Centre for Ice, Cryosphere, Carbon and Climate (iC3)

Closing large-scale uncertainty in Polar ice sheet impacts on the global carbon cycle

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iC3 is a recently funded Centre of Excellence (Research Council of Norway). This scheme provides generous long-term funding to establish research centres that have major potential to generate ground-breaking results that advance the international research frontier.
iC3 is hosted by the Department of Geosciences, UiT The Arctic University of Norway, with partners the Norwegian Polar Institute and NORCE, and will run from July 2023- July 2033.

/ iC3 OBJECTIVE

iC3 will deliver a step change in current understanding of the impact of changing ice sheets on Earth's carbon cycle and ocean ecosystems, suitable for integration to IPCC and policy frameworks.

/ iC3 APPROACH

- Research spanning ice-to-ocean continua at both poles.
- Integrated, interdisciplinary hub of experts studying the cryosphere, oceans, atmosphere and geosphere

RU1: Sub-ice carbon stores

How much carbon exisits beneath ice sheets, where is it and how vulnerable is it to release?

RU2: Landward carbon fate

How are methane, nutrient and organic carbon exported from ice sheets and processed in expanding glacier forefields?

RU3: Marine ecosystem feedbacks

How are ice sheet changes transmitted through fjord and marine systems to impact marine carbon cycles and ecosystems?

RU4: Past analogues

What carbon cycle perturbations were triggered by past ice sheet change?

RU5: Global carbon futures

What is the sensitivity of Earth's carbon cycle to ice sheet retreat on policy-relevant and longer timescales?

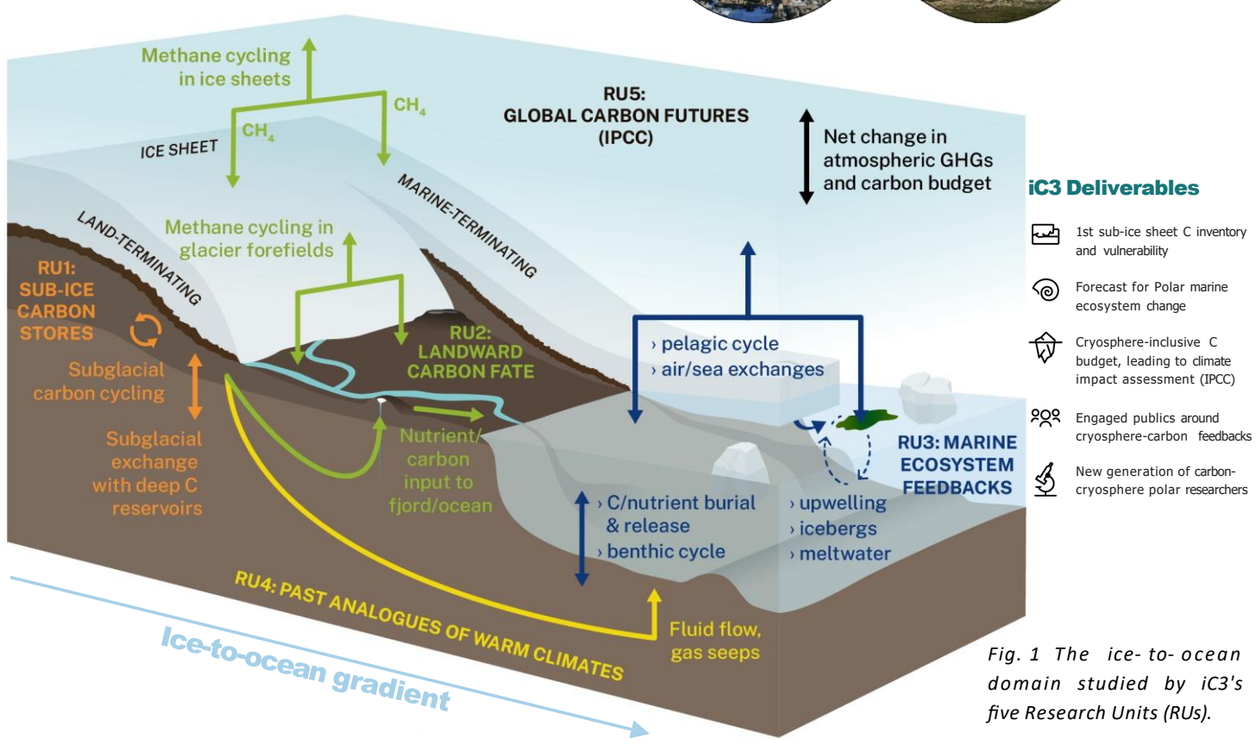

Fig. 1 The ice- to- ocean domain studied by iC3's five Research Units (RUs).

/ iC3 FIELD SITES

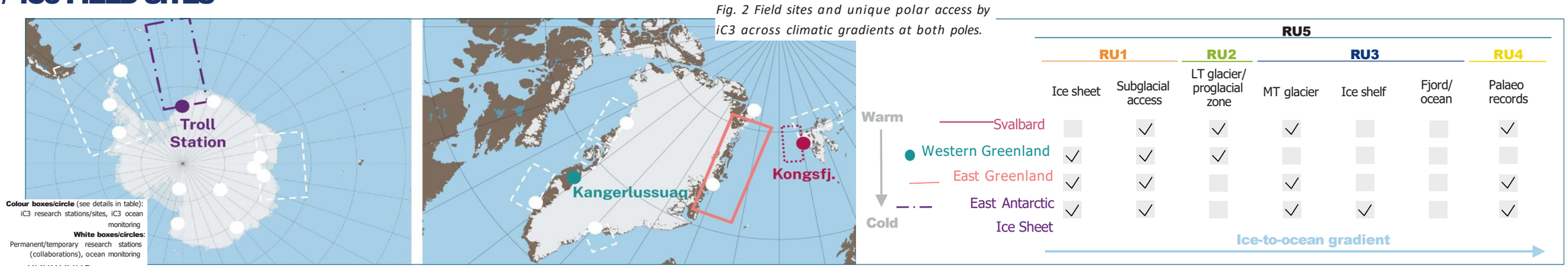

Fig. 2 Field sites and unique polar access by iC3 across climatic gradients at both poles.

/ iC3 IN NORTHEAST GREENLAND: FROM ICE TO OCEAN

- Bi-annual marine campaigns (RVs Kronprins Haakon/ Helmer Hanssen) focussing on marine ecosystems, biogeochemical cycling and past analogues.
- Terrestrial field campaigns- drilling for subglacial access, carbon cycling and export.

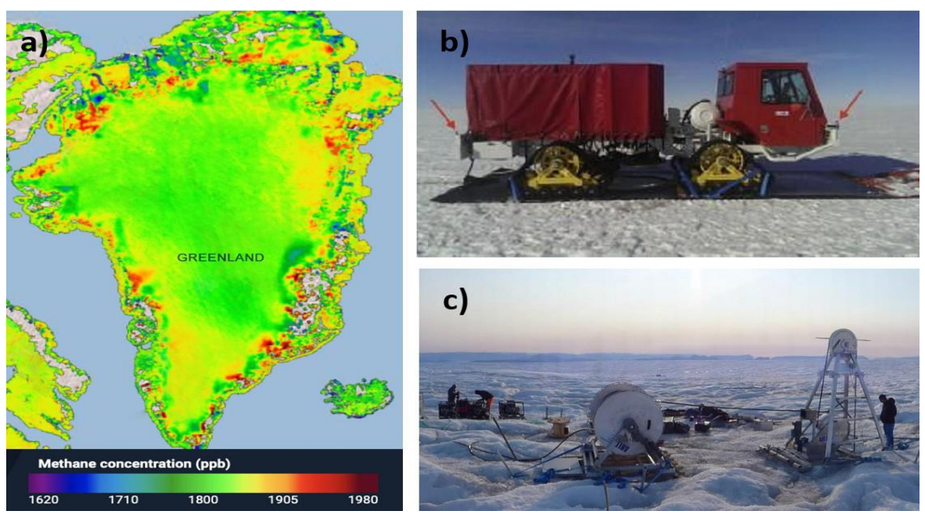

Fig.3 a. Atmospheric methane concentration (high values in red at ice margin, www.pulse.ghgsat.com), b. On-ice snowstreamer vibroseis and c. Clean (c. 1km) subglacial access drill, Greenland.

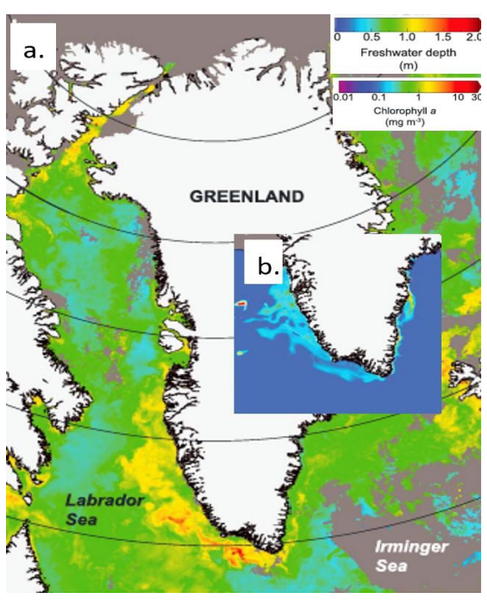

Fig. 4a Enhanced satellite chlorophyll a concentration off SW Greenland, which mirrors b. freshwater depths of Greenland meltwater (Arrigo et al., 2017).

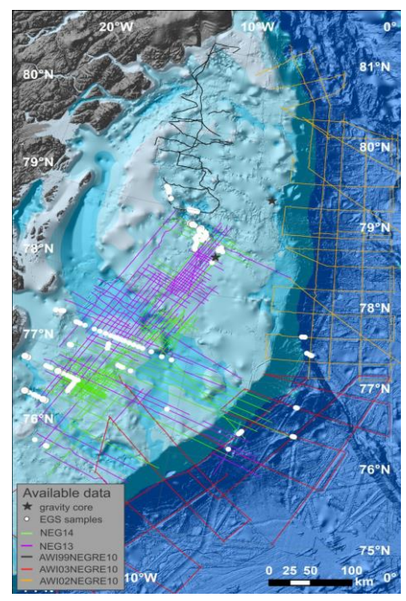

Fig. 5 Exisiting geophyscial and sedimentological database from NE Greenland, currently used to study glacial history and past ice sheet- carbon cycle interactions.

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