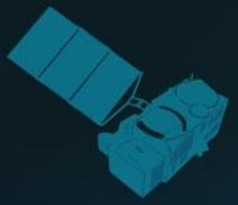

# Oceans and Sea Ice

General introduction

Dr Hayley Evers-King (Marine Applications Expert, EUMETSAT)

# Todays Agenda



- General Introduction, Hayley Evers-King (EUMETSAT, Marine Applications Expert)
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- Communicating about Sea Ice, Olivier Membrive (Meteo France, Scientific Communication & Outreach Officer)
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- Q&A
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ALTIMETRY (& SAR)

SEA SURFACE TEMPERATURE

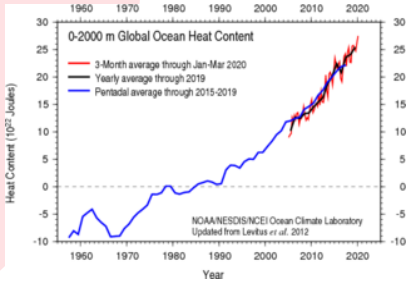
OCEAN COLOUR

Ocean currents
Weather forecasting
Storm dynamics
Maritime safety
Eddies
Thermocline

Essential Climate Variables
Climate Model Assimilation
Marine Spatial Planning
Env. Impact Assessment
Disaster response
Insurance Risk
Ocean Fronts
ENSO

Pollutant transport
Ice detection
Oil pollution
Internal waves
Debris
Biological transport (blooms, genetics)

Fishing Zones
River plumes
Aquaculture productivity
Coral bleaching
Bio-toxins
Human health
HAB formation

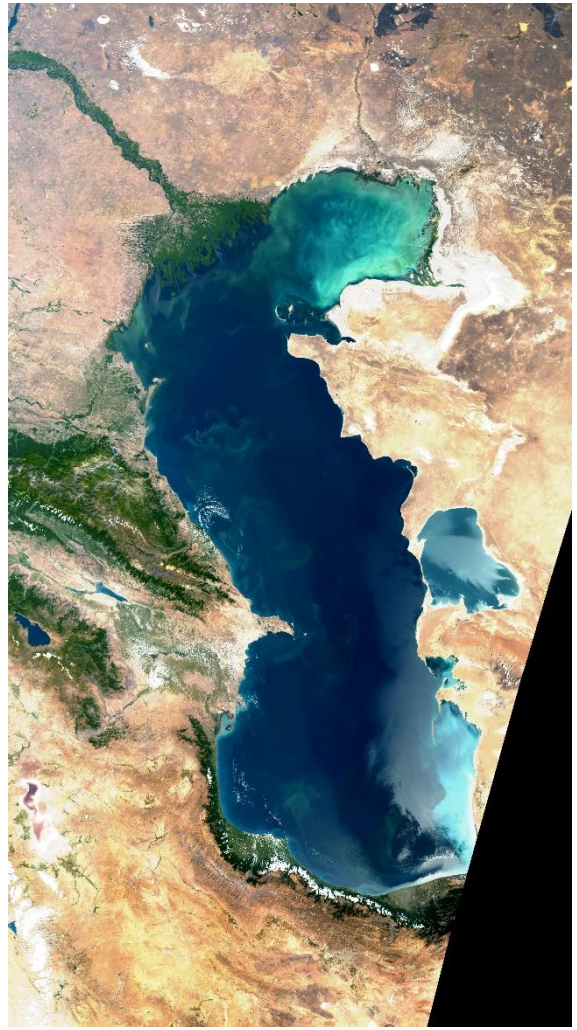



# What are our EO options for visualising the oceans and sea ice?

- Satellite measurements and products:
  - Level-1 data – visible/thermal radiometry, microwave, radar signals, (gravity, laser (LiDAR)).
  - Level-2 data – signals converted in to geophysical products
  - Level-3 and 4 data – merged, regridded, gap filled, further value added geophysical products
  - Note – available at various timeliness levels, and as reprocessed/Climate Data Records.
- Reanalysis and model outputs
  - Satellite data assimilated in to models.

# What are our EO options for visualising the oceans and sea ice? 1. Visible optical

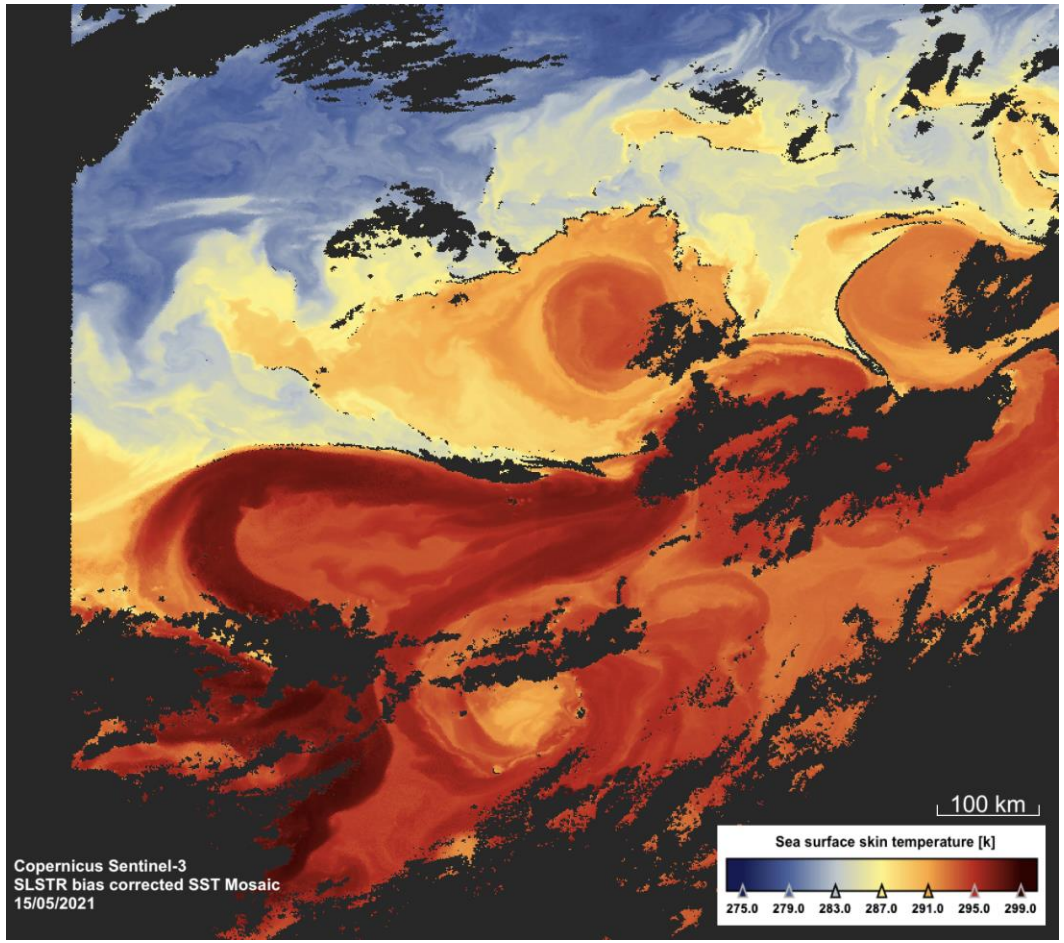
- Often referred to as 'Ocean Colour' – measurements of light across visible wavelengths
- Day time measurements
- Multispectral, narrow bands.
- A really good set of eyes designed for a dark target
- You can make an RGB/'true colour'....
- ... but there's a lot more information hidden in specific bands
  - Level-2 products such as chlorophyll-a, sediments etc.



Enhanced 'true colour' RGB of Caspian Sea from Sentinel-3 OLCI

# What are our EO options for visualising the oceans and sea ice? 2. Thermal radiometry (and microwave)

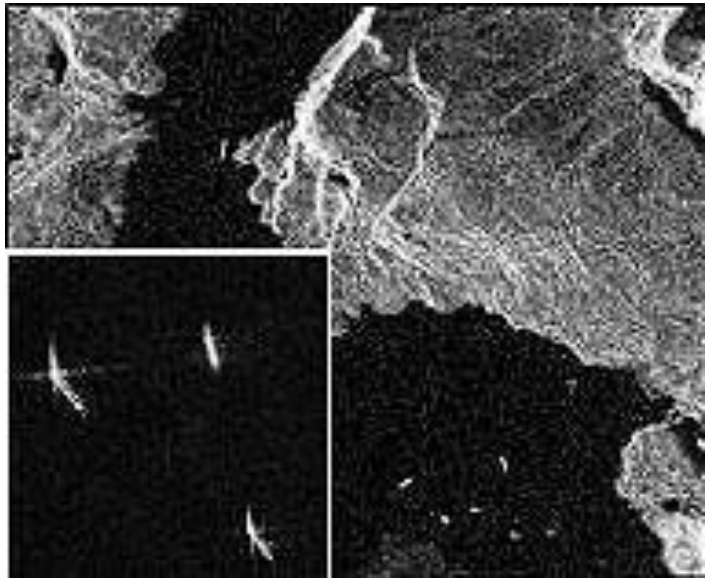
- From an ocean perspective, main objective is SST (and SIST) derivation (level-2)
  - Also ice characteristics
- Multiple bands.
- Day and night measurements
- (Microwave can also 'see through' clouds, tends to be coarser resolution)



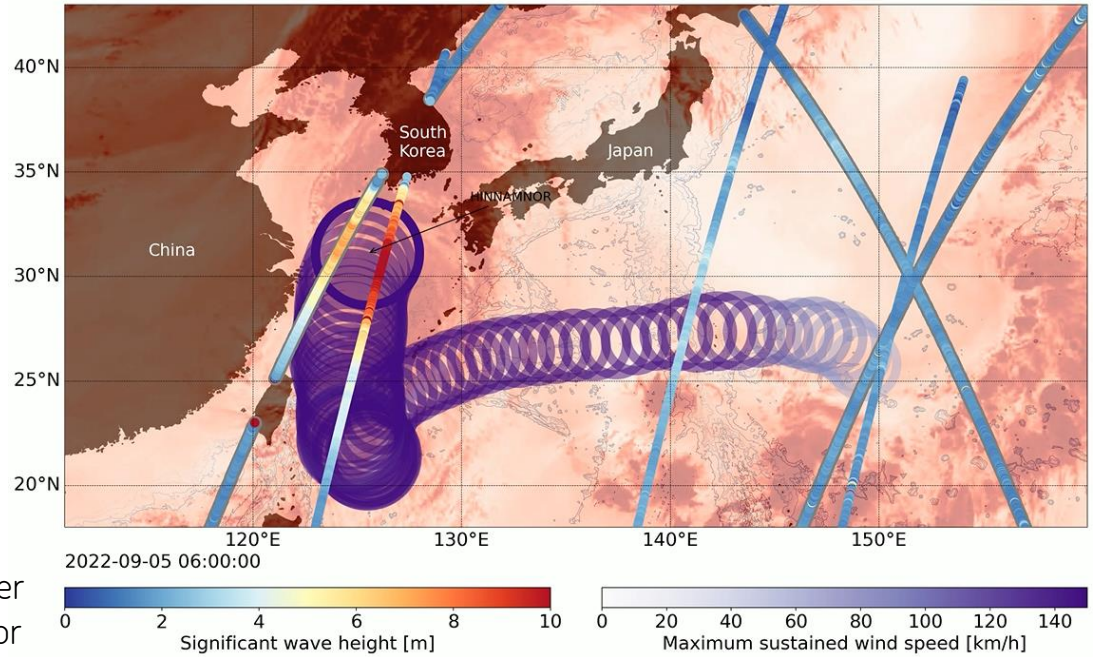

Gulf Stream SST from Sentinel-3 SLSTR

# What are our options for visualising the oceans and sea ice? 3. Radar

- Synthetic Aperture Radar – signal emitted and return echoes collected (level-1)
- Two main uses in an ocean context :
  - SAR Altimetry – narrow, along-track measurements for precise estimation of sea surface parameters – sea surface height (sea-level), significant wave height, wind speed (level-2)
  - SAR imaging – wider swath images where signal can be linked with oil spills, ship/infrastructure, waves, ice parameters.



Ships detected in a Sentinel-1 SAR image




Sentinel-3 and 6 Altimetry tracks over Typhoon Hinnamnor

## Some general things to consider:

- Resolution: Spatial, temporal, spectral – relative to the thing you're interested in telling a story about.
- Sensitivity and ambiguity: Is the signal you're seeing 'real' or 'representative'?
  - Changes between images – is it an actual change? What changed?
  - Is the product appropriate (right algorithm, flagged etc)?
- Time series: Particularly around climate related/extreme events…more in coming weeks!

**The oceans are vast and vital to the functioning of our planet, but often distant from us as land dwelling beings – encourage you to share our oceans stories!**

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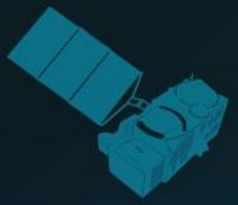

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