

$p\text{CO}_2$ measurements in the Baltic Sea on M/S Tavastland

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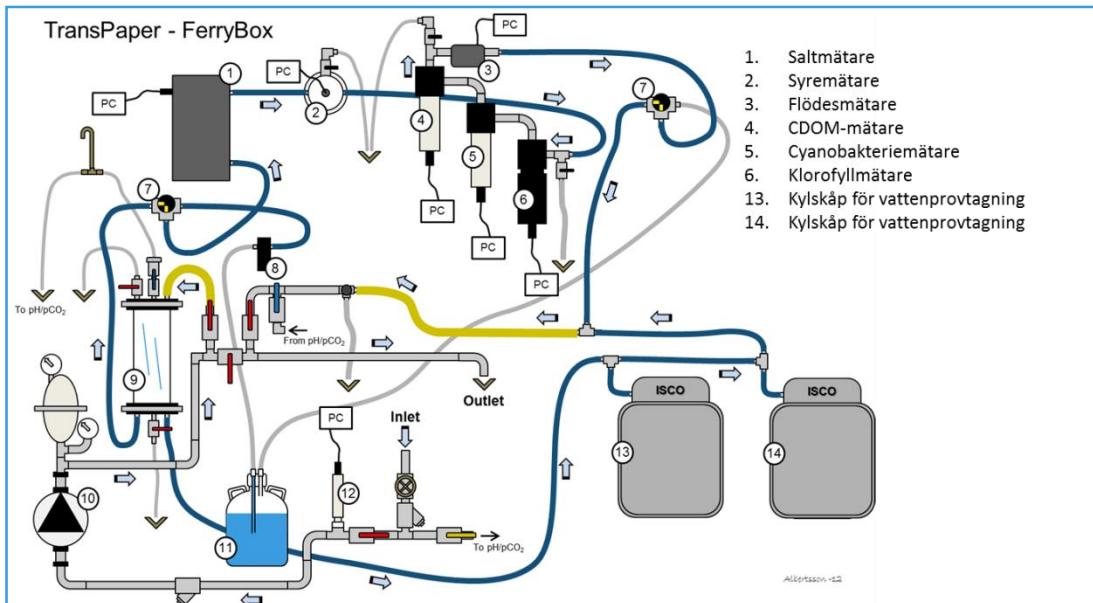
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FerryBox on M/S Tavastland



Tavastland parameters

In water, 3 m depth

- Flow rate
- Temperature, SBE38
- Temperature, SBE45
- Salinity, SBE45
- Oxygen, Aanderaa
- Chlorofyll fluorescence, Wetlabs
- Phycocyanin fluorescence, Trios
- CDOM fluorescence, Trios
- $p\text{CO}_2$, General Oceanics

In air

- Temperature
- Air pressure
- Irradiation, PAR
- CO_2



Sampling frequency is every 20 sec for most parameters.

Operating between Lubeck-Oulu-Kemi and back, every week

pCO₂ system on Tavastland

General Oceanics 8050
Installed on M/S Tavastland
2010
Part of a Ocean Acidification
Project
funded by Naturvårdsverket
during a 3 year period.
Collaboration between SMHI
and University of Gothenburg.

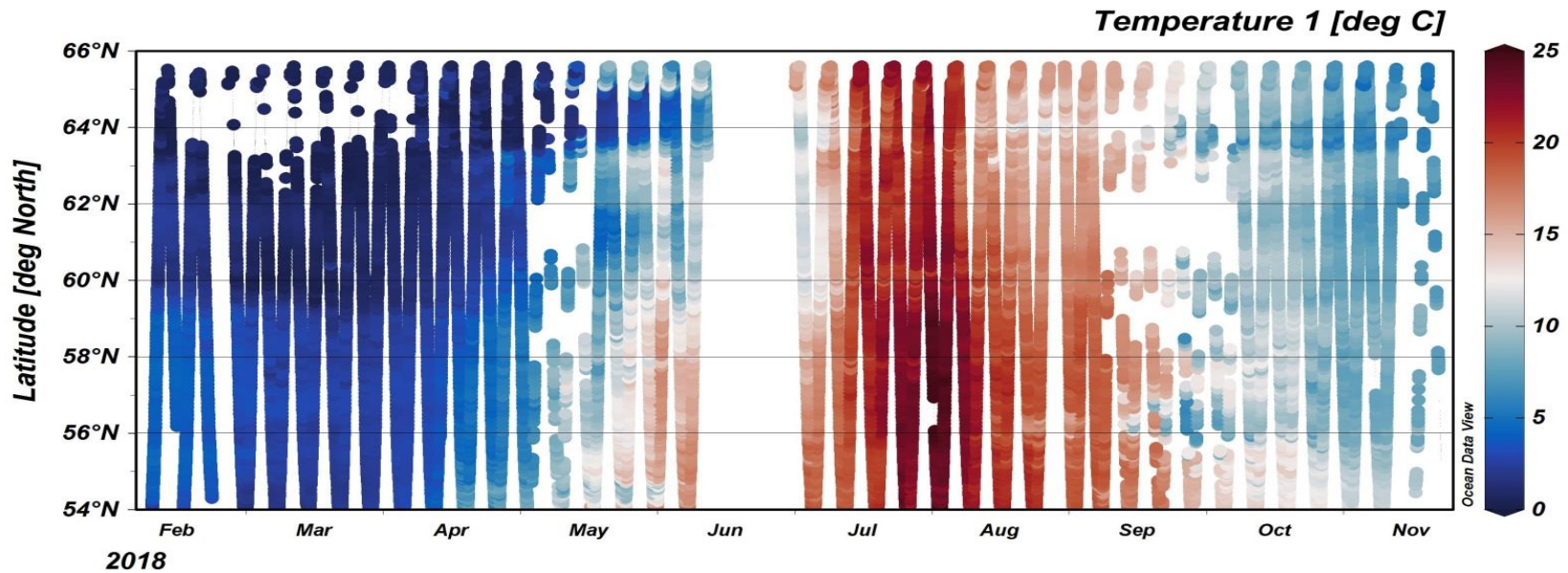
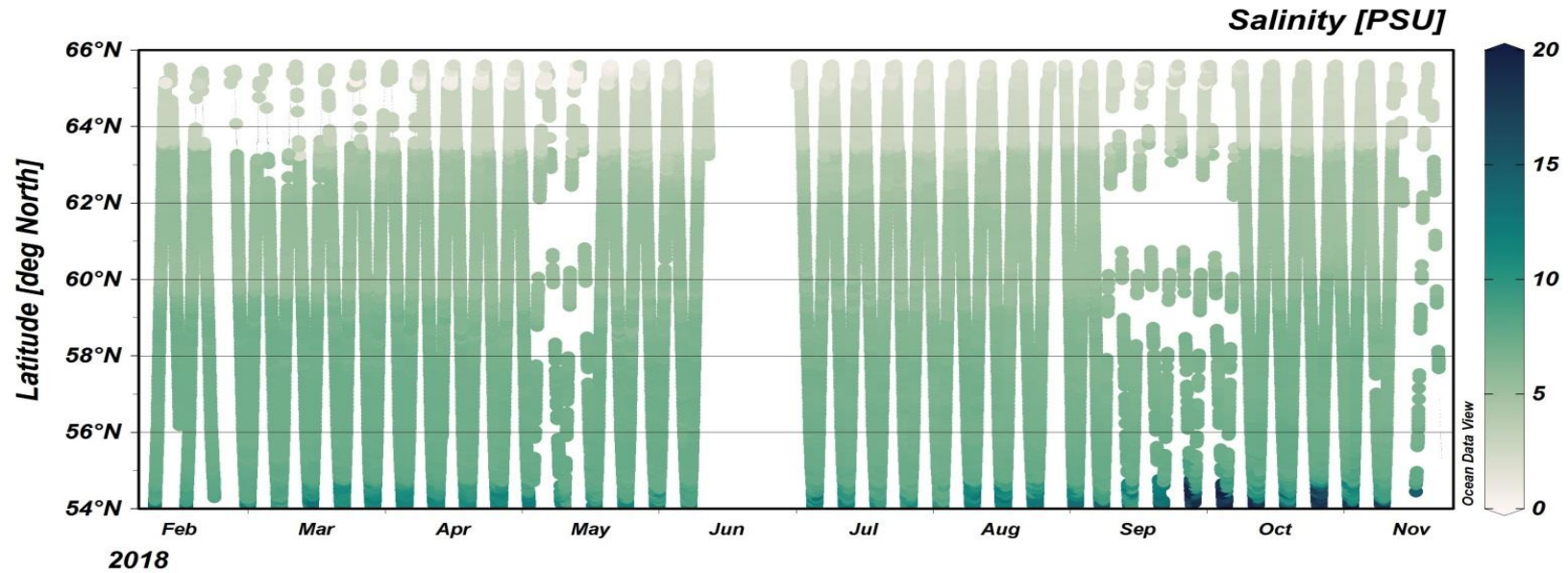


The system have an equilibrator that balances the CO₂ in seawater with a headspace gas that is analysed.

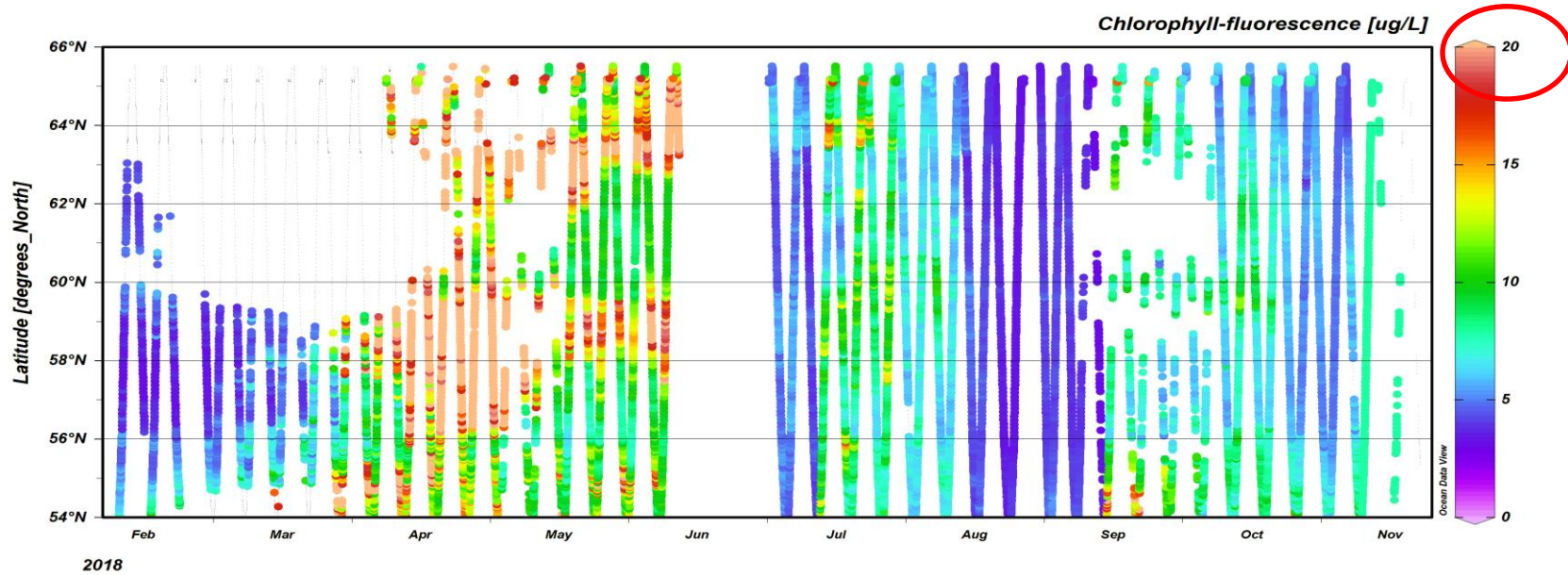
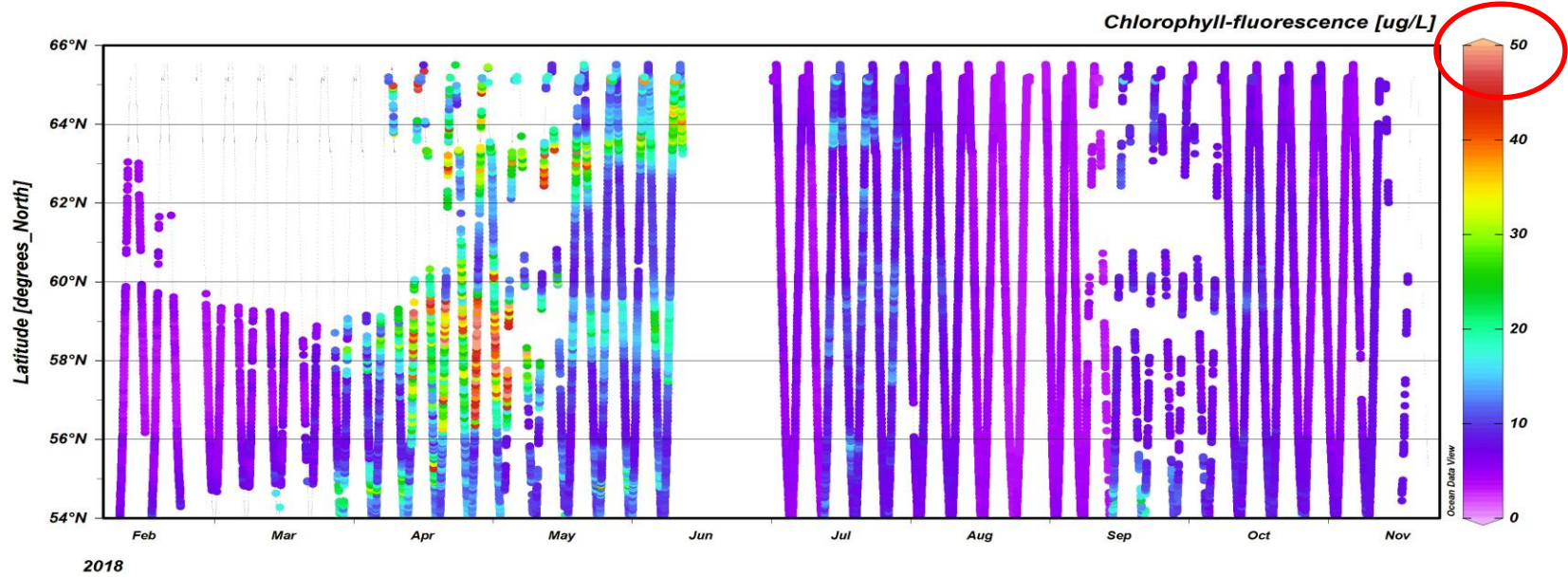
The gas goes through drying tubes and discs to dry the gas before the Non-Dispersive Infra-Red Analyser (LICOR) that only measures on dry gas.

CO₂-reference gases: 0, 200, 400, 700 ppm

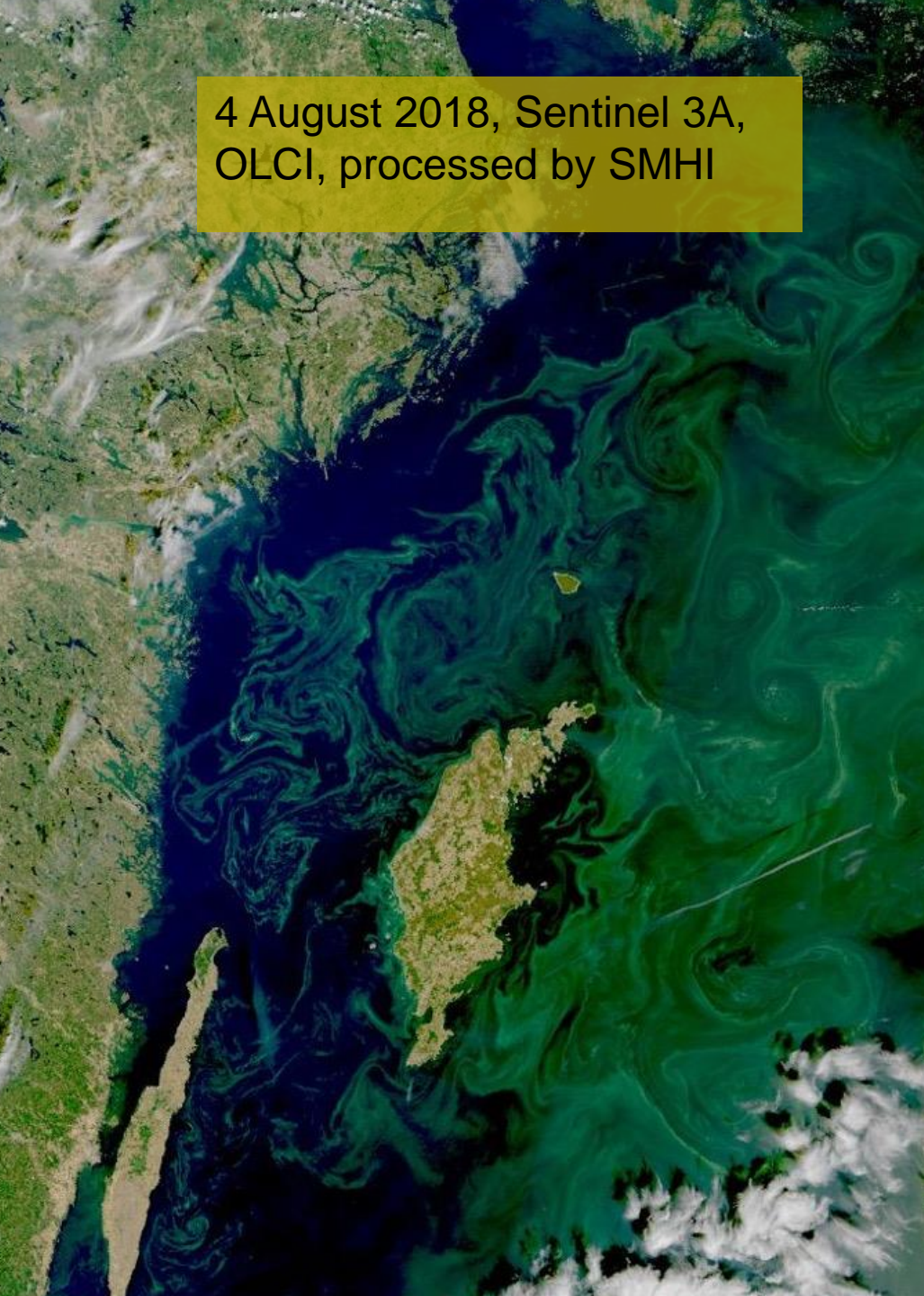
Results ferrybox: salinity and temperature 2018



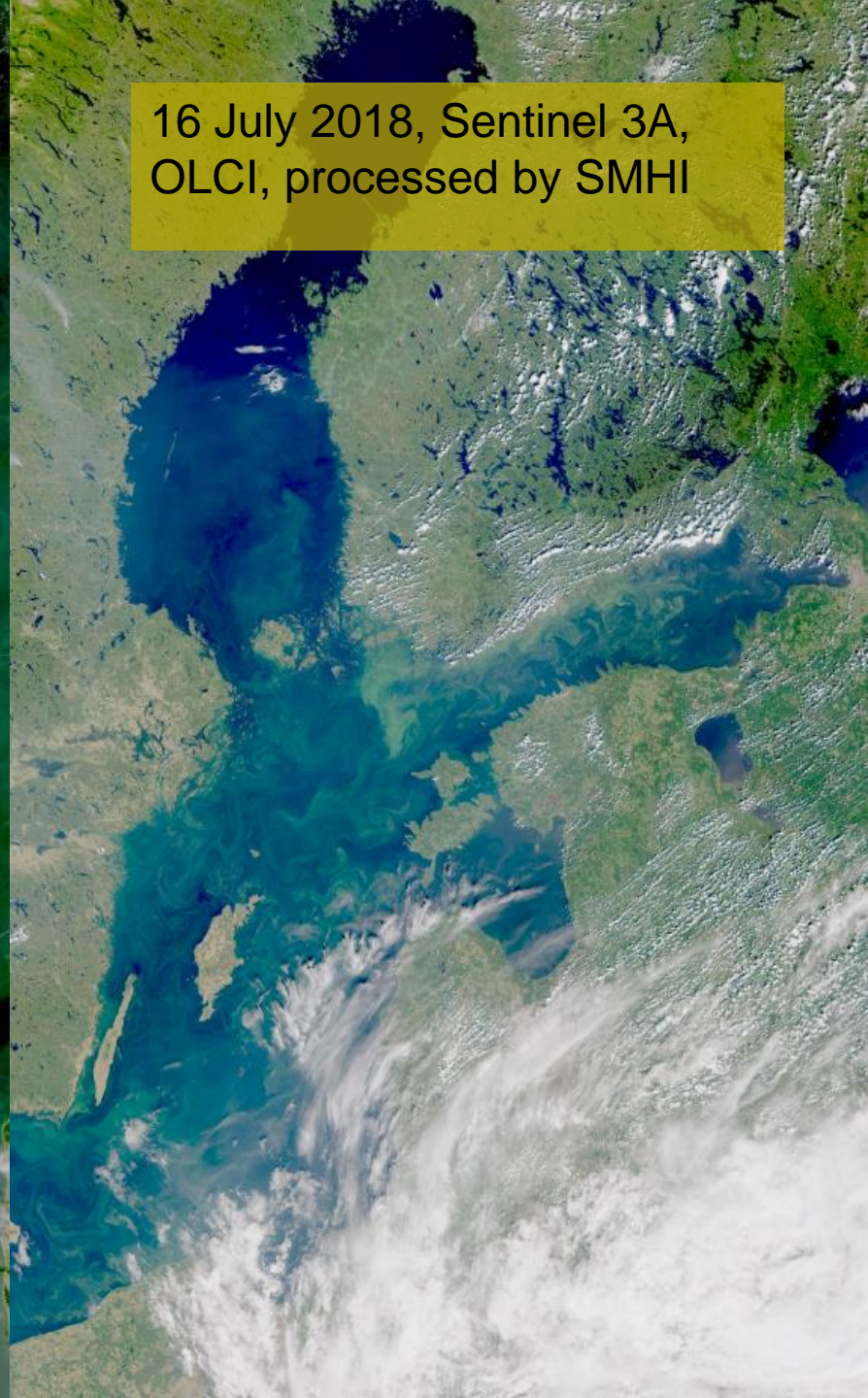
Results ferrybox: chl a fuorescence 2018



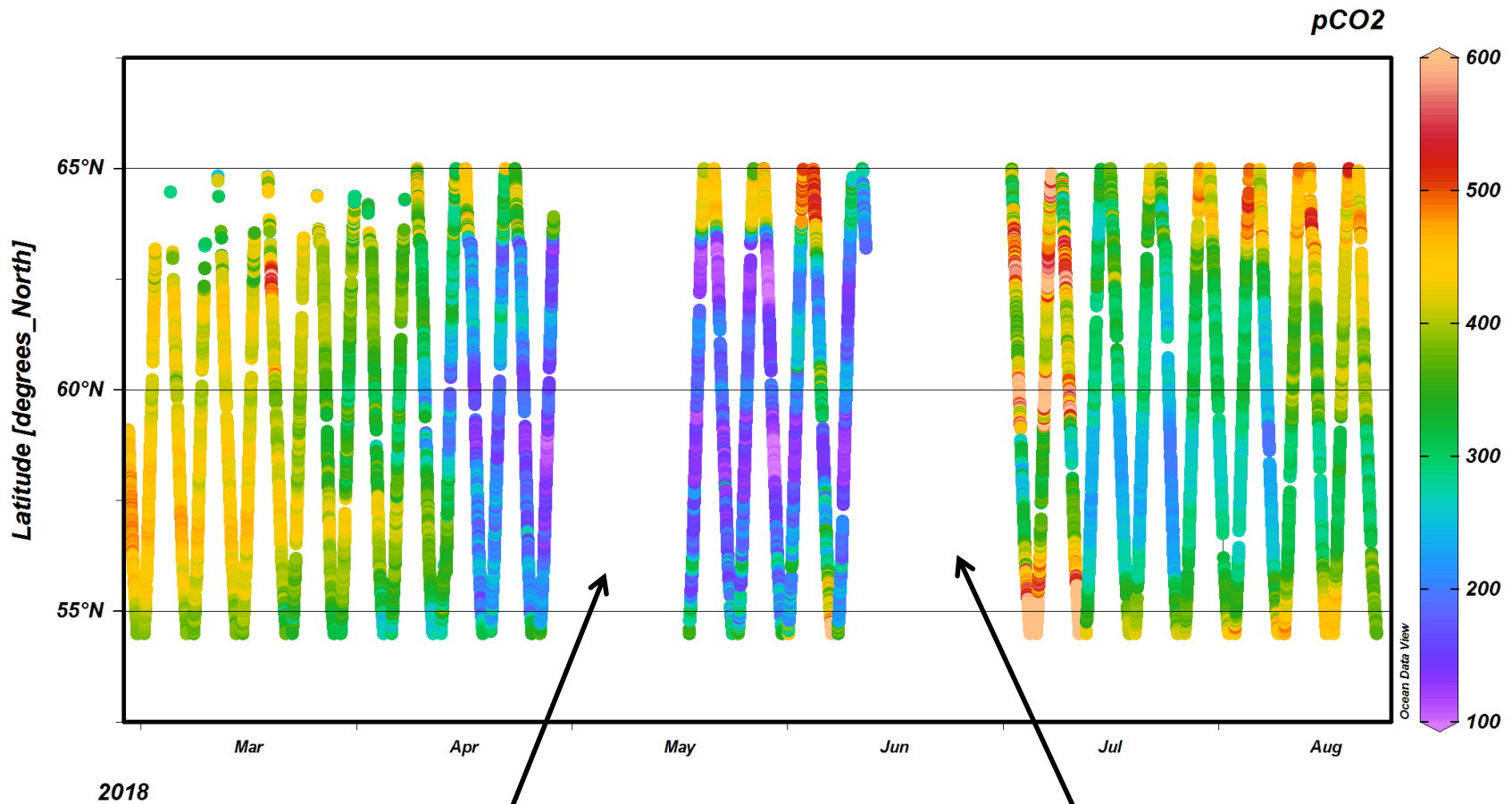
4 August 2018, Sentinel 3A,
OLCI, processed by SMHI



16 July 2018, Sentinel 3A,
OLCI, processed by SMHI



Results $p\text{CO}_2$ 2018



GO system shut down due to old computer that did not restart after power shut down.

Problem with data collection from the ferrybox.

Conclusions about results from year 2018

Unusual conditions

- Warm summer
- Long duration of cyanobacteria bloom

***p*CO₂**

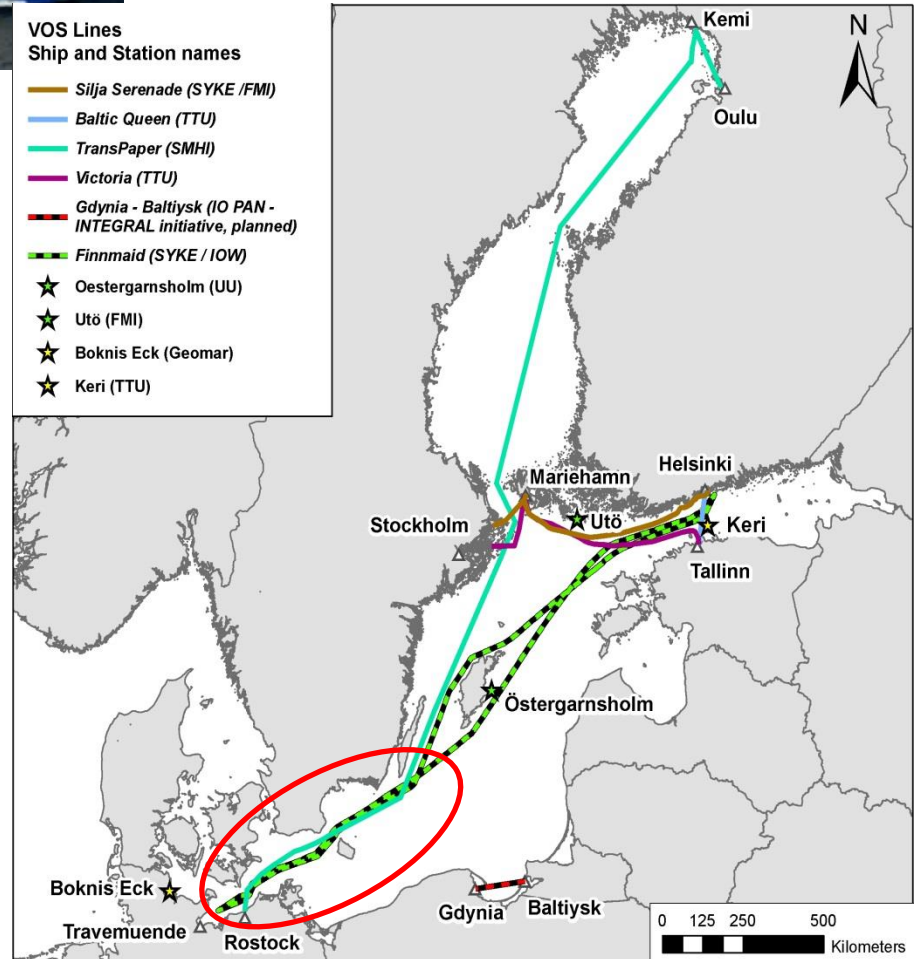
- GO-system running during large part of the year
- High *p*CO₂ in Feb. - March before spring bloom
- *p*CO₂ reduction due to high photosynthesis later in the year

Comparison Tavastland and Finnmaid

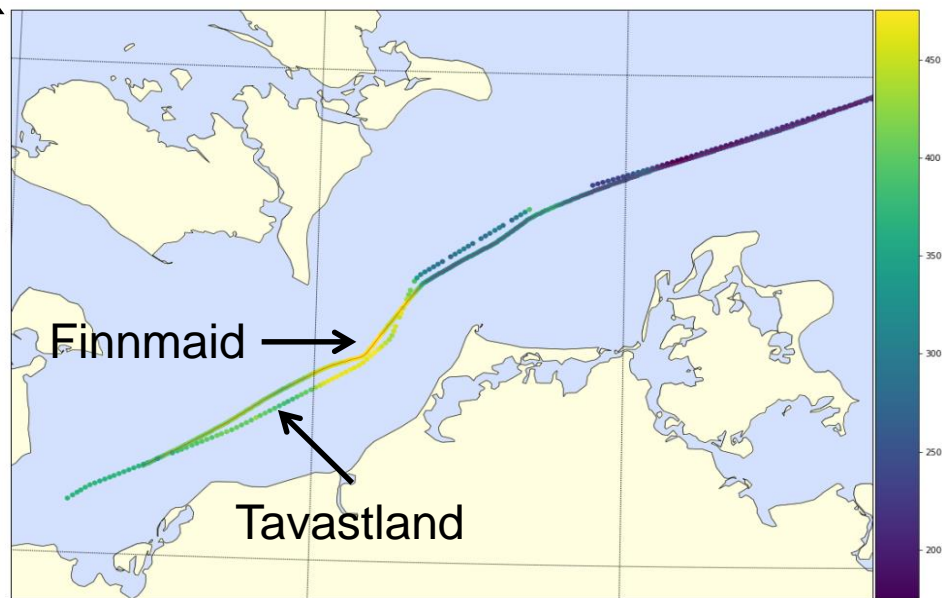
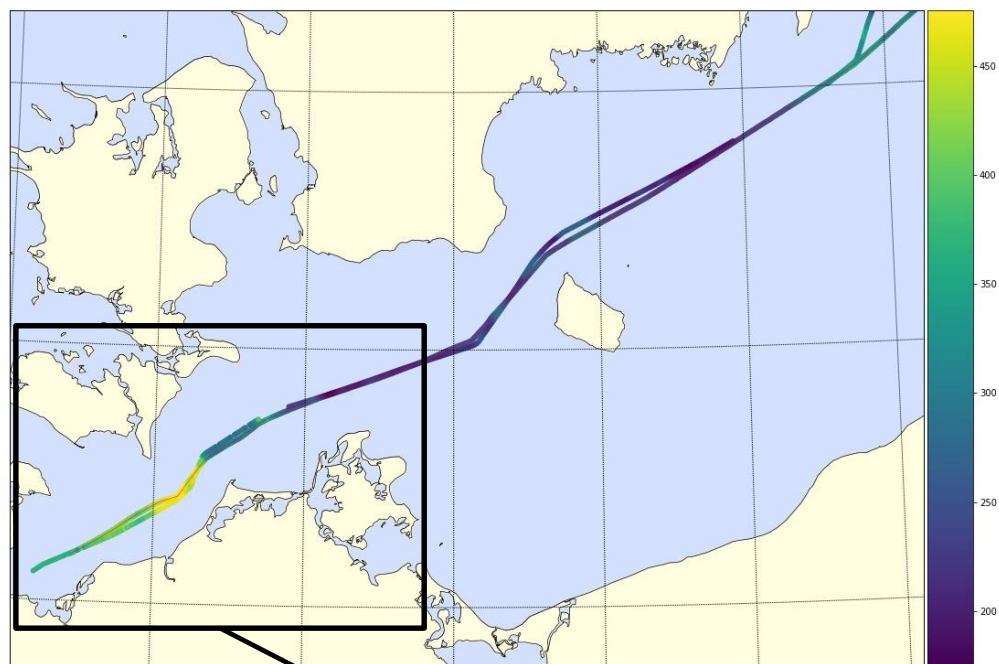
- Finnmaid ferrybox:
Basic system similar to
Tavastland due to same
designer – SYKE.



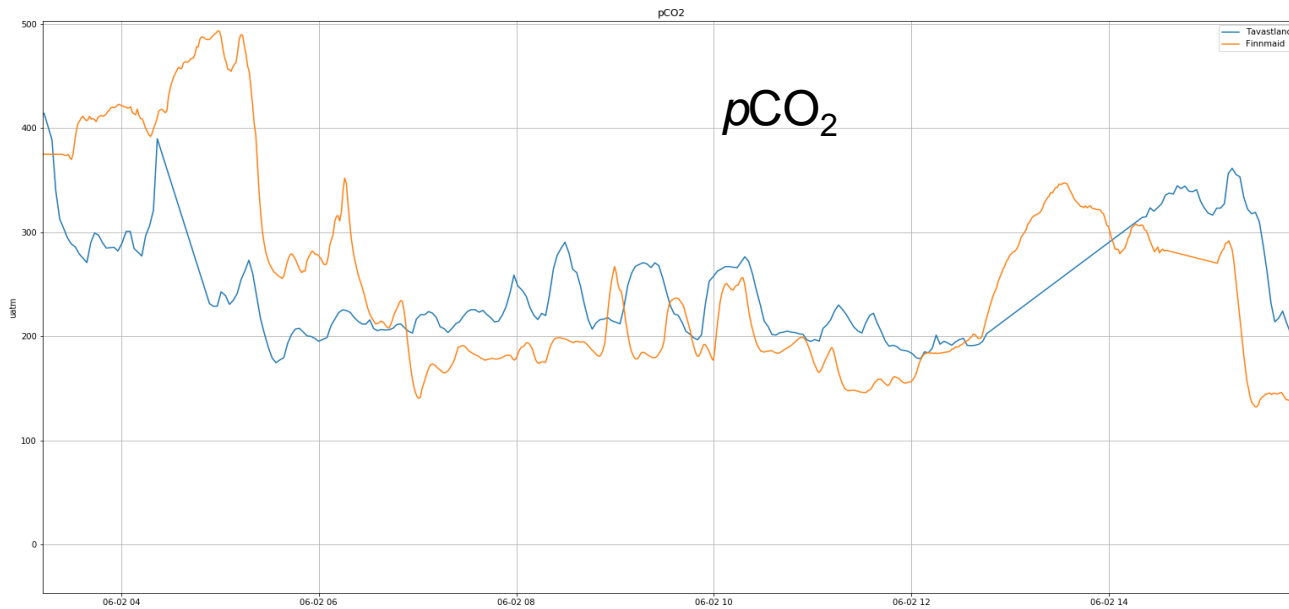
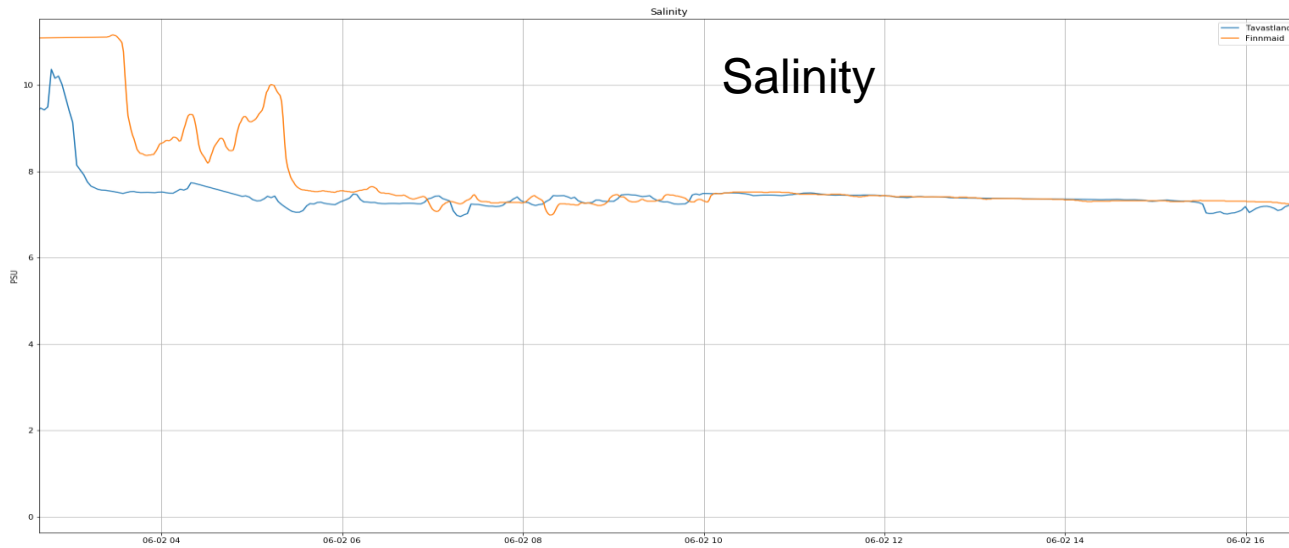
- Part of ICOS-D
- Operating between Lübeck and
Helsinki and back ~ every 3
days
- Part of Alg@line project
(SYKE)
- Instrumentation for $p\text{CO}_2$,
 $p\text{CH}_4$, $p\text{O}_2$ operated by IOW



Comparison Tavastland and Finnmaid 2018-06-02



Comparison Tavastland and Finnmaid 2018-06-02



Acknowledgment:

Crew on Tavastland



Thank you!
Questions?