Recommendations of the 2023
Ocean Surface Topography Science Team
San Juan, Puerto Rico

Sentinel-6 MF Extended Operations Phase Orbit

In light of that fact that user needs remain very high for altimetry observations complementary to the reference mission, the OSTST recommends extending operations of Sentinel-6 Michael Freilich, assuming it remains in good health, beyond the time when Sentinel-6B has become the reference mission. Specifically, the OSTST recommends:

1) Moving Sentinel-6 MF to an exact repeat orbit with the same characteristics as the reference orbit, except for a phase difference of 163° along the orbit, either ahead or behind Sentinel-6B, resulting in an interleaved ground-track to the reference orbit. (Jason-3 currently flies 163° behind Sentinel-6 MF).

	Reference	Interleaved
Semi-major axis (km)	7714.4278	
Eccentricity	0.000095	
Nodal period (s)	6745.72	
Repeat cycle (days)	9.9151	
Longitude at Equator for pass 1	99.9242º	98.5069º

2) The project adopt the same data availability requirements as expressed in the EURD (R-U-00460/490/500/515/520/570/573/576) for the Extended Operations Phase of Sentinel-6

Michael Freilich (See table below), with the understanding that Sentinel-6B operations will be prioritised over Sentinel-6 MF. These requirements are as follows:

	NRT	STC	NTC
ALT L1		95% within 36h (HR: 90%) *R-U-00490*	95% within 60d (HR: 90%) *R-U-00515*
ALT L2	90% within 3h (HR: 85%) *R-U-00460*	95% within 36h (HR: 90%) *R-U-00500*	95% within 60d (HR: 90%) *R-U-00520*
MWR L2	90% within 3h *R-U-00570*	95% within 36h *R-U-00573*	95% within 60d *R-U-00576*

Jason-3 Orbit Change

The OSTST endorses the current plan to move Jason-3 to a Long Repeat Orbit immediately after the conclusion of second tandem with Sentinel-6 Michael Freilich. This 371-nodal-day long repeat orbit should be the same as the one occupied by Jason-2. The first two LRO cycles should be phased such that Jason-3 will interleave the two Jason-2 LRO cycles, each shifted by 2-km. This will result in a systematic 2-km global grid combining Jason-2 and Jason-3 LRO data. The OSTST also recommends two additional LRO cycles that revisit the Jason-2 LRO ground tracks to fill in gaps and reduce mean sea surface errors.

Climate Quality Accuracy in Future Missions

The OSTST notes that to achieve accuracy in global and regional sea level change as detailed in GCOS requirements, it will be necessary to maintain and continue to improve accuracy of orbital determination systems, such as those achieved using a combination of SLR, DORIS and GNSS. The OSTST has demonstrated that three tracking systems (GNSS, DORIS and SLR) are necessary to achieve maximum accuracy on the determination of regional sea level trends, and it strongly recommends that such accuracy be maintained in the design of Sentinel-6C. The OSTST also noted that accuracy of the Climate Data Record requires continued maintenance or improvement of the terrestrial reference frame, which also relies on these tracking systems. Finally, requirements on other aspects of the altimetric measurement system must also be maintained or continue to improve.

Synergies with Argo and GRACE

Argo plays a critical role in numerous cross-cutting climate-related science topics important to the altimetry, GRACE and broader science communities. In light of Deep Argo's ability to rapidly expand observations of the ocean below 2000 m, resolve variations of temperature and salinity over the full-ocean depth, and close regional and global sea level budgets, the OSTST recommends substantially increased support for the OneArgo Program. Added resources are needed to expand the array to include global implementation of Deep Argo and increased coverage by Core Argo in polar regions and marginal seas.

Altimetry Product Evolution

The OSTST recommends that agencies study the performance of the three latency products, NRT, STC and NTC with an aim toward understanding if all three still meet user needs, or if their performance and latencies should be redefined or adjusted. This should be considered across all platforms.

Potential Gap between CryoSat-2 and CRISTAL

The OSTST recommends studies to address which satellites, airborne operations, or other assets might help fulfill scientific needs for high-latitude ocean and ice elevation measurements during a potential gap between CryoSat-2 and CRISTAL. The OSTST also recommends minimizing the probability of a gap by extending CryoSat-2 operations through at least 2028 and avoiding delays in the launch of CRISTAL to the extent possible.

Integrity of the Altimetry Constellation and Instrument Function

In light of ongoing efforts to launch a large number of communications satellites in orbits close to the 1336 km altimetry constellation, the OSTST recommends that agencies take steps to determine and establish sufficient margins that will safeguard altimetry missions in both reference and polar orbits from collision, debris and interference with their passive and active instruments.

Appreciation

The OSTST expresses its appreciation to NASA and CNES for the successful launch and commissioning of the SWOT mission and its revolutionary new wide swath altimeter for ocean and surface water.