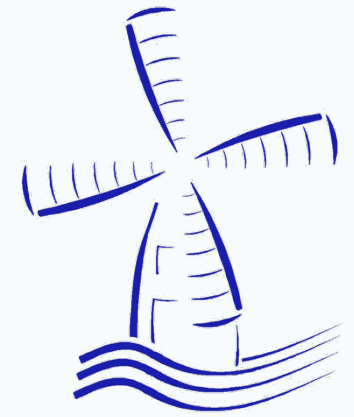


Wavemill Product Assessment (WaPA)



Defining Potential Products from a novel spaceborne interferometric SAR

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Wavemill - Introduction

The Wavemill 2D Ocean Current Mapping System is a microwave interferometric SAR concept to provide wide swath, high-resolution, high precision 2D maps of ocean vector currents.



WaPA - Wavemill Product Assessment

- *Provides a basis for defining the scientific capabilities and limitations of a spaceborne Wavemill instrument as a possible candidate Earth Explorer Core mission.*
 - **Task 1:** Carry out a comprehensive state of the art review of space borne measurements of surface current.
 - **Task 2:** Determine the scientific validity of primary Wavemill products (ocean surface currents).
 - **Task 3:** Investigate the impact of wind-wave scattering on the Wavemill performance, and the potential to recover surface wind measurements.
 - **Task 4:** Investigate potential validity of secondary products
 - inland hydrography, swell and ocean / atmosphere interactions, ice
 - **Task 5:** Investigate requirement for auxiliary data - potential for synergistic exploitation

Primary Wavemill Product

- **Total Surface Current Vector¹**
 - Resolution 1-4 km (TBC)
 - Range 5-500 cms^{-1} ; accuracy $< 5\text{cms}^{-1}$ / 10%
 - Direction 0- 360°; accuracy $< 10^\circ$
 - Global ocean, coastal areas, inland seas
 - Revisit period 2-10 days

¹*From Ocean Total Surface Current Velocity - Mission Assumption and preliminary Technical Requirement (EOP-SM/2513/CD-cd)*

Potential Secondary Wavemill Products

There are a number of potential secondary products from the Wavemill instrument. Aim is to evaluate these and produce preliminary algorithm descriptions

High Resolution Ocean Winds, Waves and Topography

- Configuration could resolve very long waves and avoid directional ambiguity
- Relative range / sea surface height across the swath

Inland Hydrography / river currents

- Can potentially focus the system to increase resolution to 2-3 m

Cryospheric Applications

- Sea ice - freeboard thickness, ice edge, drift, type, concentration
- Ice Sheet – margin, grounding line, ice stream surface velocity
- Iceberg locations and characteristics, snow characteristics

Summary



- WaPA has defined the validity and limitations of the Wavemill science products in anticipation of a possible Earth Explorer Core mission
- Findings of scatterometry analysis confirm that dual polarisation or a third antenna is needed to separately and independently extract surface current and surface wind.
- The Wavemill End-To-End Simulator accurately represents real situations and has calculated a preliminary geophysical error budget.
- Characteristics of Proof of Concept Campaign airborne data can be explained by relatively simple geophysical models, indicating a strategy for inverting the measurements into the required geophysical products.
- Wavemill has the potential to make important measurements in the marginal ice zone.
- To manage power and data downlink, switching between different measurement modes may be required



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