



ships4sst

shipborne radiometers for sea surface temperature

High latitude Radiometer activities at DMI

Jacob L. Høyer, Sotirios Skorpelos, Nis Jepsen,
Guisella Gacitua,

Danish Meteorological Institute



DMI
Vejr, klima og hav



Outline

- Normal ISAR/FRM operational activities at DMI
- MW and IR Inter-comparison experiment

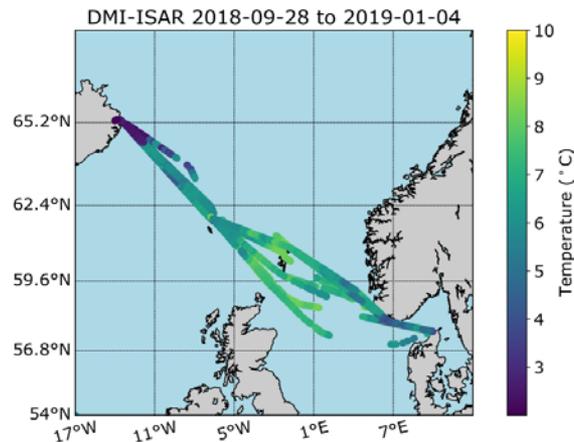
New member of the DMI team

- *Welcome to Guisella Gacitua*
- *New to the DMI radiometer team*



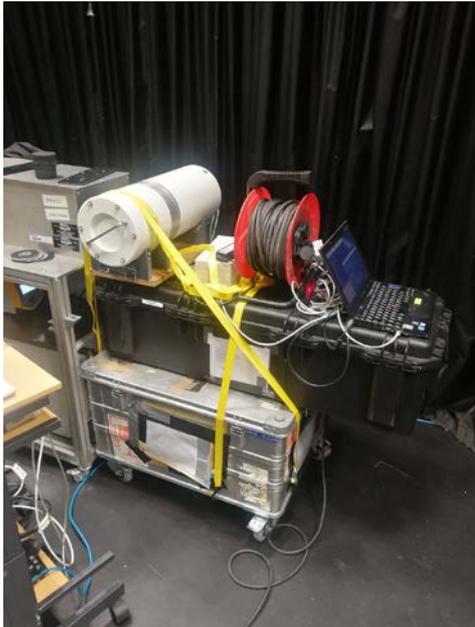
Routine Deployments

- DMI ISAR installed on Smyril line ferry Norrøna, December 2017
- Incidence angle: 25 degrees
- Routine operations between Denmark, Faroes and Iceland, also during COVID-19
- Round time: 1 week
- Year round service
- Servicing and calibration: every 2-3 months



CEOS WGCV inter-comparison

- Participated in CEOS WGCV intercomparison Campaign, June 2022
 - Lab experiment
 - Field experiment
 - Data delivered to NPL for verification



MW/TIR Intercomparison experiment

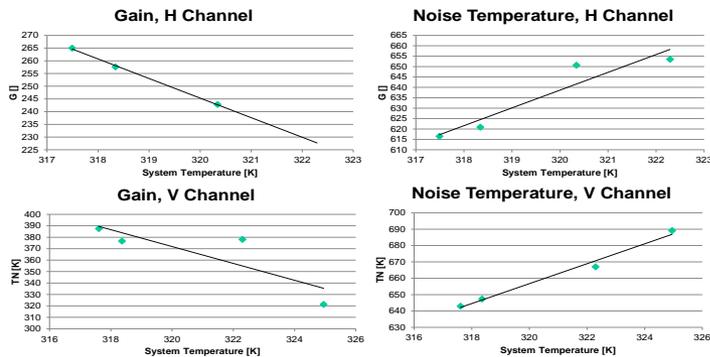
Aim:

- *To perform first inter-comparison between MW and TIR SST radiometers*
- *To asses IR (skin) and MW (subskin) SST relation, prepare for CIMR*

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- *Documentation (available at: ships4sst.org):*
 - *Procedures for MW deployments (**FRM4SST-PRD-DMI-001**)*
 - *MW (C and X band) Characterisation report (**FRM4SST-CR-DMI-001**)*
 - *Inter-comparison between IR and MW radiometer observations (scientific paper to be submitted)*

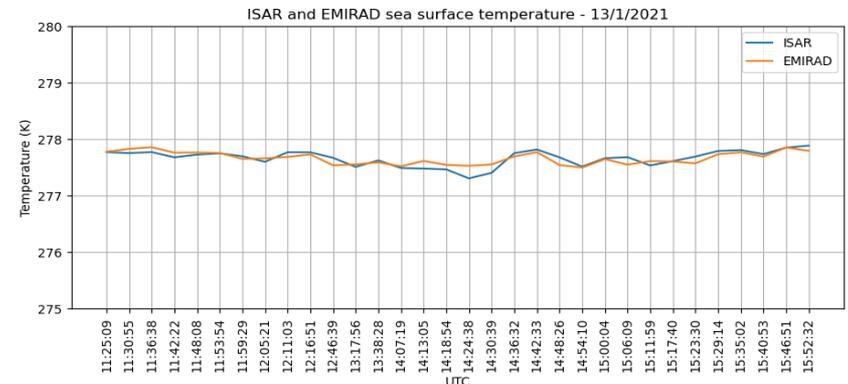
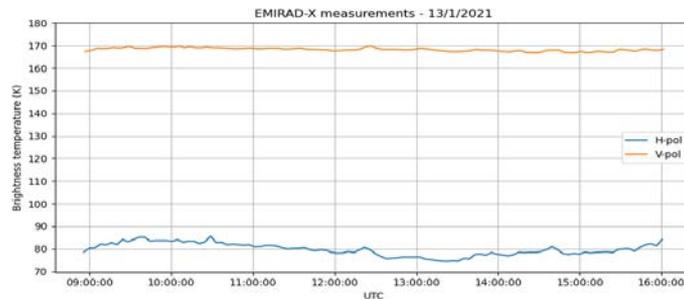
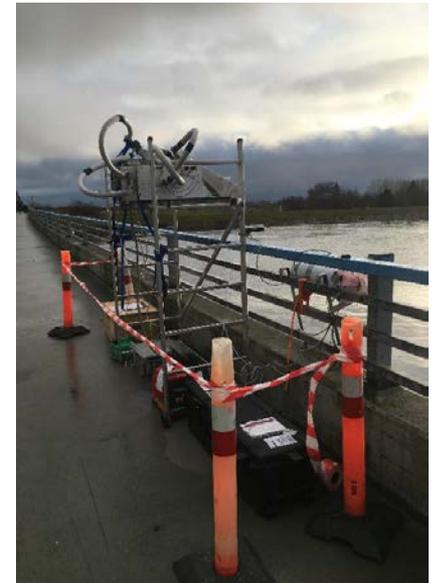
Campaign Radiometers

- **Infrared radiometer : ISAR (well known)**
- **Microwave Radiometer**
 - **DTU EMIRAD**
 - **C band - Frequency (-3 dB: 7.0365 – 7.0635 GHz)**
 - **X band – Frequency (-3dB: 10.64 – 10.74 GHz)**
 - **Refurbished and Characterized.**

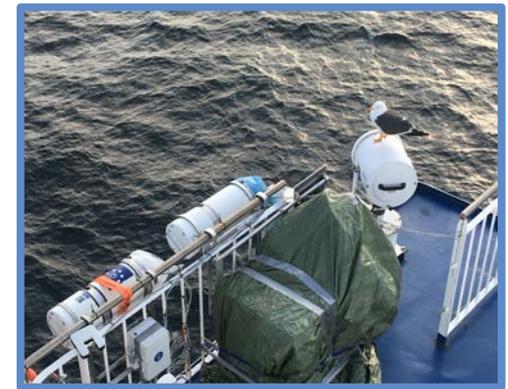


1st Campaign : Static deployment

- *Static installation on a bridge*
- *Looking at salty waters in Copenhagen*
- *1-day deployment in cold and calm waters*
- *ISAR and MW (C+X band) radiometers*
- *Results in Characterisation report*

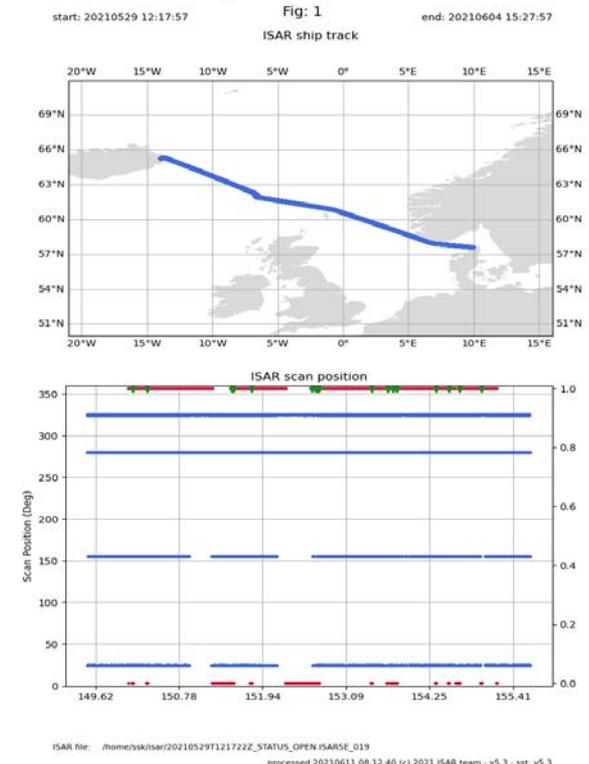


2nd Campaign ship deployment



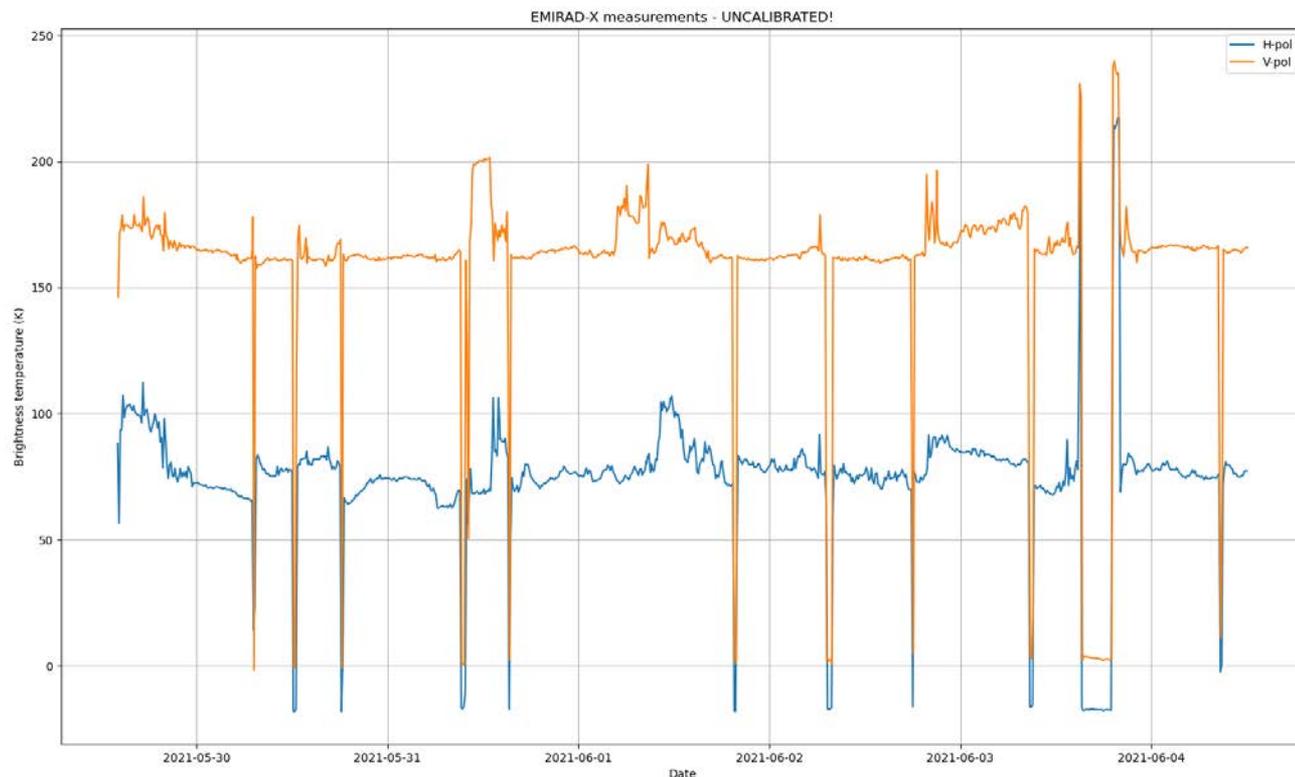
- 10 days deployment on DMI ISAR Ferry: Denmark-Faroes-Iceland
- Side-by-side deployment of:
 - ISAR-08,
 - ISAR-19,
 - EMIRAD-C band
 - EMIRAD-X band
 - Thermal Infrared camera
- Good weather, lots of data acquired
- ISAR incidence angle: 25 degrees
- MW incidence angle: 55 degrees

ISAR Engineering Plots - SN 19



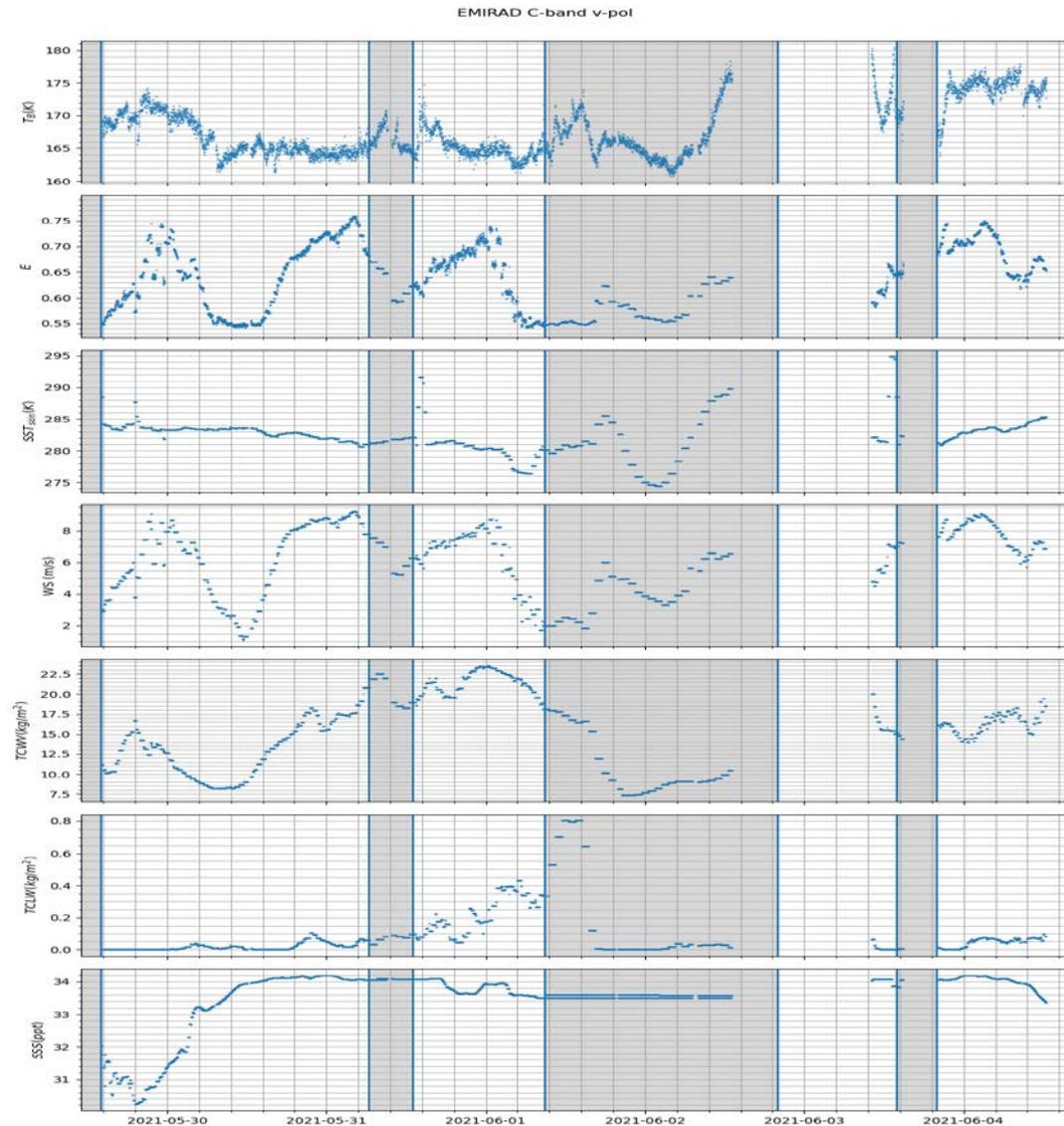
MW observations

- Example of MW observations
- Regular sky observations (55 degrees)



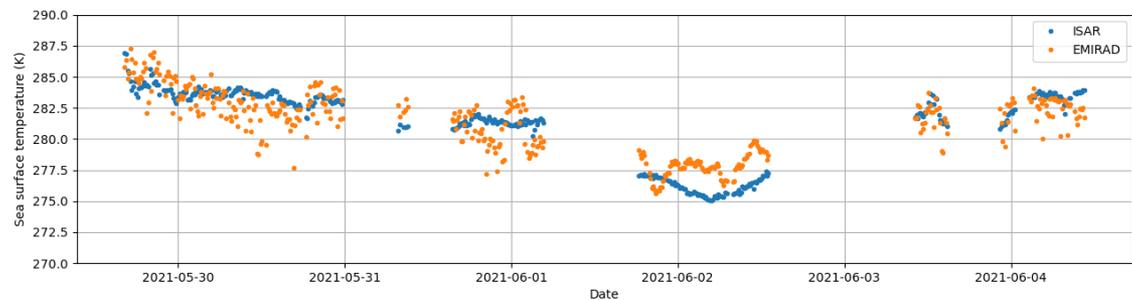
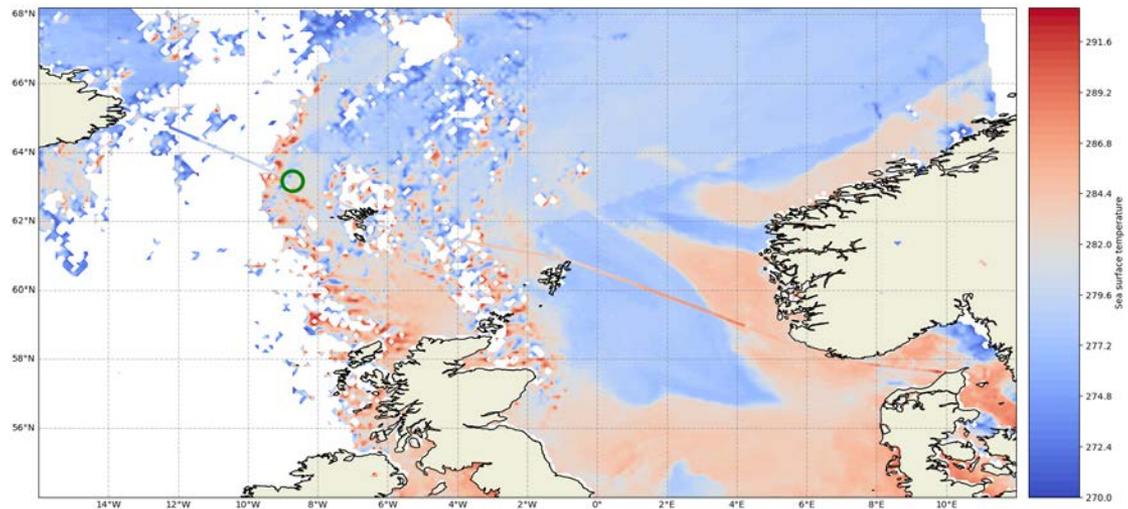
Data processing

- ISAR and EMIRAD observations are collocated
- Auxiliary information added to the matchups
 - SST (L4)
 - Wind speed and direction, TCLW, TCWV (ERA-5 NWP)
 - Salinity (DMI HYCOM model)
 - Simulated surface emissivity



SST comparisons

- Sentinel 3 SSTs overlaid
- Comparison between IR and MW SSTs
- Statistical retrieval, 4 channels MW



Next steps

- Compare with simulated TBs
- Determine spatial and temporal scales of MW TB versus IR TBs
- Understand the MW and IR variability
- Write paper on comparison
- Lessons learned for follow up experiments

Questions ?