

Jason-3 & Sentinel-6 MF calibration at the Corsica facilities

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Jason-3 & Sentinel-6 MF during Formation Flight Phase





Abstract

Initially developed for monitoring the performance of TOPEX/Poseidon and follow-on Jason legacy satellite altimeters, the Corsica geodetic facilities that are located both at Senetosa Cape and near Ajaccio have been developed to calibrate successive satellite altimeters in an absolute sense. cessful calibration process used to calibrate most of the oceanographic satellite altimeter missions has been regularly updated in terms of in situ instruments. geodetic measurements and methodologies. In this study, we present an assessment of the long-term stability of the in situ instruments in terms of sea level

> monitoring that include a careful monitoring of the geodetic datum. Based on this 20+ years series of sea level measurements, we present a review of the derived absolute Sea Surface Height (SSH) biases for the following altimetric missions based on the most recent reprocessing of their data: TOPEX/Poseidon and Jason-1/2/3, Envisat and ERS-2, CryoSat-2, SARAL/AltiKa and Sentinel-3A&B. For the longest time series the standard error of the absolute SSH biases is now at a few millimeters level which is fundamental to maintain the high level of confidence that scientists have in the global mean sea level rise. Launch in November 2020, Sentinel-6 Mickael Freilich flew in tandem with Jason-3 during its first year of mission. We will present in detail the analysis of this tandem phase. Preliminary results show that the absolute SSH bias for both missions are very close at the few mm level for the LRM mode and both very close to 0. Improvement thanks to SAR will be also presented: measurements are valid (and accurate) up to the coast (few hundred meters); on the whole set of cycles, the standard deviation of 20Hz data is improved by a factor close to two: 33 mm compared to 56 mm with LRM (69 mm for Jason-3).

In preparation of SWOT, an extension of the "geoid" over the Ajaccio and Senetosa area has been realised during 2 campaigns in 2021 and 2022. Prelimininary results arealso presented.



Sentinel-3A SSH bias analysis over Senetosa and Ajaccio









Sentinel-3A altimeter calibration netosa & Ajaccio (mean) pass 741: SAR NTC PDGS - BC00 → SAR PDGS: mean = +9.8 mm, StD = 17.6 mm



Synthesis of SSH biases for missions overflying Corsica facilities

Altimeter	Ν	σ (mm)	Mean (mm)	Slope (mm/yr)
T/P ALT-A	7	22	+25 ± 8	N/A
T/P ALT-B	66	30	+24 ± 4	+6 ± 4
T/P POSEIDON-1	7	26	+12 ± 10	N/A
JASON-1 (GDR-E)	163	33	+43 ± 3	-1±1
OSTM/JASON-2 (GDR-D)	206	33	+16 ± 2	-3 ± 1
JASON-3 (GDR-F)	158	30	+4 ± 2	+2 ± 1
SENTINEL-6 MF Side A (NTC F06)	21	23	+4 ± 5	N/A
SENTINEL-6 MF Side B (NTC F06)	22	32	+13 ± 7	N/A

on-3 (GDR-F el-6 MF LRM Side A (NTC F06) el-6 MF LRM Side B (NTC F06 673.2 AL/AltiKa (GDR-F 103.2 inel-3A SAR (PDG 20.0 inel-3A PLRM (PDG nel-3B SAR (PDGS 14.1 nel-38 PI RM (PDG Only during the Formation Flight Phase with Sentinel-3A (5 cycles for SAR and 4 for PLRM) 24.5 24.1 11.9 42.7 16.2 3.6 3.6 12.9

-A (MGDR+ ALT-B (MGDR++

POS-1 (MGDR++ on-1 (GDR-E) 1-2 (GDR-D)

25 years of continuous monitoring

200 200 201 201 201 201 201 201 201 201

onclusions: Sentinel-6 MF (LR) shows a very good agreement with Jason-3 at a few mm 13mm difference between Side A and Side B (Side B shorter) during the FFP The SAR made (HR) of Sentinel-6 MF provides very accurate data few hundreds meters up to the coast 20.0 22.4 14.1 6.6

Recent developments in the frame of SWOT Cal/Val

Evolution of the Corsica facilities: Extension/unification of the reference surfaces

- Junction of the historical Senetosa and Ajaccio references surfaces following the Sentinel-3A ground track (
- Extend and densify the reference surface in preparation of SWOT (measured) nents in May 2022, 508 nautical miles)

In average, very small difference (2mm)

between SAR and PLRM in terms of

SSH bias but higher standard

deviation for PLRM.

Preliminary results

vial thanks to Claud

Corrica Facilities sin

e than 25 years

Measurements using CalNaGeo and Cyclopée: a very good consistency (few mm in average / 20 mm standard deviation)

GNSS measurements coup

altimeter, together on a stabilized arm

CalNaGeo (« GNSS carpet »)

SWOT

and May 2022 surveys. Black lines for surveys of Ajaccio (2005) and Senetosa (1999) reference surfaces (bathymetry in background)

Background photo by Claude Gaillemin ©:

Storm @ Senetosa lighthouse

during Sentinel-6 MF overflight

(2022/08/07)

