The CryoTEMPO-EOLIS dataset

Monitoring glaciers, ice sheets and ice shelves with CryoSat-2 Swath processed data

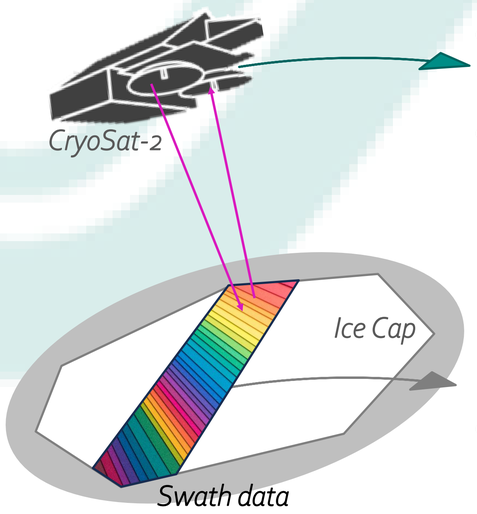
1 earthwave

3 esa

2 THE UNIVERSITY of EDINBURGH

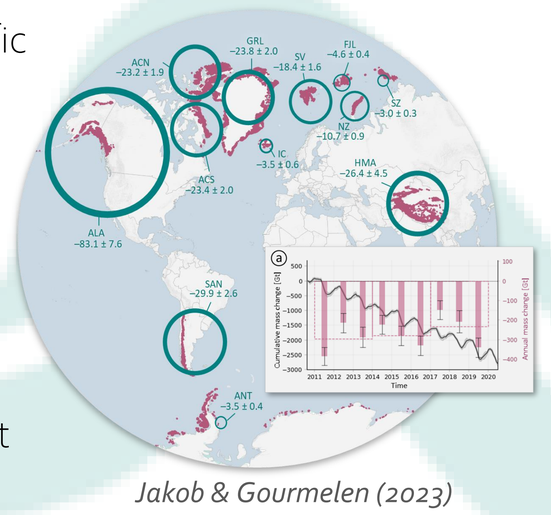
Sophie Dubber [1], Livia Jakob[1], Noel Gourmelen[2,1], Carolyn Michael[1], Martin Ewart[1], Julia Bizon[1], Alex Horton[1], Tristan Goss[1], Andrea Incatasciato[1], Alessandro Di Bella[3], Jerome Bouffard[3], Tommaso Parrinello[3]

CRYOSAT–2 DATA → SWATH PROCESSING → SCIENTIFIC STUDIES



- CryoSat-2 provides elevation data of ice surfaces globally.
- Swath processing enables the retrieval of multiple elevation measurements orthogonal to the satellite ground track
  → creating a 2D map of the observed surface.
- Swath gives ~1-2 orders of magnitude more measurements than POCA.

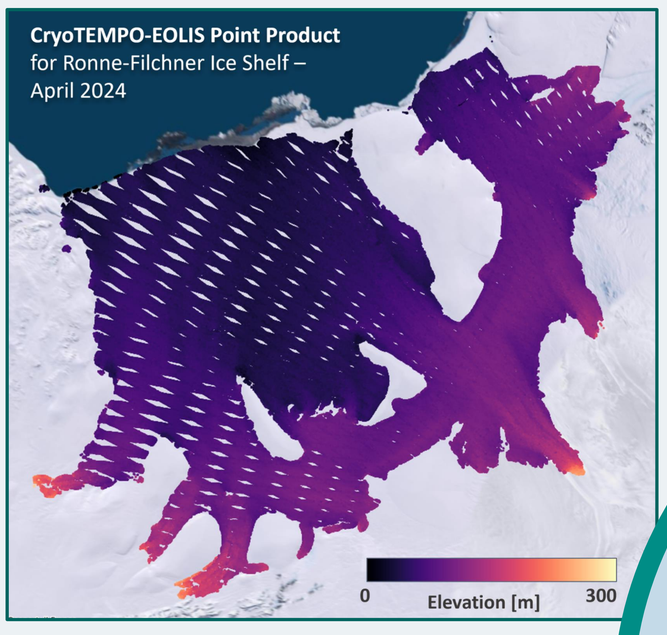
- Swath processing leads to scientific innovation:
  → Jakob & Gourmelen 2023 – glacier mass loss at a global scale.
  → Malczyk et al 2020 – subglacial lake drainage beneath Thwaites glacier.
  → Wuite et al 2019 – calving front migration of Ronne-Filchner.



Jakob & Gourmelen (2023)

1 POINT PRODUCTS

- **CryoTEMPO-EOLIS is an operational altimetry dataset for non-altimetry experts**
- The point product provides global coverage of glaciers, ice caps, ice sheets and ice shelves.
- Monthly elevation point data, with uncertainties calculated using ICESat-2 ATL06 as a reference dataset.

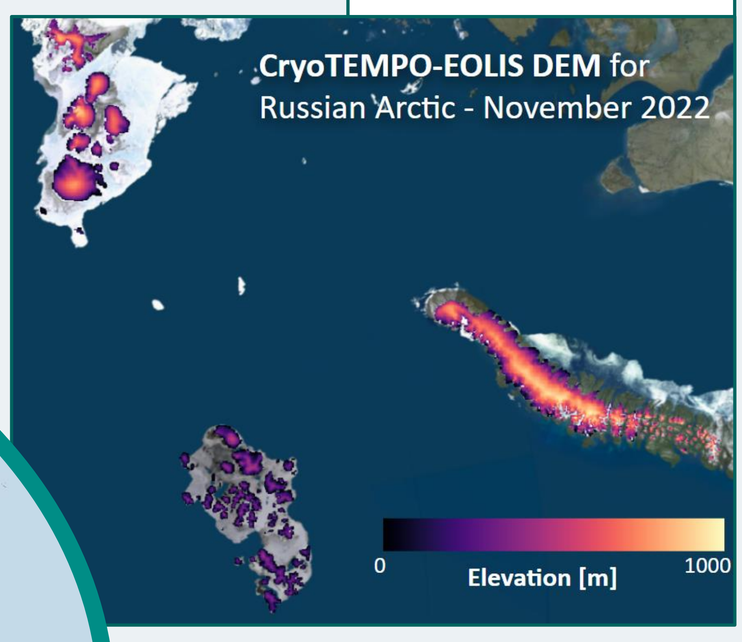


Product Coverage

- Greenland Ice Sheet & Peripheral Glaciers
- Antarctic Ice Sheet, Ice Shelves & Peripheral Glaciers
  - Alaska
  - Arctic Canada
- Western Canada & US
  - Iceland
  - Svalbard
  - Russian Arctic
  - Asia
- Central Europe
  - Scandinavia
  - Low Latitudes
- Southern Andes
  - New Zealand

2 GRIDDED PRODUCTS

- Monthly Digital Elevation Models.
- Derived from EOLIS point data, gridded to 2km resolution.
- The gridded product is published each month, using data within a 3-month rolling window.
- Gridded uncertainties are calculated from point uncertainties, using spatial auto-correlation.
- Products are available for glaciers and ice sheets, covering regions with the highest quality point data.



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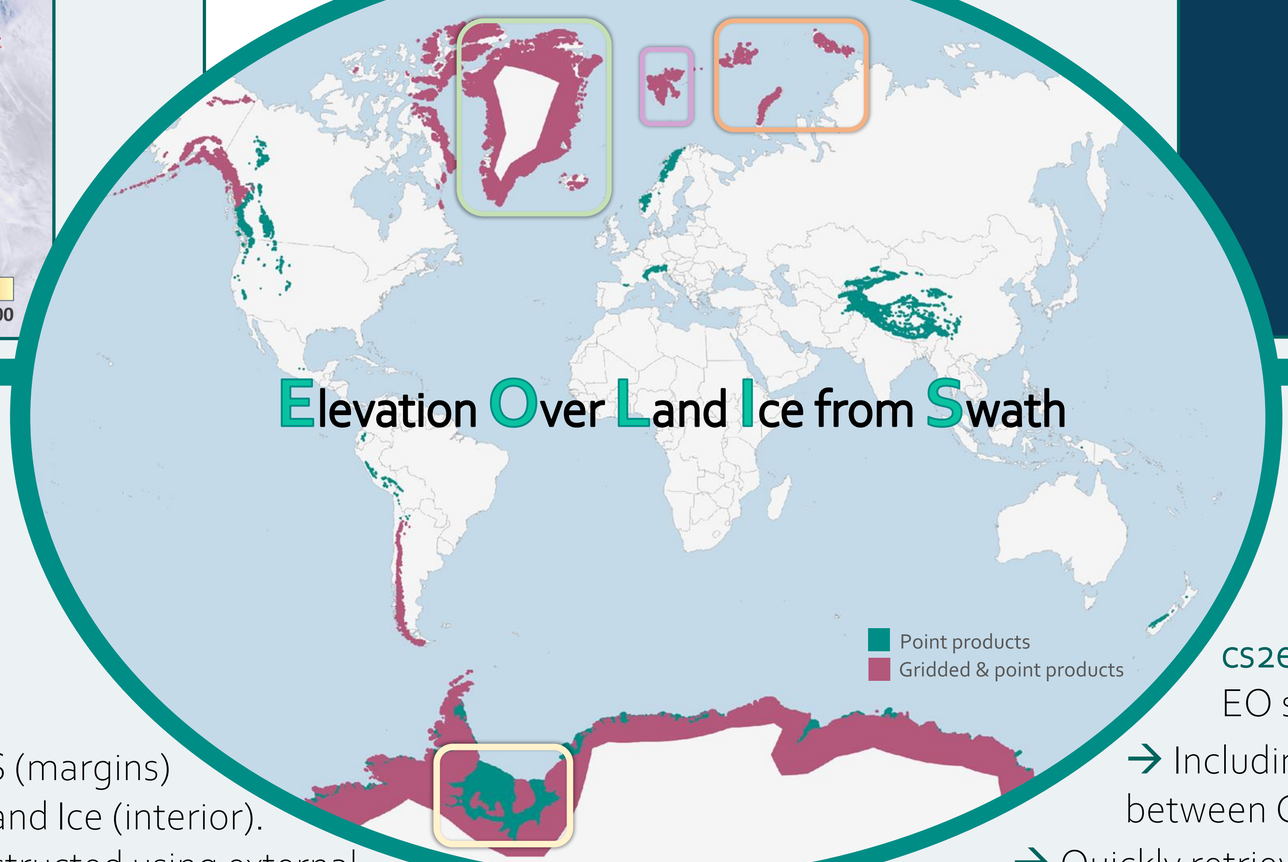
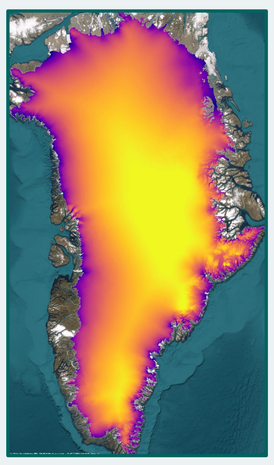


3 UPCOMING DATASETS

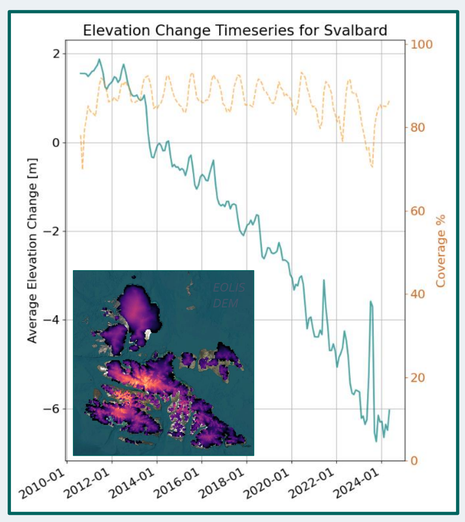
Seamless Annual Ice Sheet DEMs



- Generated using CryoTEMPO-EOLIS (margins) and CryoTEMPO Land Ice (interior).
- Missing data reconstructed using external drift kriging with velocity and external DEMs.
- Uncertainties for all pixels quantified with respect to ICESat-2.
- Use cases include input into ice sheet models and validation of existing models.

Elevation Change Product

- Gridded elevation change using a mean EOLIS DEM as reference dataset.
- This product will simplify the generation of elevation change timeseries from EOLIS data, by removing the need to account for changes in data distribution and coverage across elevations.



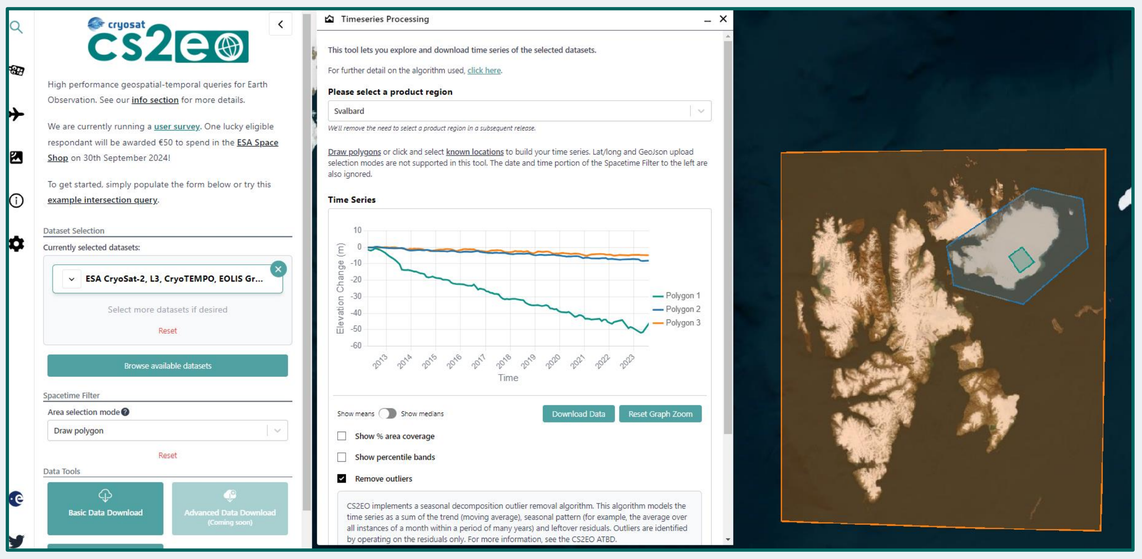
4 DISCOVER & EXPLORE

cs2eo.org: search, visualise and download EO satellite and airborne datasets.

→ Including coincident observations between CryoSat-2 and ICESat-2.

→ Quickly retrieve elevation change time series based on EOLIS gridded products, using:

- RGI glaciers & regions, or IMBIE regions
- Custom-drawn polygons



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