

# Ocean Surface Current Airborne Radar (OSCAR) Demonstrator & SEASTARex campaign

Adrien Martin<sup>1</sup>, Christian Trampuz<sup>2</sup>, Hugo Keryhuel<sup>2</sup>, Karlus Macedo<sup>2</sup>, Ruizhi Hu<sup>2</sup>, Adriano Meta<sup>2</sup>, Marcos Portabella<sup>3</sup>, Louis Marié<sup>4</sup>, Christine Gommenginger<sup>1</sup>, JF Filipot<sup>5</sup>, Jochen Horstmann<sup>6</sup>, José Marquez<sup>7</sup>, Petronilo Iglesias<sup>8</sup>, Tania Casal<sup>8</sup>

For more info: [admartin@noc.ac.uk](mailto:admartin@noc.ac.uk)



**Radar**metrics  
Seeing through.

**ICM** Institut  
de Ciències  
del Mar



**Ifremer**

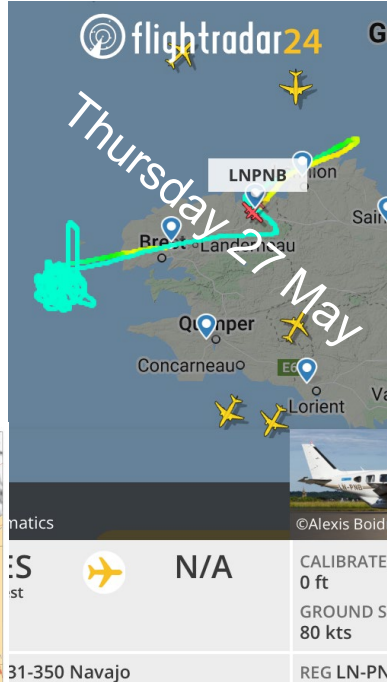
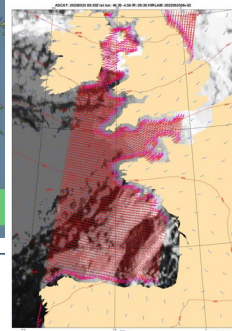
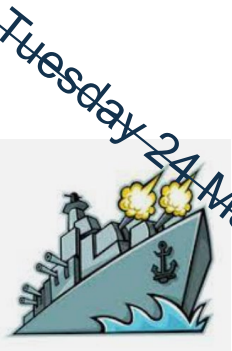


FRANCE  
ENERGIES  
MARINES



Helmholtz-Zentrum  
**hereon**

ESA LPS22 Bonn



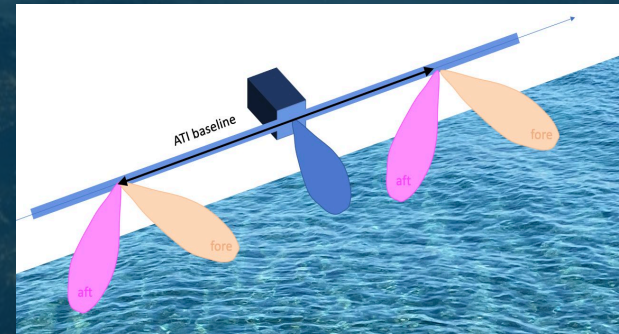
A. Martin (National Oceanography Centre)

ESA LPS 22 Bonn

OSCAR

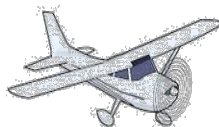
SEASTAR is a dedicated ocean mission to address well articulated scientific needs for new synoptic imaging of ocean current and wind vectors at 1km resolution.

Its focus on key interfaces of the Earth system makes SEASTAR relevant to a large and growing community of ocean, atmosphere, cryosphere, coastal and climate scientists and operators.

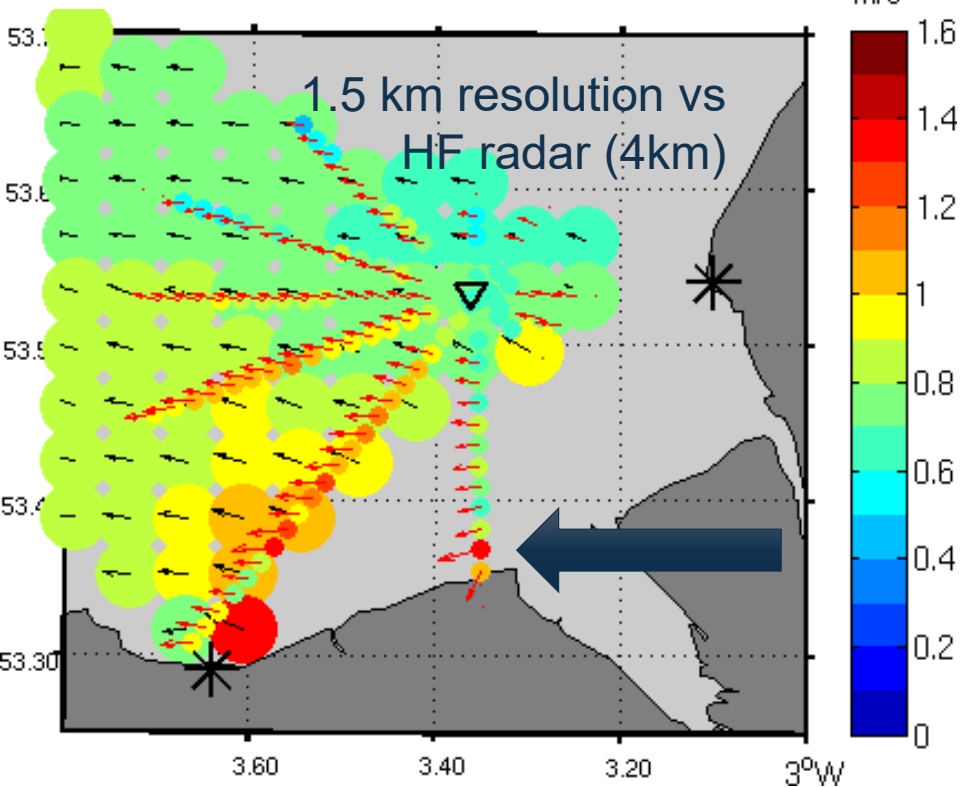


[projects.noc.ac.uk/seastar/](http://projects.noc.ac.uk/seastar/)

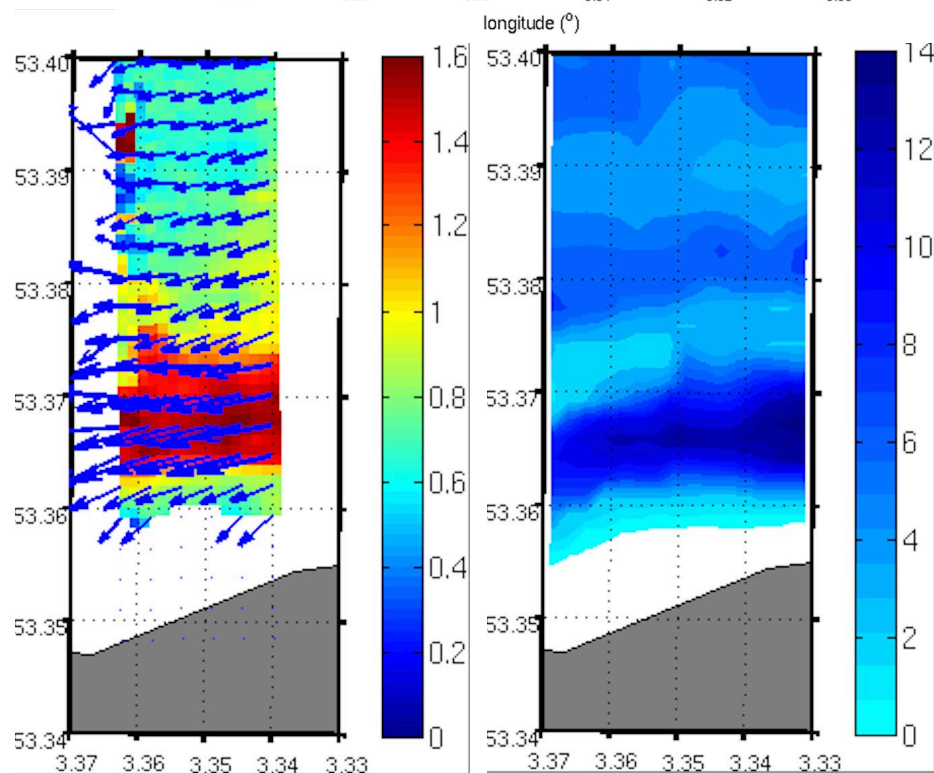
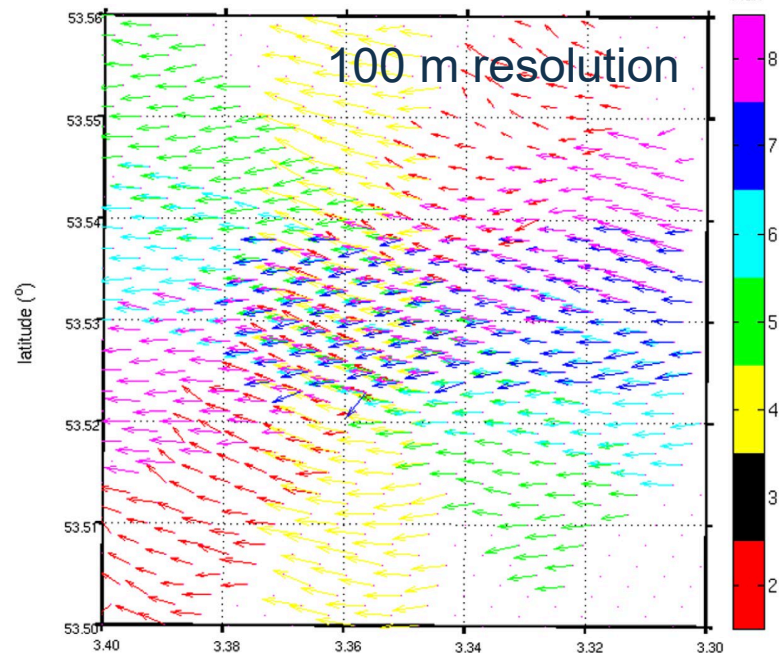
# Wavemill Airborne measurements Irish Sea 2011



*Martin & Gommenginger, RSE, 2017*

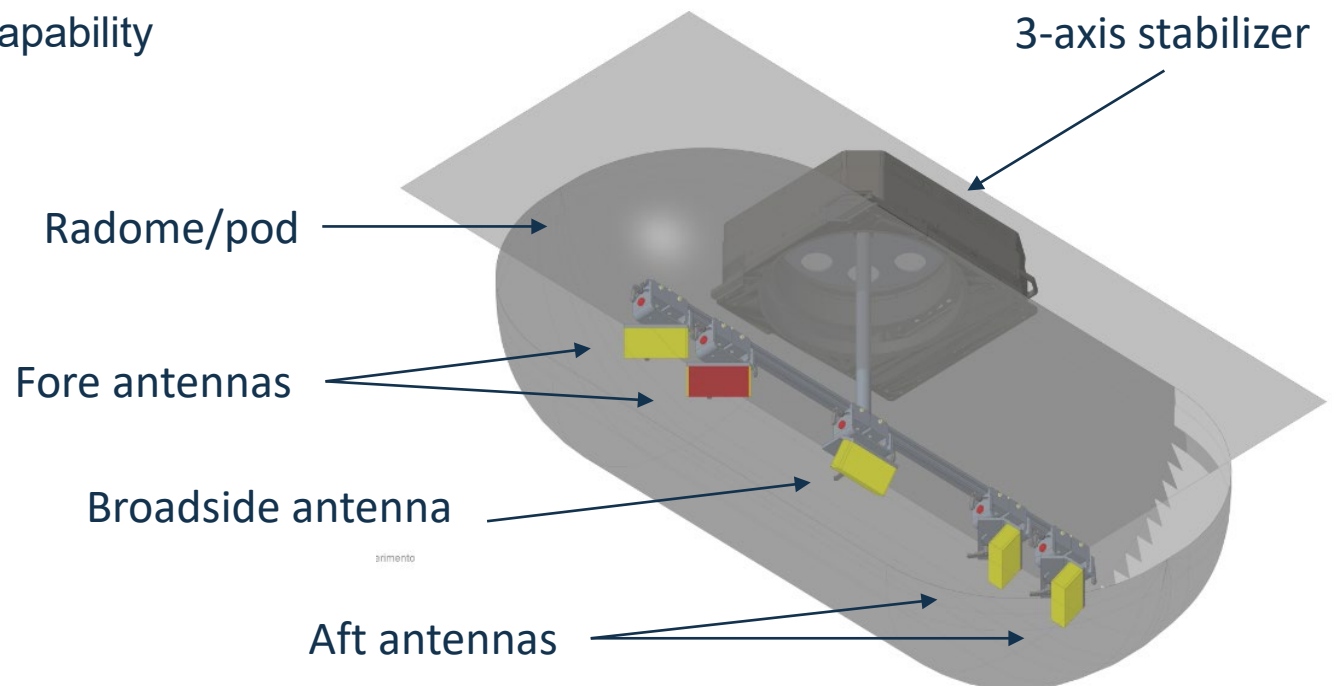
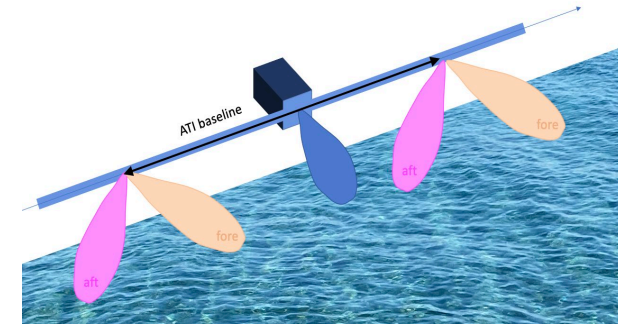


Better than 10cm/s @1.5km versus HF radar



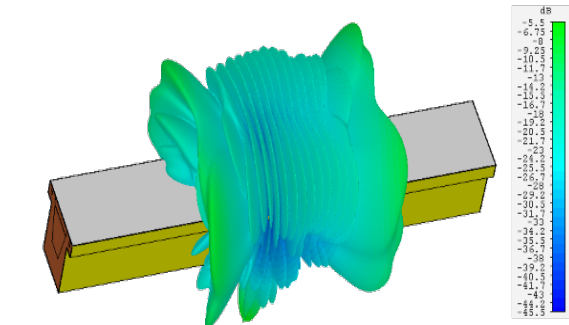
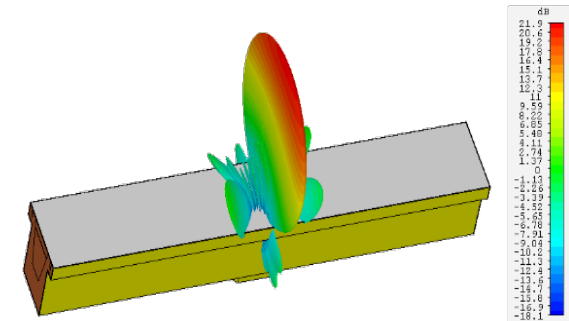
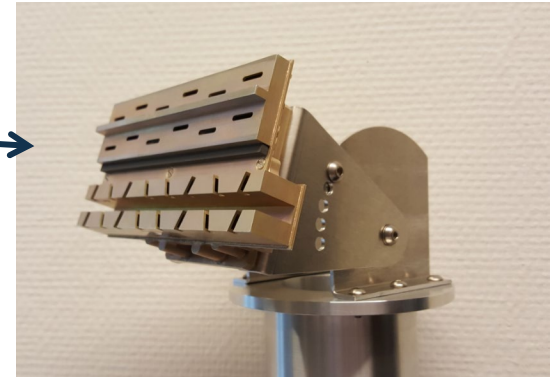
# OSCAR key features

- Ku-band SAR at 13.5 GHz, up to 150 MHz bandwidth, 30W average power
- 2 + 2 along-track interferometric beams (fore and aft), squinted by  $\pm 45^\circ$
- 1 broad-side antenna to “complete” Scatterometer
- full-polarimetric capability
- 3-axis stabilized



# Instrument technology

- dual-polarimetric antenna
- slotted waveguide antenna
- very high accuracy 3-axis stabilizing unit
- very high accuracy Navigation Unit, IMU rigidly mounted onto the antenna frame



# Antennas + instrument



# Long story short – start in 2016



**EASA** Application for Flight Conditions for a Permit to Fly

Aviation Document Certificate (ADC) 000000001 (Type: Permit to Fly - PTFL)

Minimum 200 hrs total time on fixed wing multi engine piston or turboprop and 100 hrs on tail rotor or fixed rotorcraft.

Flight instructor Training received from ATP (pilot) or an ATP or from Approved ATC (instructor) who have received the training from EASA.

The flight conditions approval remains valid provided the declared configuration is approved, the aircraft is maintained in accordance with the applicable regulations, and compliance with applicable EASA CS, EASA ADs, and EASA SBs.

The flight conditions have been established and justified in accordance with CS-A-208.

The aircraft is defined in Part B against the requirements and information using a sample for the intended operation under the identified conditions and restrictions.

10. Approval and/or Approvals Approval Number or approval(s)

11. Date of issue	12. Applicant name and signature	Computer Generated Document
08 March 2022	Richard Jager	
Date	Name	Signature

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 13.2. EASA Approval Date: 08/03/2022

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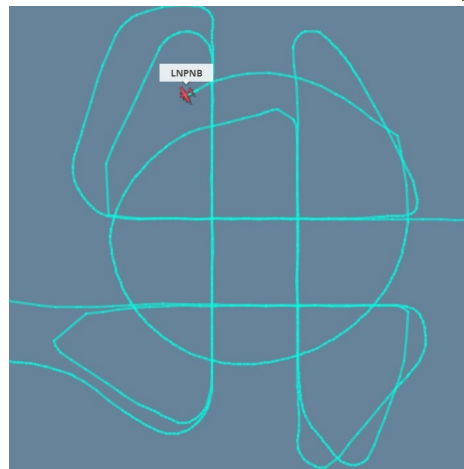
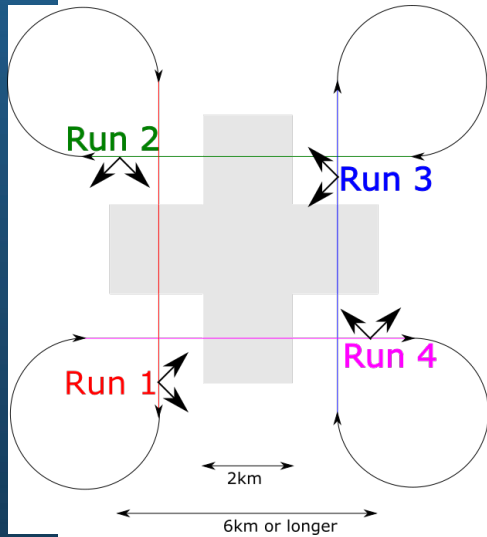
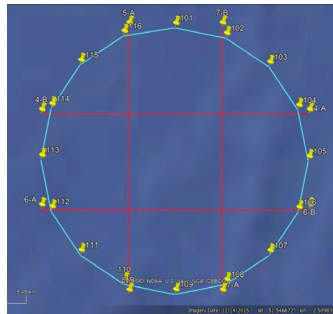
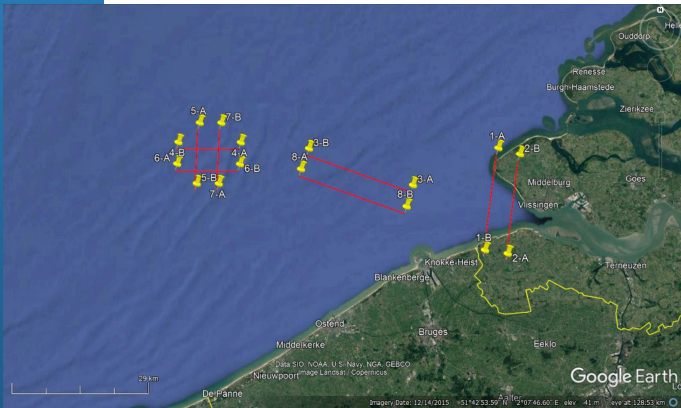
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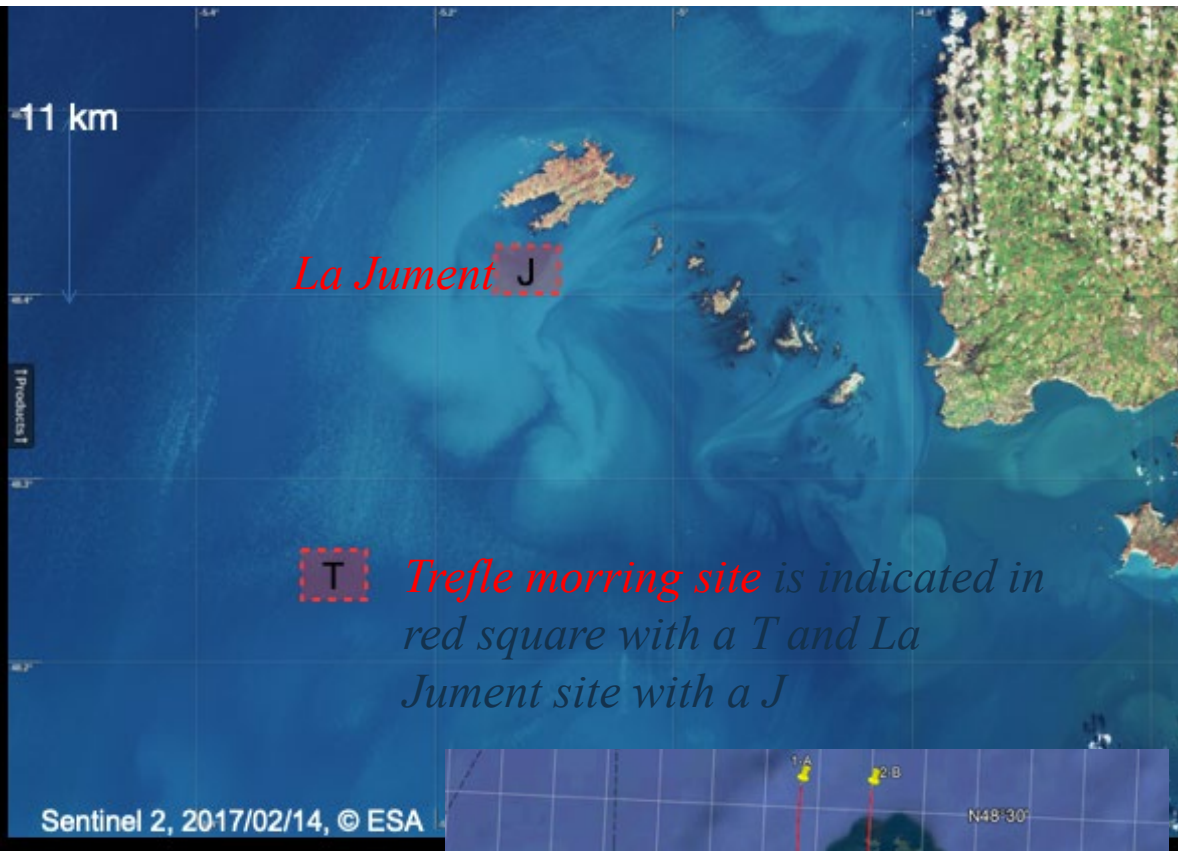
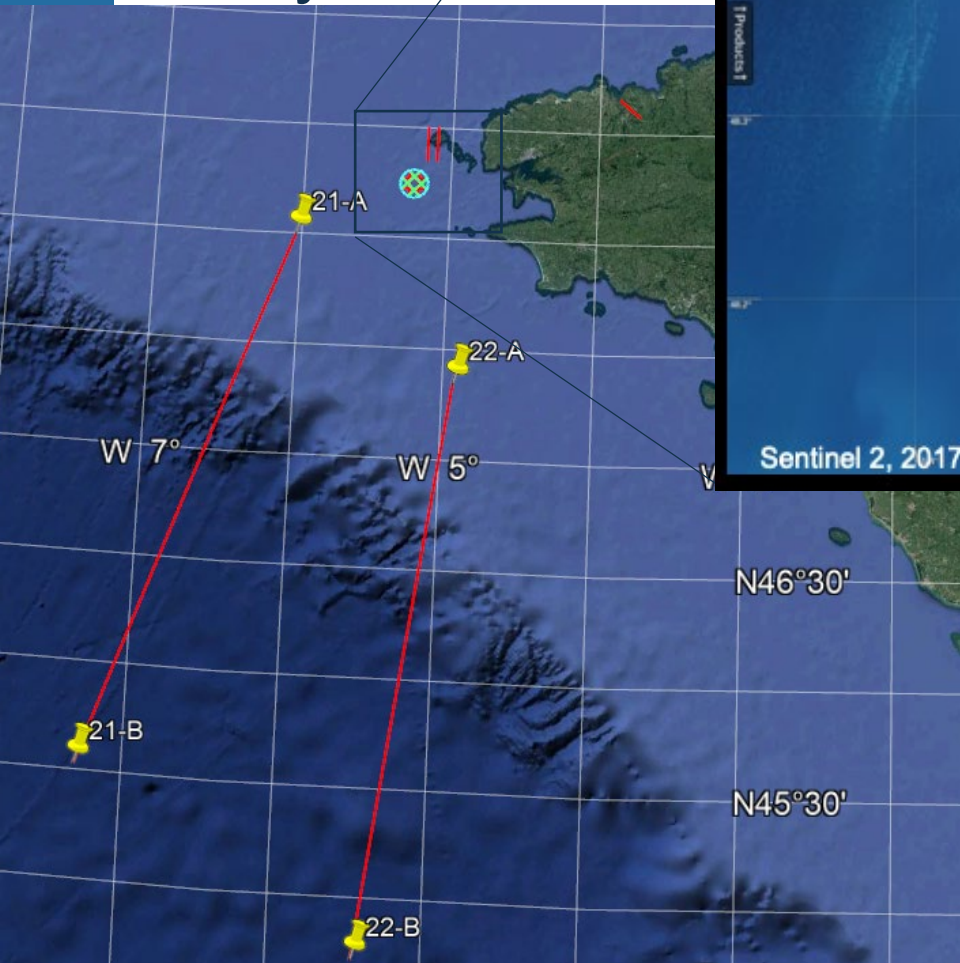
Aircraft certification  
Feb 2022



# Netherlands functional test flight – 11 April 2022



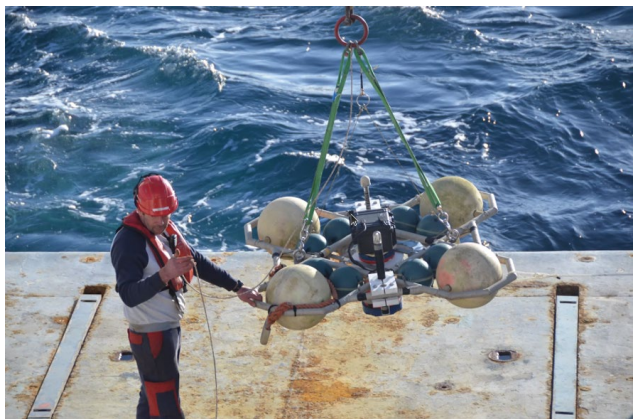
# SEASTARex campaign Iroise Sea May 2022



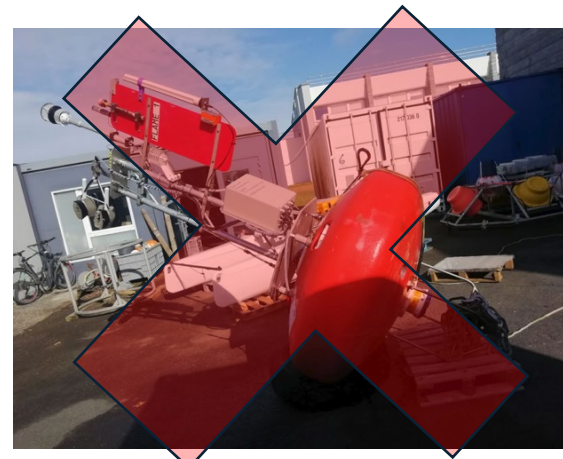
**T** *Trefle morning site* is indicated in red square with a T and La Jument site with a J



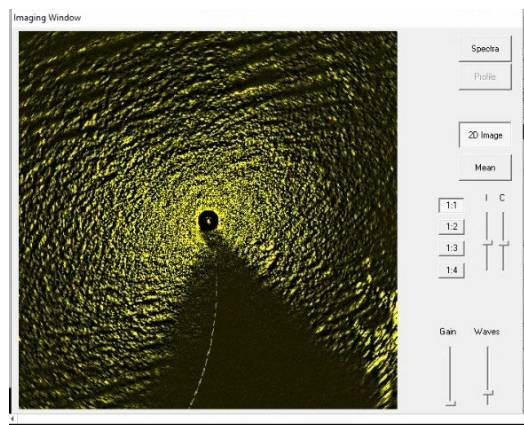
# SEASTARex campaign - ground truth measurements



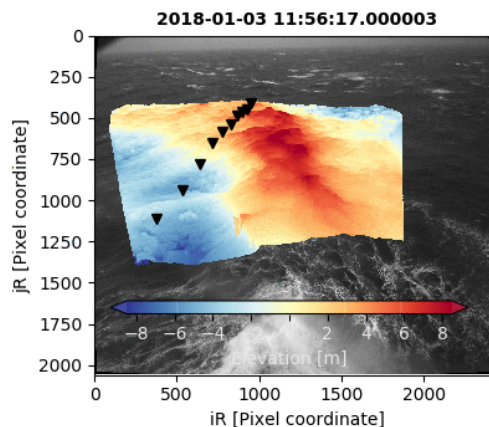
*TREFLE buoy carrying a down looking ADCP and an IMU. It provides measurements of the vertical profile of surface current and directional wave spectrum*



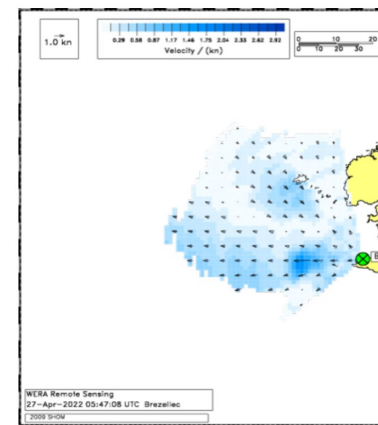
*Dual sonic anemometer, high speed gas analyser instrument and an IMU to correct buoy motion. It also carries a meteorological package measurement slow (1Hz) fluctuations of wind, air temperature, humidity and pressure at the height of 2m above sea level.*



*La Jument lighthouse X-band marine radar*



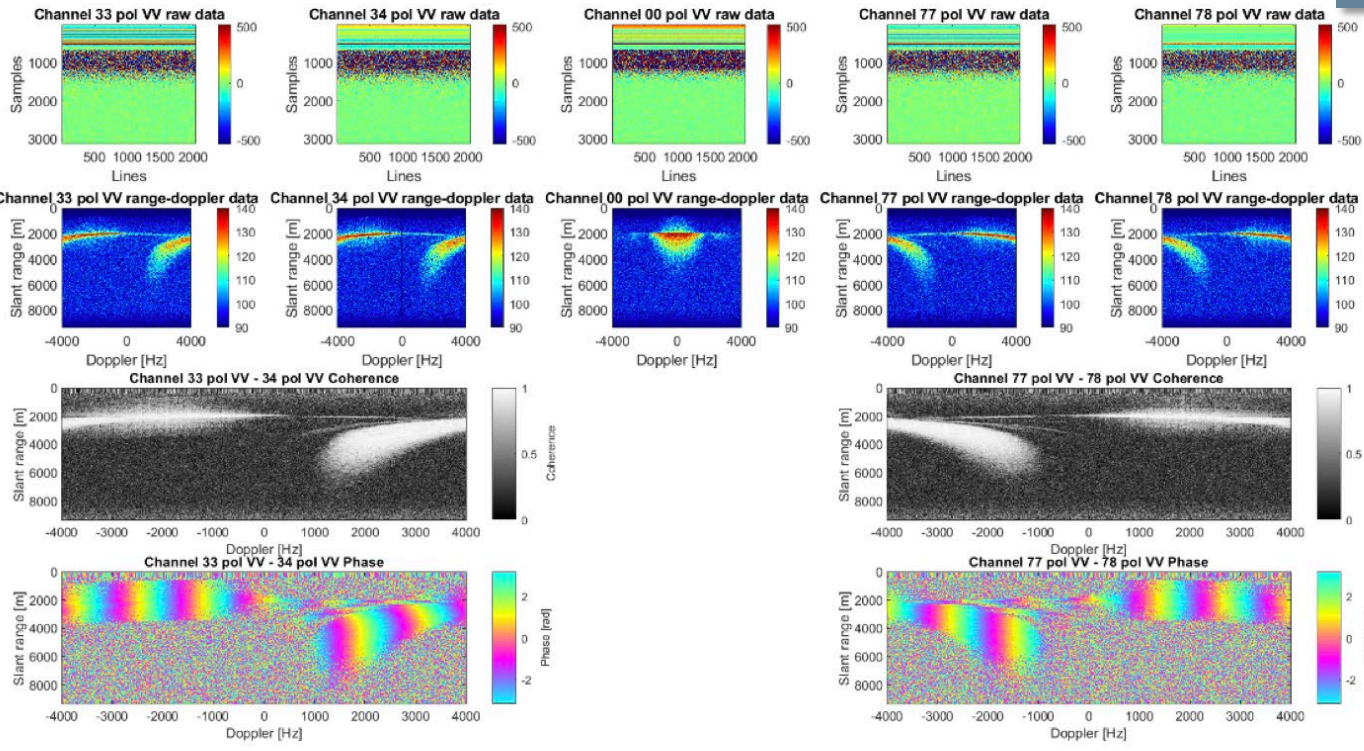
*La Jument lighthouse Stereo-Video*



*HF Radar*

# Over strong gradient area (Quessant)

20220517T093215 - file 7



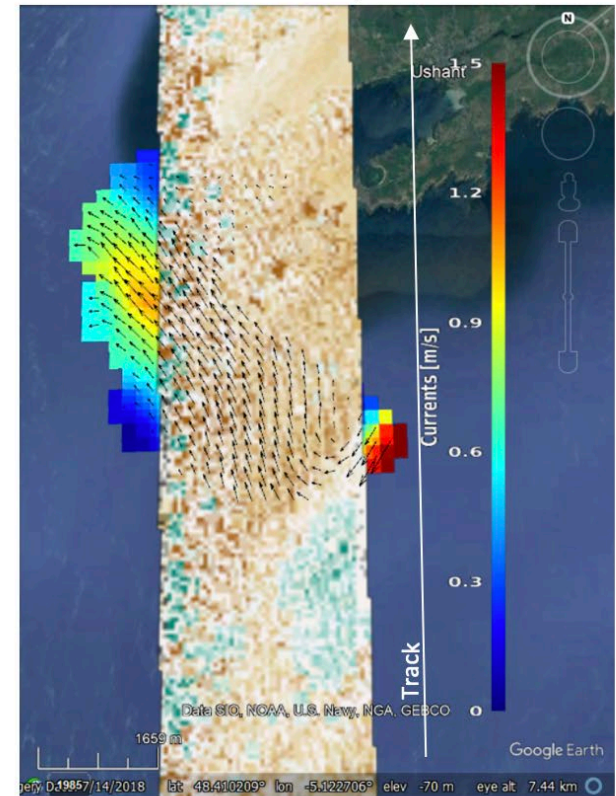
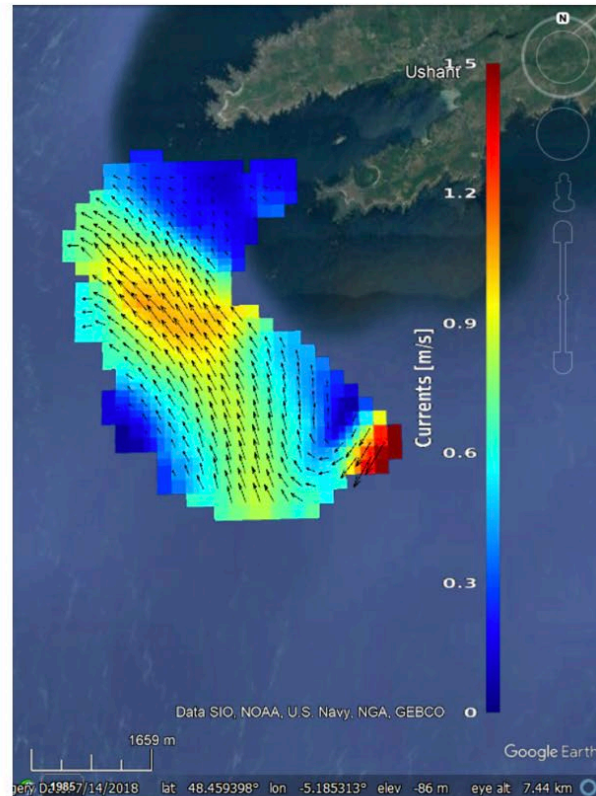
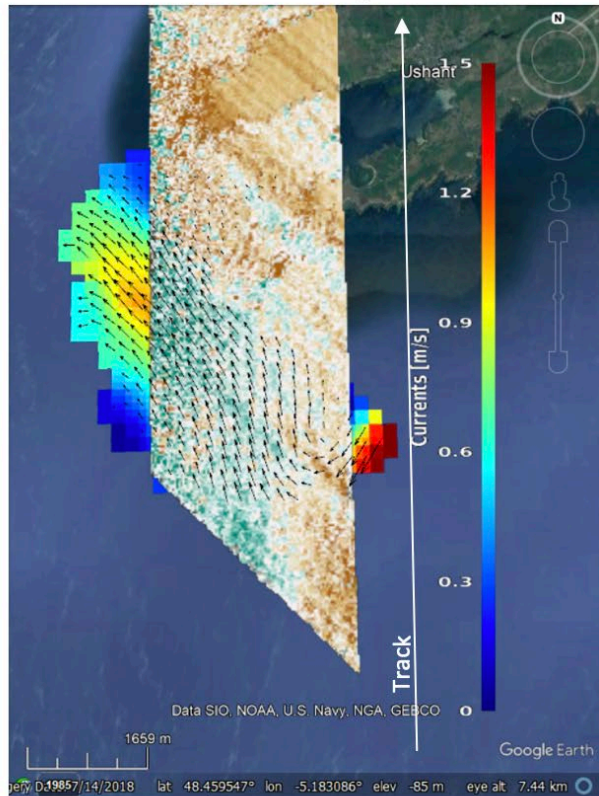
# OSCAR Track South-North (course 0°N)

OSCAR SAR processing is still work in progress, with some residuals still to be removed, but the physical features are visible

OSCAR 45° squint fore

X-band ground-based marine radar

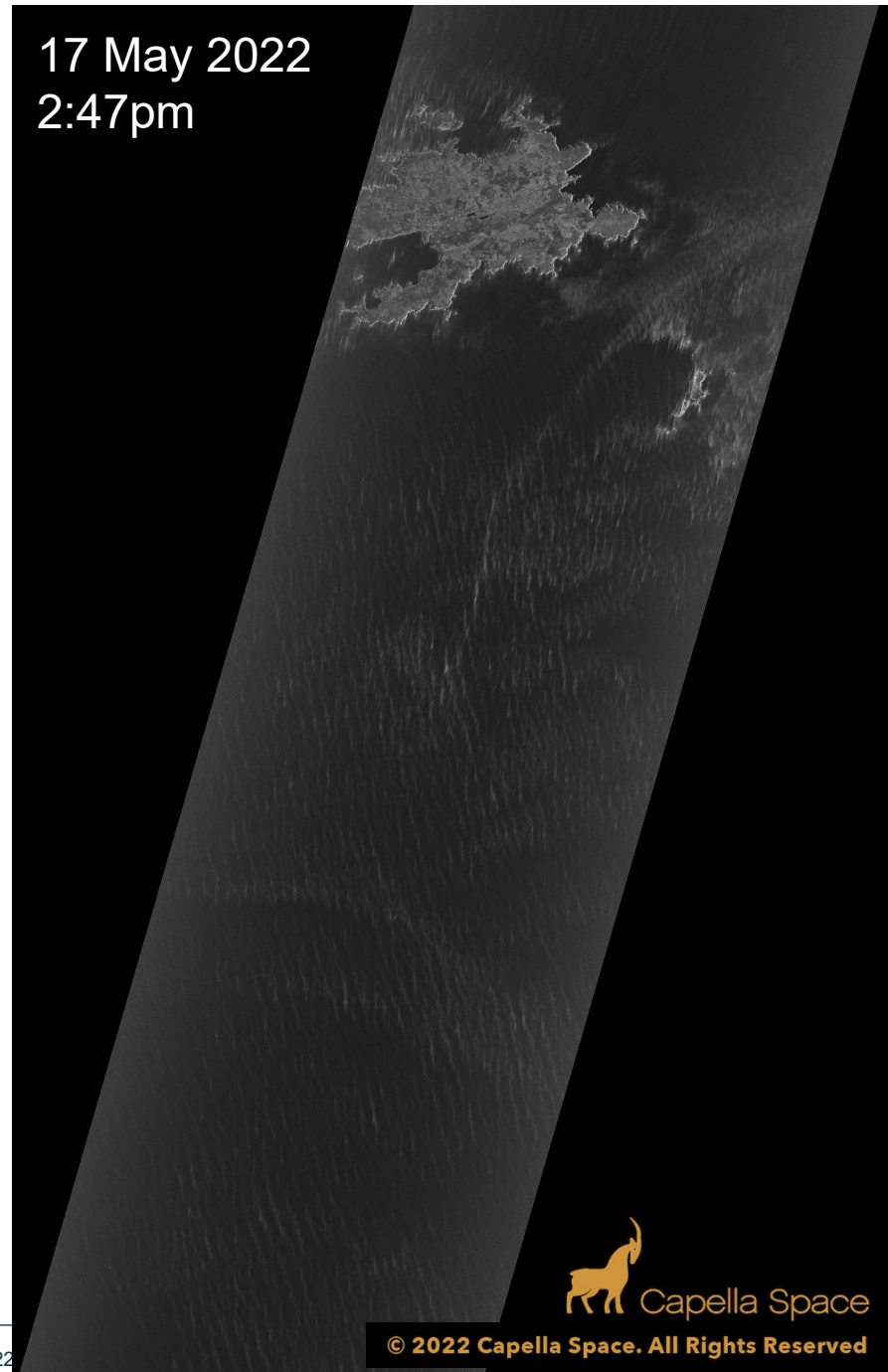
OSCAR 45° squint aft



# Satellite SAR acquisition

- Sentinel-1, Sentinel-2, Sentinel-3
- ESA Third Party Mission
  - Radarsat-2
  - TerraSAR-X
  - PAZ
  - COSMO-Skymed
- Others
  - NovaSAR
  - Capella

17 May 2022  
2:47pm



# NovaSAR-1

Acquisition 33889

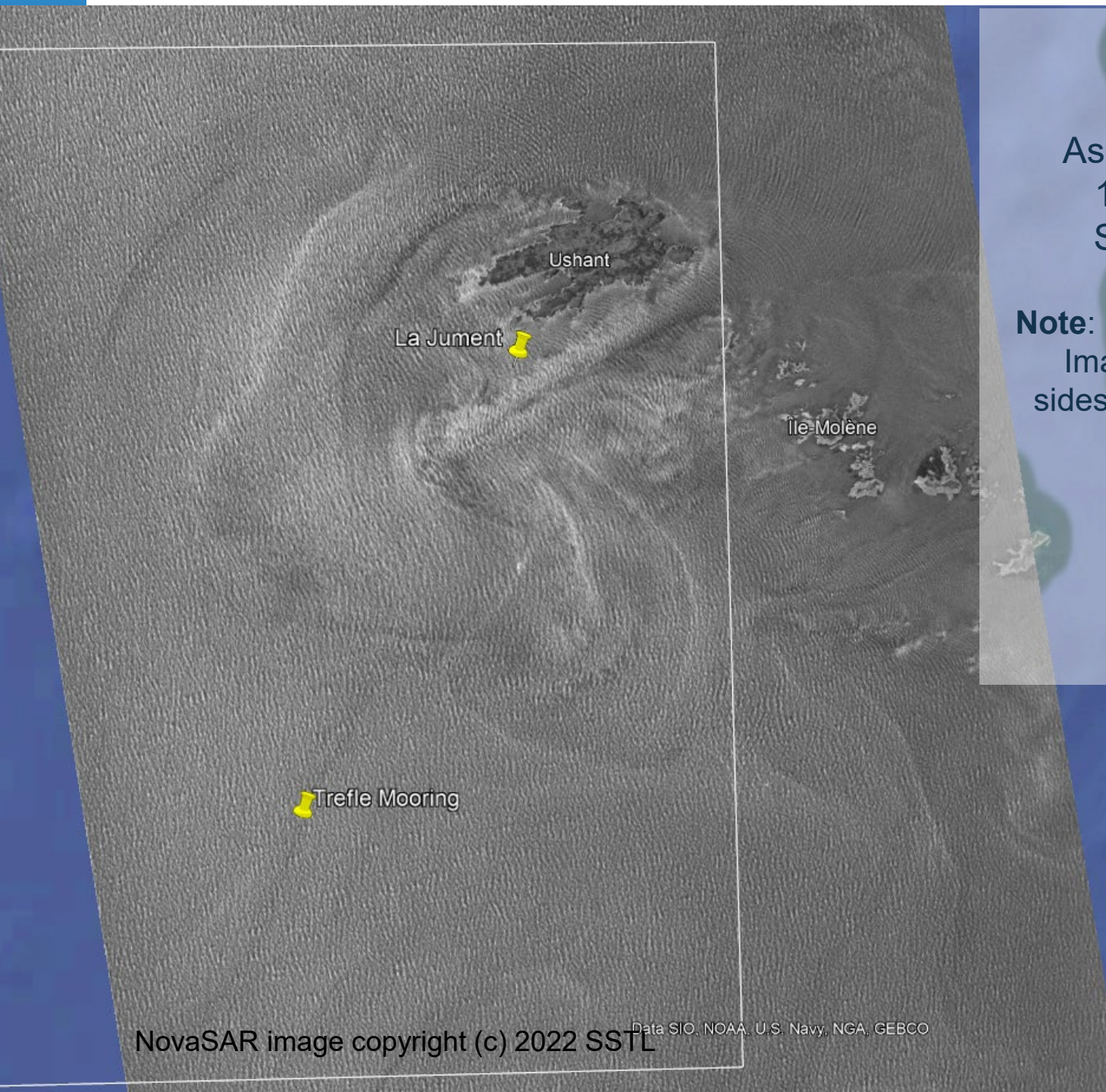
Ascending, Right-sided

17<sup>th</sup> May at 10:30 am

Stripmap VV, 6m res.

**Note:** Swath extended during  
Image processing on both  
sides to give a wider view of  
the trials area

Courtesy:  
Martin Cohen,  
Airbus, Portsmouth







## *Off-shore flight*

