The ESA CCI Sea-Ice Thickness CDR: Current State and Evolutions

B4.01 Heritage Missions and Long Time Data Series

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sea ice cci

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Current State (CCIplus)

- Temporarily extended to include the ERS-1/2 satellite era

- Covering the winter months from October 1993/1995 until April 2022.

- CDR comprises various processing levels from orbit trajectories (L2p) to gridded (L3C) and gap-free (L4) data products

- Top-down tuning approach based on retracker thresholds for individual waveforms going from CryoSat-2 down to ERS-1/2

- Use of improved training data based on Dual-Mission Orbit Crossovers in mission-overlap periods
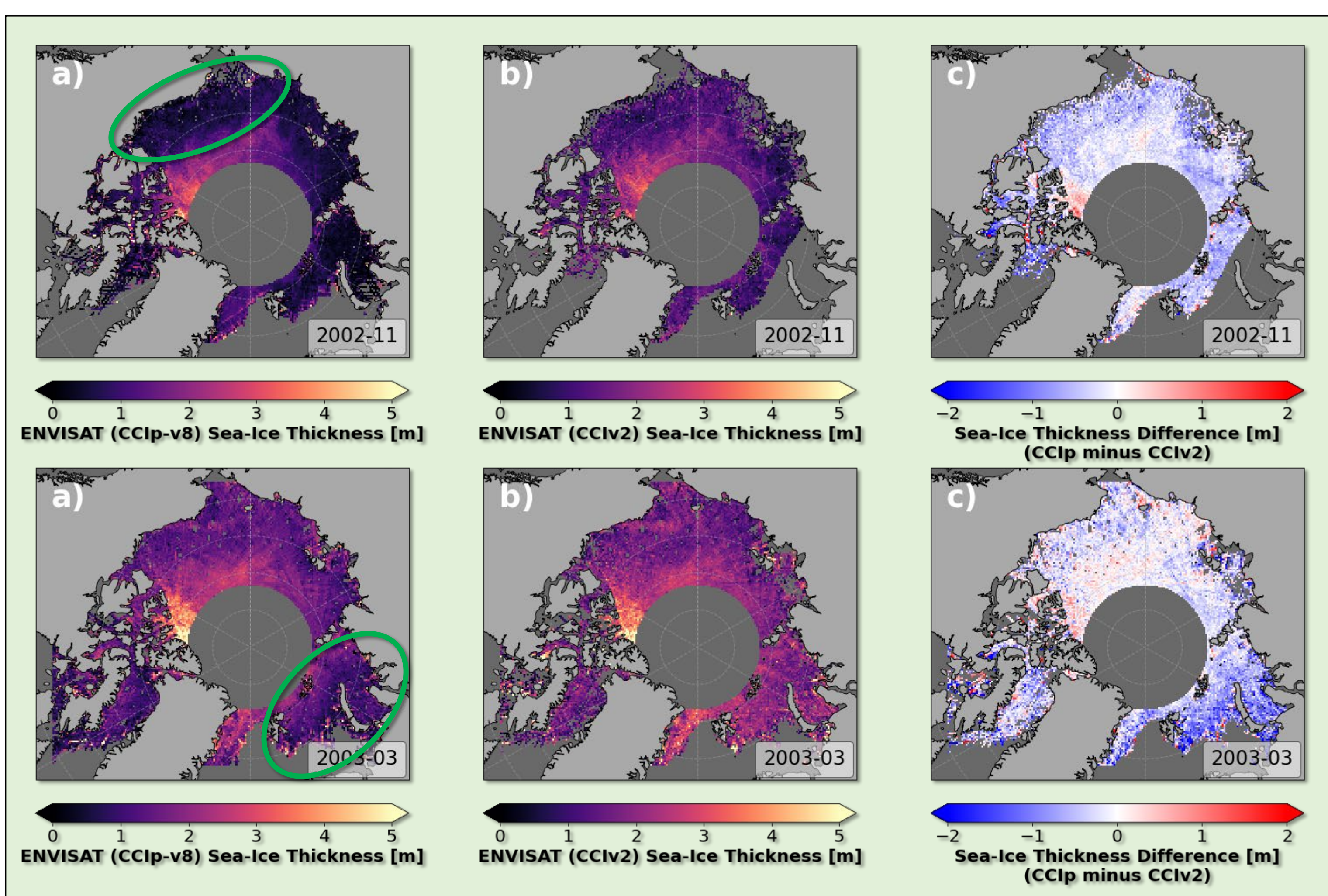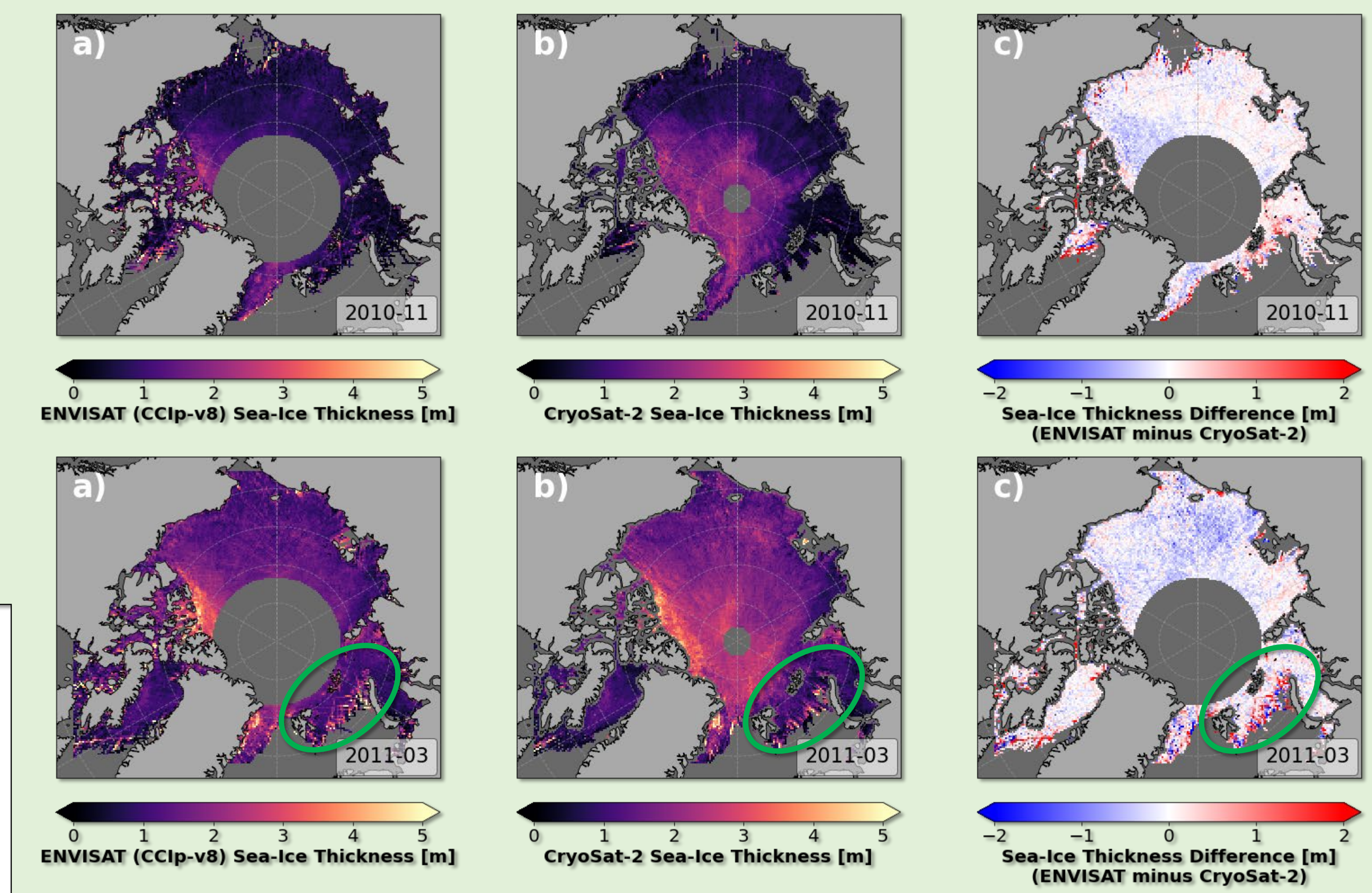
- Antarctic remains a challenge ☹
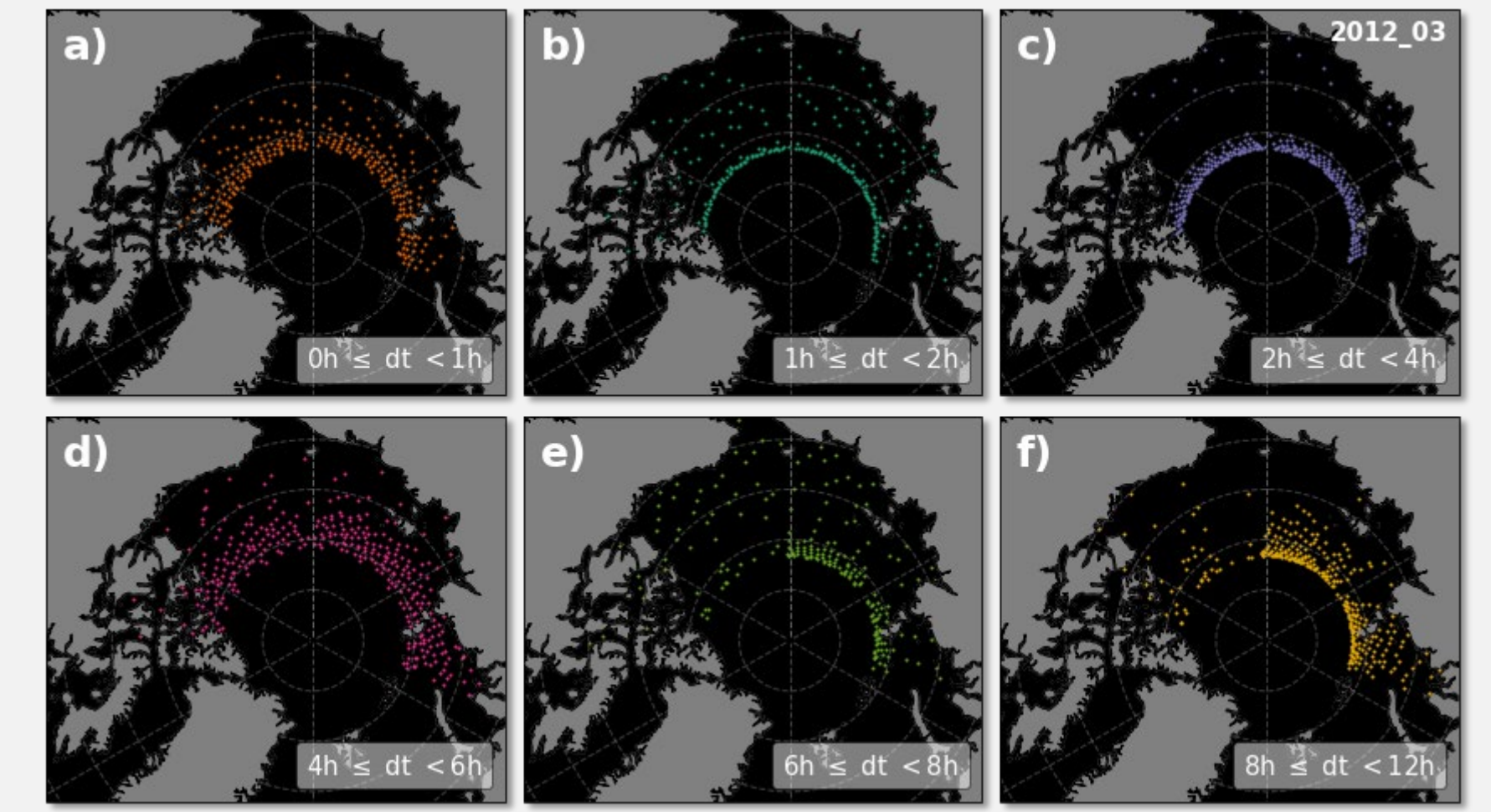
Example of CryoSat-2/ENVISAT Crossovers

Data Showcase

CryoSat-2 *vs.* ENVISAT

- Use of Dual-Mission Orbit Crossovers and a deep neural network

- Substantial improvement of sea-ice freeboard and **sea-ice thickness** estimates for **ENVISAT (a)** compared to reference **CryoSat-2 (b)**

- Marginal Ice Zone (MIZ) remains a problem

CCIplus *vs.* CCI

- Improvement of **sea-ice thickness estimates for heritage missions (a)** over **previous releases (b)**

- Areas with expected **thicker sea ice appear thicker**, areas with expected **thinner sea ice appear thinner (c)**, respectively

- Especially **thin-ice areas** are more pronounced and inline with CryoSat-2 reference
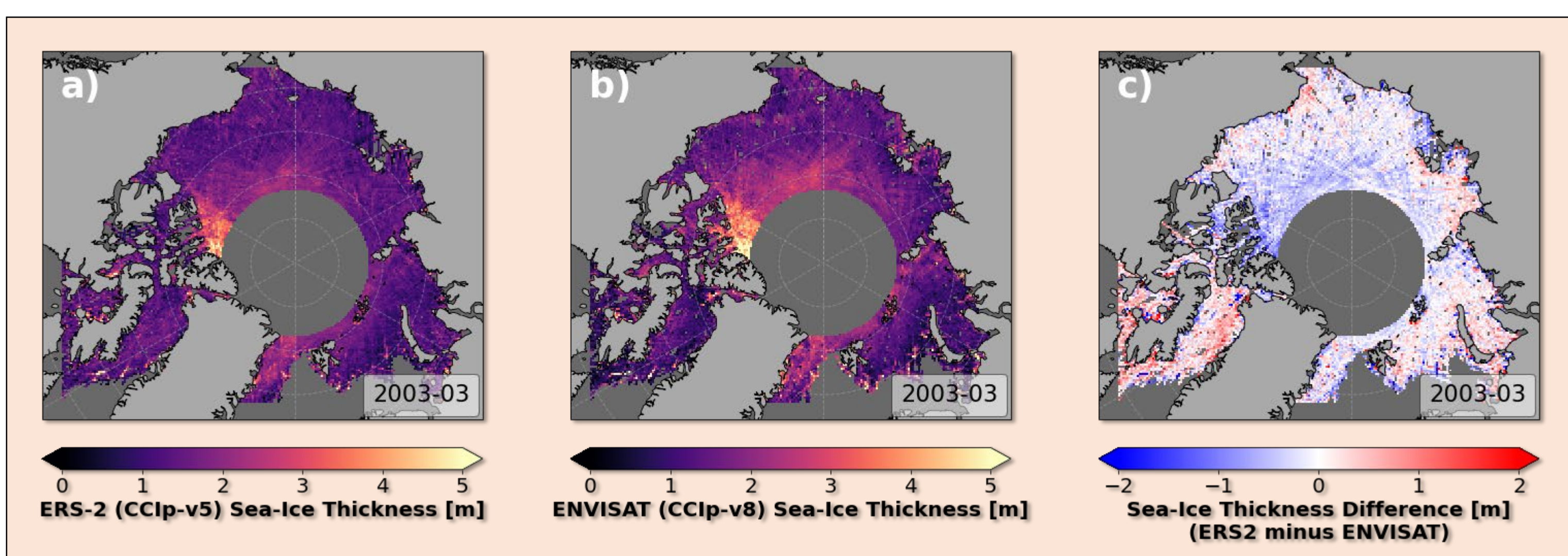

Improved Thickness Range & Distribution

Updated Retracker Threshold Estimation
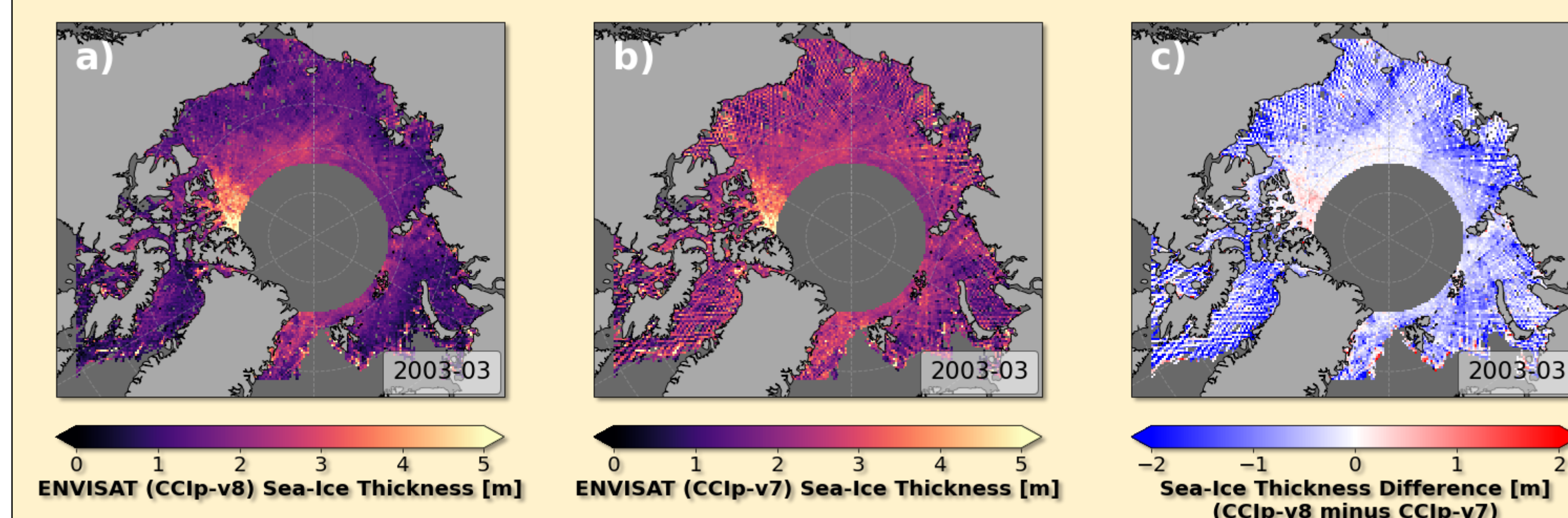
CCIplus iterations

- Issues with **waveform-alignment shift** not present in the dual-mission orbit crossover dataset (**Full-waveform (b) to sub-waveform (a)**)

- Model based on **waveform subset around the first-maximum index**

ENVISAT *vs.* ERS2

- Employ **consistent configuration** as for ENVISAT

- Sea-ice-thickness **contrast between thin and thick sea ice** not yet on the same level as ENVISAT

Extended with ERS