function of  $\beta'$
- Origin shifted to subsolar latitude
- **Tangential sine strongly** changes with  $\beta$ ', corrected by new SRP coefficient
- Odd behavior of the normal acceleration : bias, 🤻 drift + not a function of  $\beta$ '



### **Empirical accelerations**

- Jump at β'=90°
- Behavior seen on 3 years
- Attitude change?



# Conclusions

- New SRP coefficient removes tangential acceleration dependency to β'
- COP bias and β' signal in the normal direction for GPS and DORIS
- Strange behavior of empirical accelerations in the normal direction at β'=90°
- Better estimates of SRP coefficient and more reliable estimates of COP (DORIS and GPS) in the normal direction possible once this behavior is explained
- DORIS COP values :

	Current	Updated
X (Tan)	0.850	0.850
Y (Nor)	-0.750	-0.742 (+8 mm) ?
Z (Rad)	1.010	1.021 (+11 mm)

**GPS COP values :** 

	Current	Updated
X (Tan)	0.349	0.349
Y (Nor)	-0.165	-0.167 (-2 mm) ?
Z (Rad)	-1.315	-1.317 (-2 mm)

