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WaPA – Final Review

Airbus DS Task 5 overview

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25 November 2014

Synergistic Instrument Data – Instrument and mission implications of synergetic observations

As part of WP5000 Synergistic Instrument Data...

WP5100 and 5200 tasks

- Provide mission/system and instrument level consultancy to the identification of instruments offering synergy with the Wavemill instrument
- Review the technical implications of the inclusion of any additional instruments on the Wavemill platform
- Outline implications and impacts on the Wavemill MRD and on the instrument definition

WP5200 Airbus DS outputs

D6: WaPA MRD Implications Report...

WVM-TN-ASU-SY-0003: WaPA MRD Implications Report

- Synthesis of impact and implications on the Wavemill Mission Requirement Document and instrument definition

Instrument and mission implications of synergetic observations

Mission/system and instrument level synergies with Wavemill (1)

Focus of synergistic observations work package directed early towards satellite-to-satellite level observational synergies as:

- The initially proposed concept for including secondary payloads on Wavemill platform dismissed following evolving outputs from parallel OSCM study
 - Unrealistic to assume that the Wavemill/OCSM payload complement could provide capacity / margin for additional sensors due to already being significant mass, power and data drivers on the satellite platform
 - Complementary observations more likely to be achieved from separate platforms... either in convoy or totally free-flying
 - Some notable political advantages exist in claiming synergy with other systems:
 - Sentinel 3 : SST, ocean colour, SAR altimetry
 - Sentinel 1 : conventional across-track SAR and InSARwith the long-term commitment to Sentinel offer the advantage that these will be contemporary with Wavemill
- Also possibly...
- SWOT : however non-SSO 21-day repeat

Instrument and mission implications of synergetic observations

Mission/system and instrument level synergies with Wavemill (1)

Due to the extremely marginal compatibility with the Vega launcher, a secondary payload from a system-point-of-view is non-compatible

Configuration	Antenna mass (kg)	Instrument mass (kg)	Platform mass (kg)	System mass (kg)
Dual sided	220	338	804	1550
Single sided, 3 swath	380	497	804	1750
Single sided, 2 swath	257	385	804	1600

Altitude	VEGA Issue 3 Launch Mass (kg)	VEGA Issue 4 Launch Mass (kg)	PSLV Issue 5 Launch Mass (kg)	PSLV-XL Issue 5 Launch Mass (kg)
400	1630	1480	1700	1850
500	1565	1430	1600	1750
600	1500	1380	1500	1650

Excluding the possibility of a different launcher-vehicle, there is certainly a possibility to optimise the orbit so as to attain simultaneous viewing of certain regions, or at least maximum cross-overs, which could be done with limited impact to the primary system/instrument

Other launchers, e.g. PSLV-XL may enable certain small (50-100kg) secondary payloads

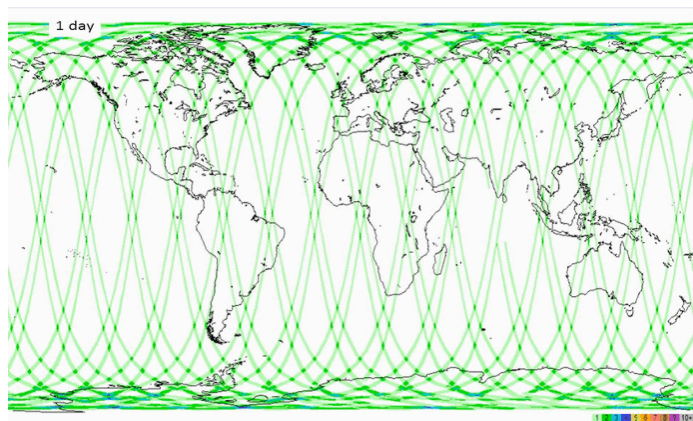
- however, data and power for the secondary payload would still remain critical

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Instrument and mission implications of synergetic observations

Mission/system and instrument level synergies with Wavemill (2)

Expected orbit:



Parameter	Value	Comment
Altitude	400-600km	Vega performance drops rapidly with altitude, and power required to maintain equivalent SNR increases
Inclination	SSO	Constant thermal and power generation, plus good coverage at high latitudes
Repeat Cycle	TBC	At present very long (>30 day) and tracking eddy features
Coverage	Key Regions + Global	Focus RAW data on key dynamic regions, with global coverage augmented with compression

Mission launch date and lifetime overlap:

- Sentinel 3C likely to launch ~2020, with a design lifetime of 7 years, and OSCM/Wavemill likely to be 2025+ with a lifetime of 5 years
- Other sentinels launch date TBC but ~2020+ so more time-cross over with OSCM

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Instrument and mission implications of synergetic observations

Mission/system and instrument level synergies with Wavemill (3)

Potential Observational Synergies:

Any ocean monitoring or altimetry mission has the potential to be synergistic with OSCM/Wavemill

- Sentinel-2 will provide hi-res imaging of inland water and coastal areas, and could be compatible
- Sentinel-3 will provide ocean monitoring services
- Sentinel-6 will provide high precision altimetry
- Jason altimeters also compatible with complementary acquisitions
- SWOT will provide wide swath ocean high information

Furthermore...

- Sentinel-1 being used for current information from Doppler tracking
- CFOSAT is to measure wind and waves at the ocean surface on a global scale

Instrument and mission implications of synergetic observations

Implications and impacts on the Wavemill MRD (1)

Moving away from the VEGA launch vehicle requirement, to a larger launch vehicle, would enable higher altitudes to be obtained, hence provide more of an opportunity to have more synergistic, or even trailing, orbits with the forthcoming Sentinel missions

Exact repeat cycles and various orbital parameters would need to change/be specified to complement other specific missions

- unlikely to be fully synergistic with multiple missions so would need to focus on one/two

Instrument and mission implications of synergetic observations Implications and impacts on the Wavemill MRD (2)

Potentially, external instrument calibration strategies could change, with OSCM/Wavemill using signals from coordinated acquisitions to help calibration

Synergistic/coordinated acquisitions at higher altitude would require greater DC power to be fed to the instrument to maintain a performant SNR/current retrieval

Dual sided operation may result in more cross-overs opportunities

- 2x100km separated by ~400km