

ESA Polar campaigns

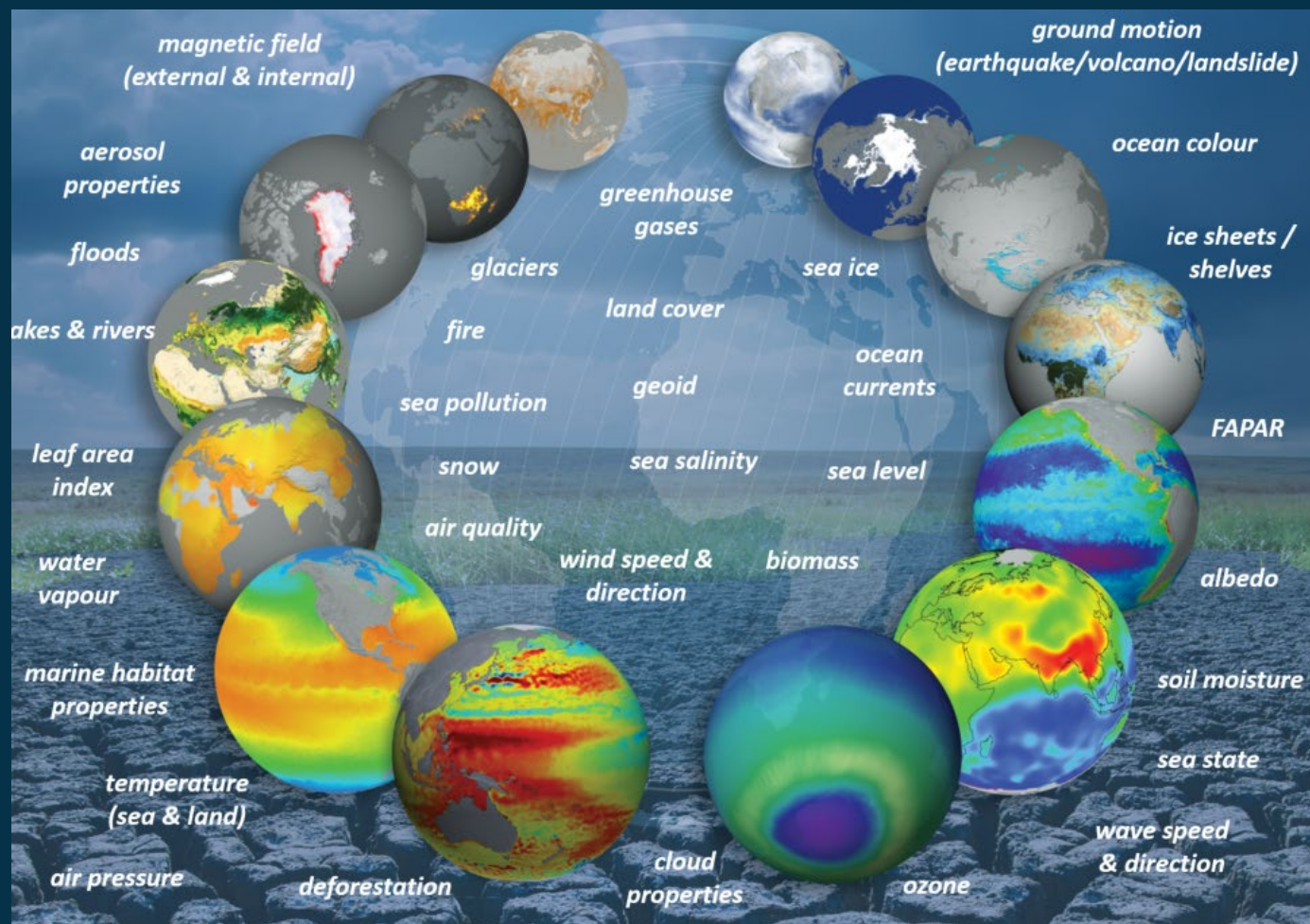
Tania Casal & Dirk Schuettemeyer

15/09/2021

ESA D/EOP mission :

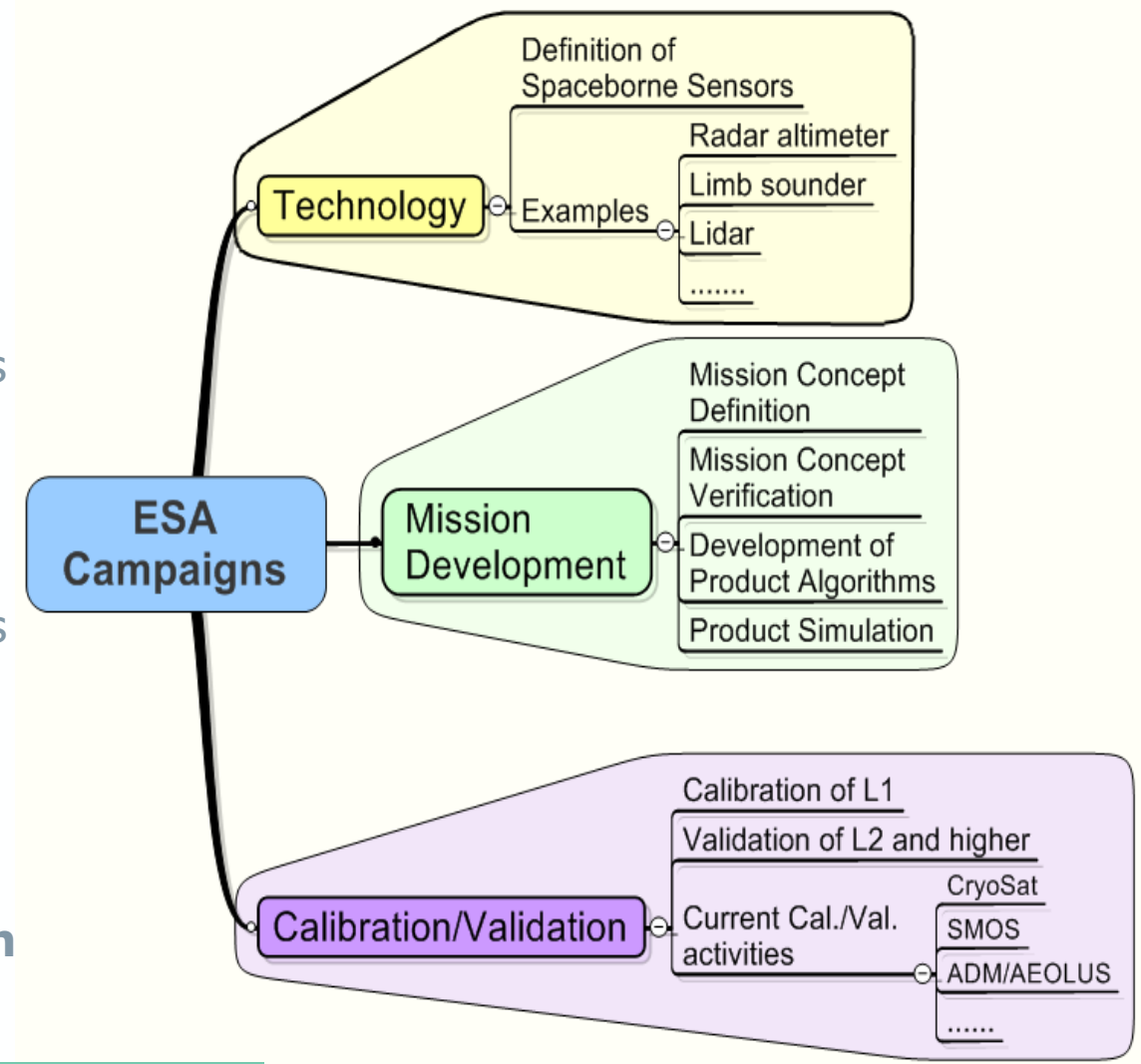
Develop world-class Earth Observation systems addressing scientific & societal challenges with European and global partners

To fulfil the above mission, a set of activities are implemented by EOP to ensure the best possible EO product quality for the missions operated by ESA, including product and processor performance and evolution, calibration and validation activities



General Role of ESA Earth Observation campaigns

- 1. ESA campaign activities started in 1981**
 1. 182 campaigns as of December 2020
 2. Typically 6-10 campaigns/year
- 2. Strategic objectives:**
 1. Support strategic goals of EO Science Strategy
 2. Transnational access to airborne facilities member states
 3. Foster partnerships with national and international organisations
- 3. Campaign activities address:**
 1. Testing technology/Observing techniques
 2. Optimising requirements/design and reducing mission risk
 3. L1-L2 Algorithm prototyping/Product simulation
 4. Calibration/Validation
- 4. Campaign data archive supporting science and application development**



<https://earth.esa.int/eogateway/search?text=&category=Campaigns>

Campaigns for different project phases



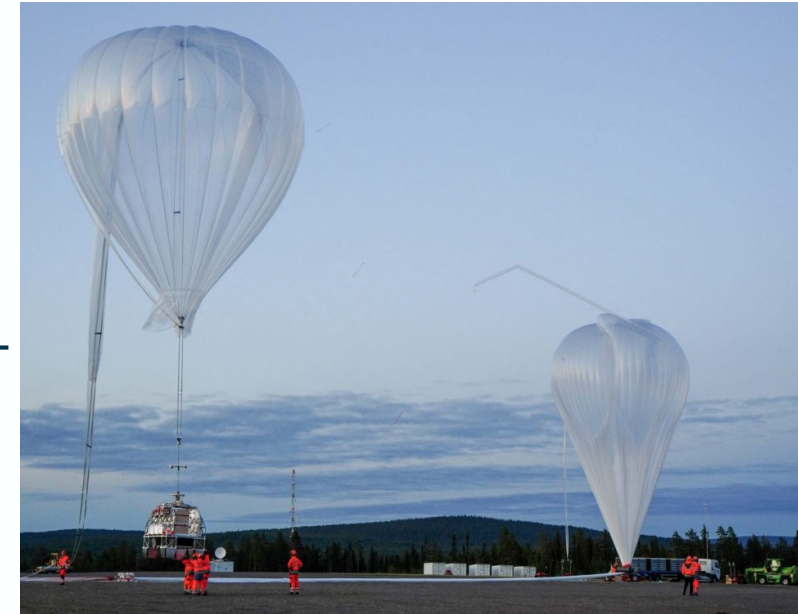
	Pre-Phase A	Phase A Feasibility	Phase B Design	Phase C/D Development	Phase E1 Commissioning	Phase E2 Operation	Data Archive
Technology	X	X					X
Mission Development (Geophysical)	X	X	X				X
Mission Development (Simulation)	X			X			X
Cal/				X	X	X	X
Science Applications						X	X

The majority of ESA campaigns are focussing on the needs of individual missions.



MAGIC4AMPAC: Arctic Methane sensing campaign 2021

- Joint science campaign (Europe and US) in Scandinavia with appr. 80 people on-site.
- Main campaign organized by CNES, France
- Main objectives: multi-sensor airborne sensing of arctic methane using HyTES (NASA), multiple in-situ (DLR) and Methane lidar (DLR/CNES) + balloon & ground measurements
- Data will be used for AMPAC community study, simulation studies for both NASA SBG, ESA LSTM



<https://sscspace.com/blog/2021/08/31/cnes-completes-series-of-balloon-flights-from-esrange/>



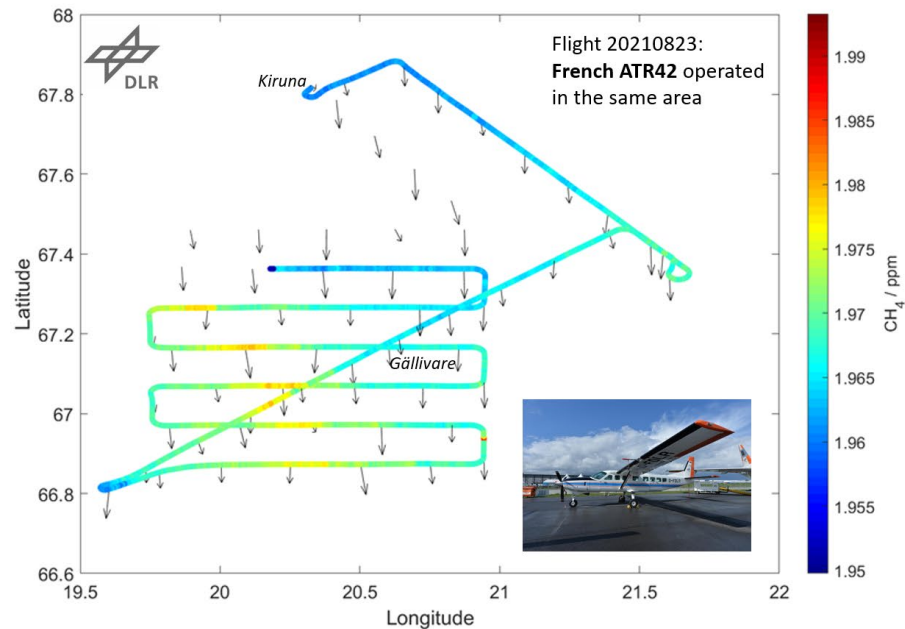
MAGIC4AMPAC: Arctic Methane sensing campaign 2021

First glance of **MAGIC4AMPAC** results:

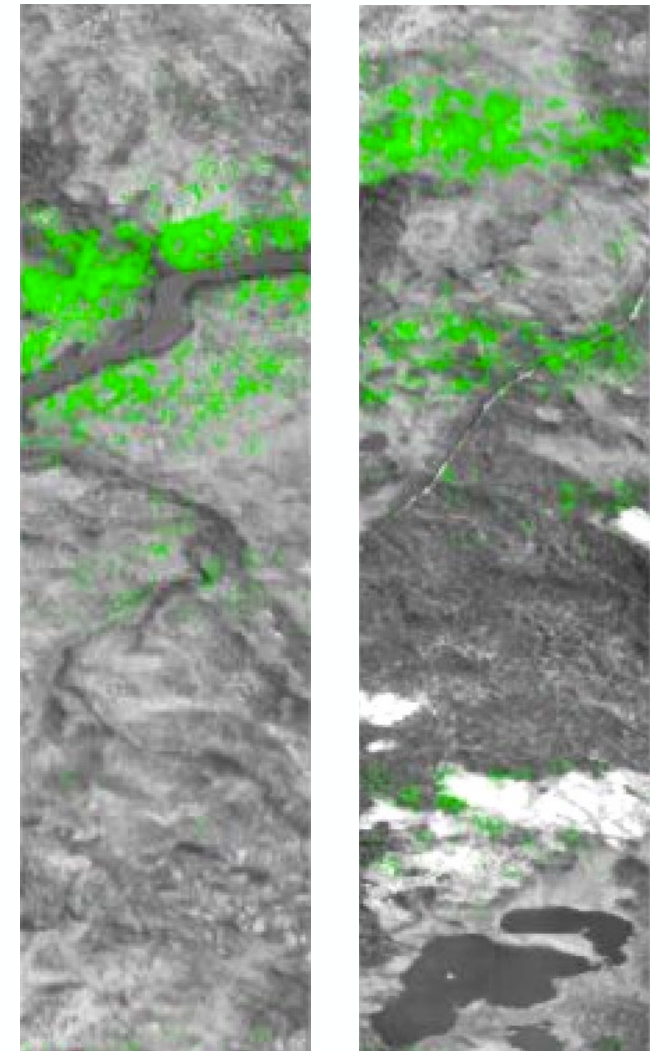
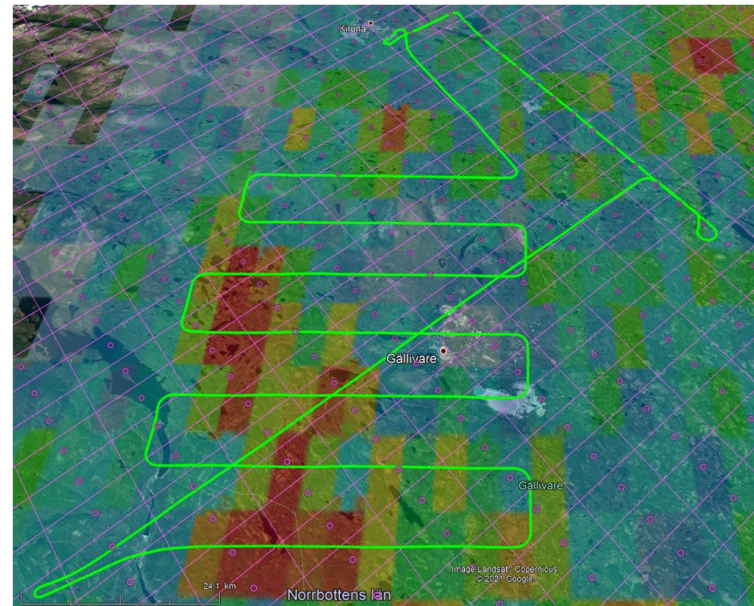
- Successful airborne measurements of CH₄ from Arctic wetlands in Scandinavia
- First intercomparisons with the Finnish JSBACH CH₄-emission inventory are promising
- Methane validation flights with TROPOMI were planned and successfully performed

Example: 20210823

DLR-Cessna in situ CH₄ measurements (PICARRO instrument)



Preliminary data! Please contact anke.roiger@dlr.de or Heidi.Huntrieser@dlr.de



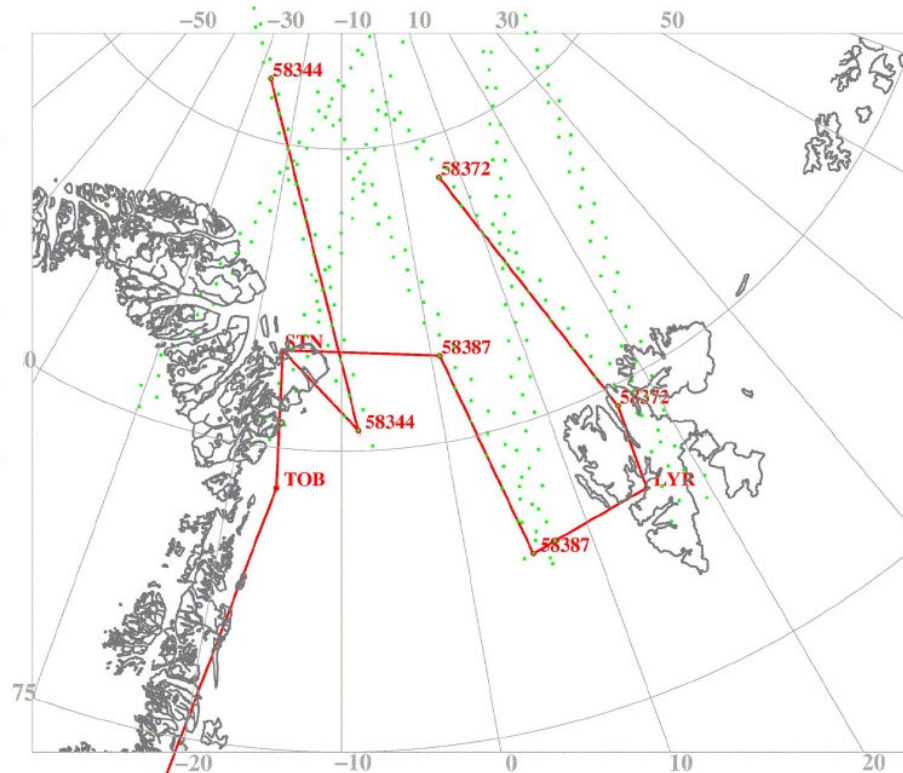
First Methane quicklooks from HyTES! Please contact simon.j.hook@jpl.nasa.gov

Spring 2022: Arctic (Cryo2Ice validation)

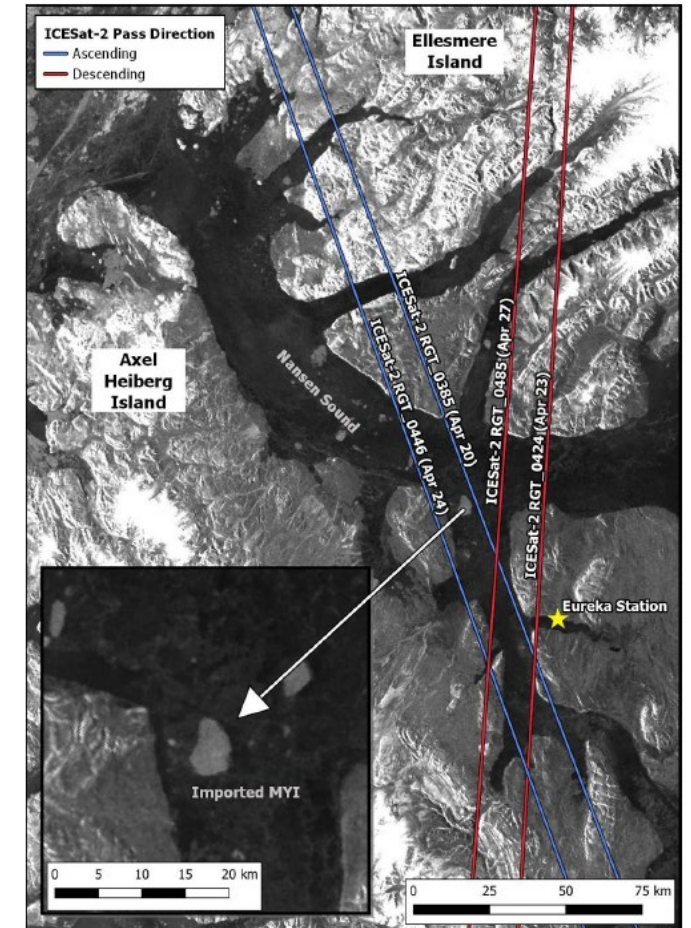
Plans for 2020-CryoVex/MOSAIC (Cancelled)
Airborne/Ground



Plans for 2021-Cryo2Ice (Cancelled/Postponed to 2022) - Airborne/Ground

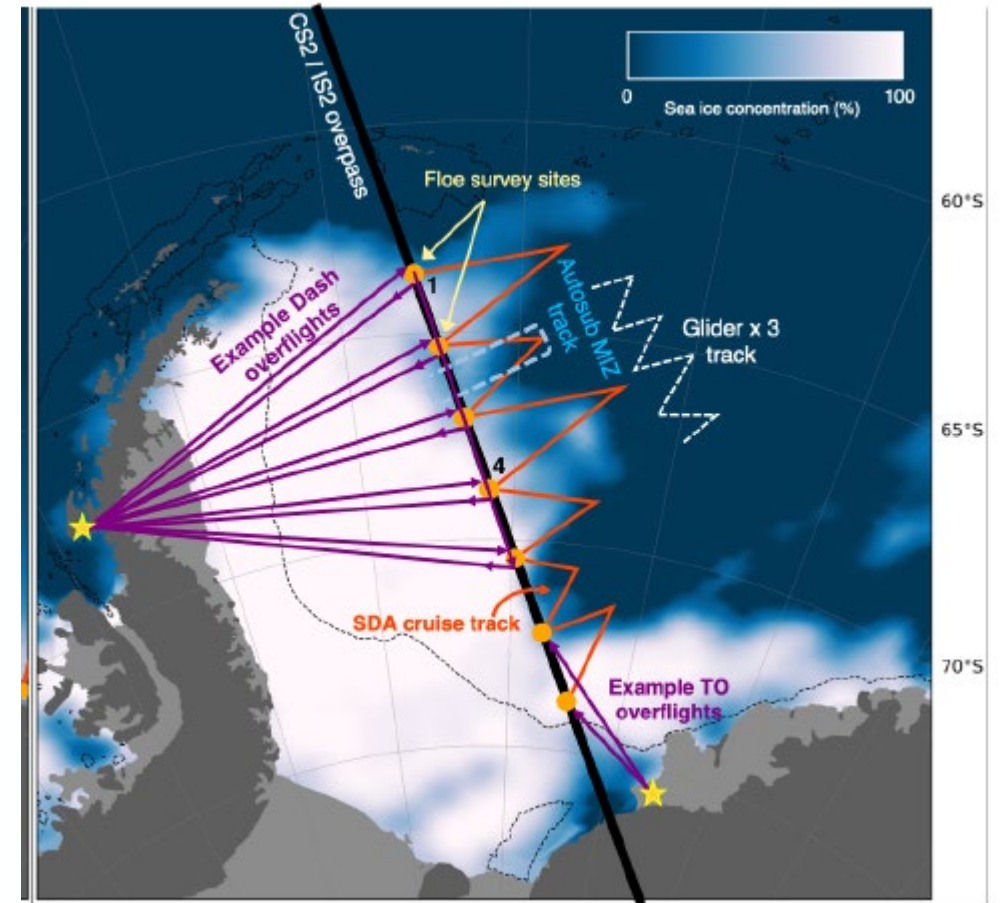
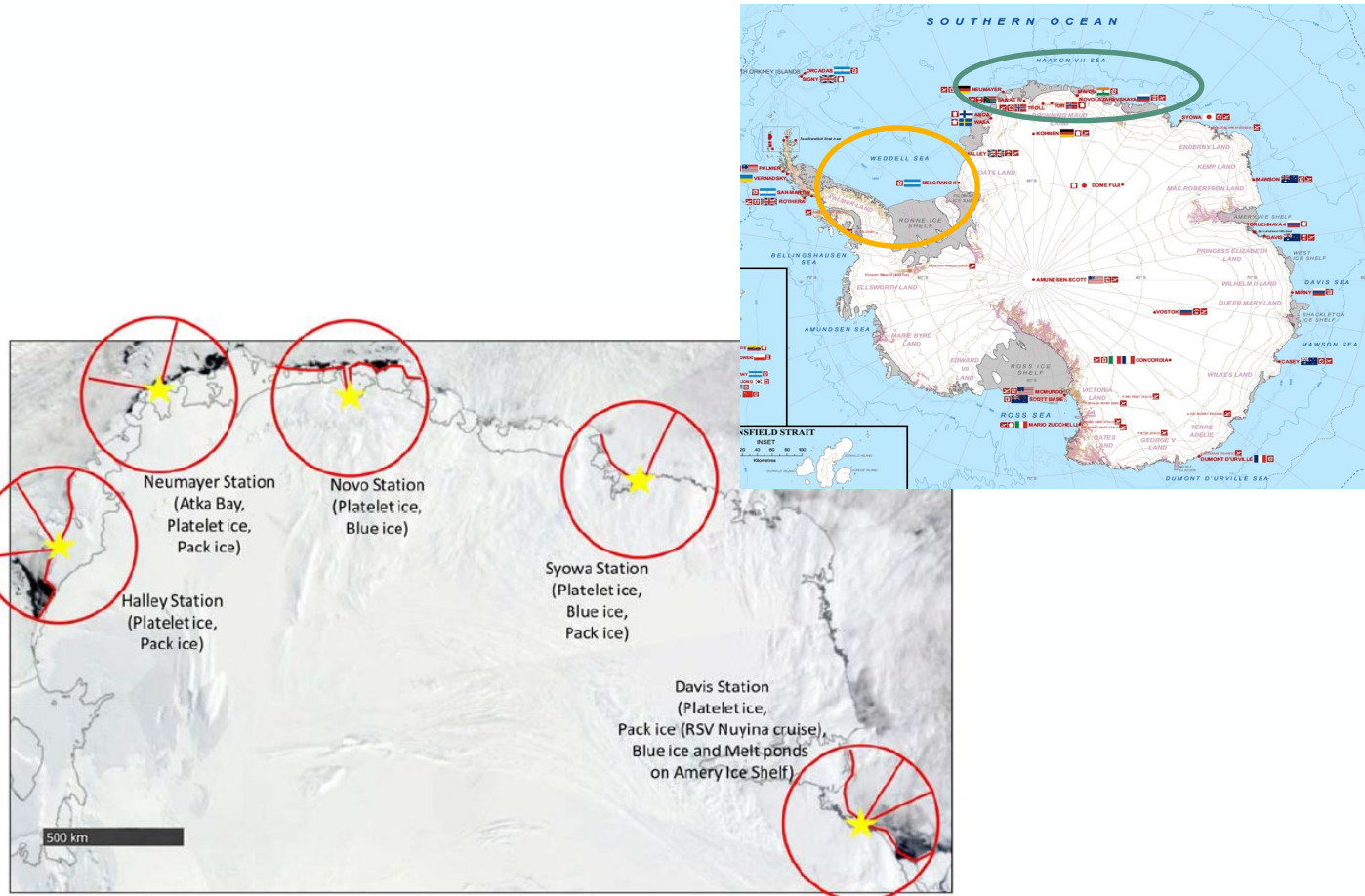


ECCC Eureka Plans for 2022 (Postponed since 2020) -Ground



Oct/Nov 2022: Antarctic (Cryo2Ice validation)

Proposals under evaluation for national funding



BAS: DEFIANT (Drivers and Effects of Fluctuations in sea Ice in the ANTArctic)

AWI: **ANTS**I (Antarctic Sea Ice: Thickness, Melt Ponding, and Ice Shelf Interaction)

Potential Future Campaign Activities

- CoMet 2.0 (DLR, Germany) take place in Canada or Alaska in August 2022
- Fire Detection Experiment (FIDEX_II, ESA) take place in Canada in August 2022
- Potential Activities for EE11 commended missions related to polar activities:
 - CryoRad ultra-wideband sensor with an 0.4-2 GHz focusing on physical properties of the cryosphere and its cold ocean waters
 - STRATUS radar sounder probing the Earth's subsurface in polar regions