

ICOS

● ● ●
INTEGRATED
CARBON
OBSERVATION
SYSTEM

VLIZ & ICOS

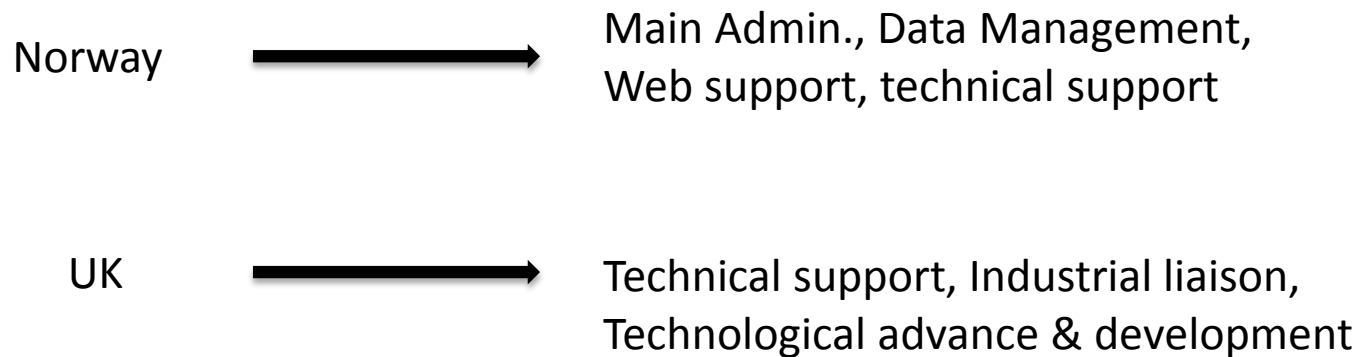
Thanos Gkritzalis, Dre Cattrijsse, Michiel T 'Jampens, Ann-Katrien Lescrauwaet, Tjess Fernandez



Vlaams Instituut voor de Zee vzw
Flanders Marine Institute

OTC & marine MSA

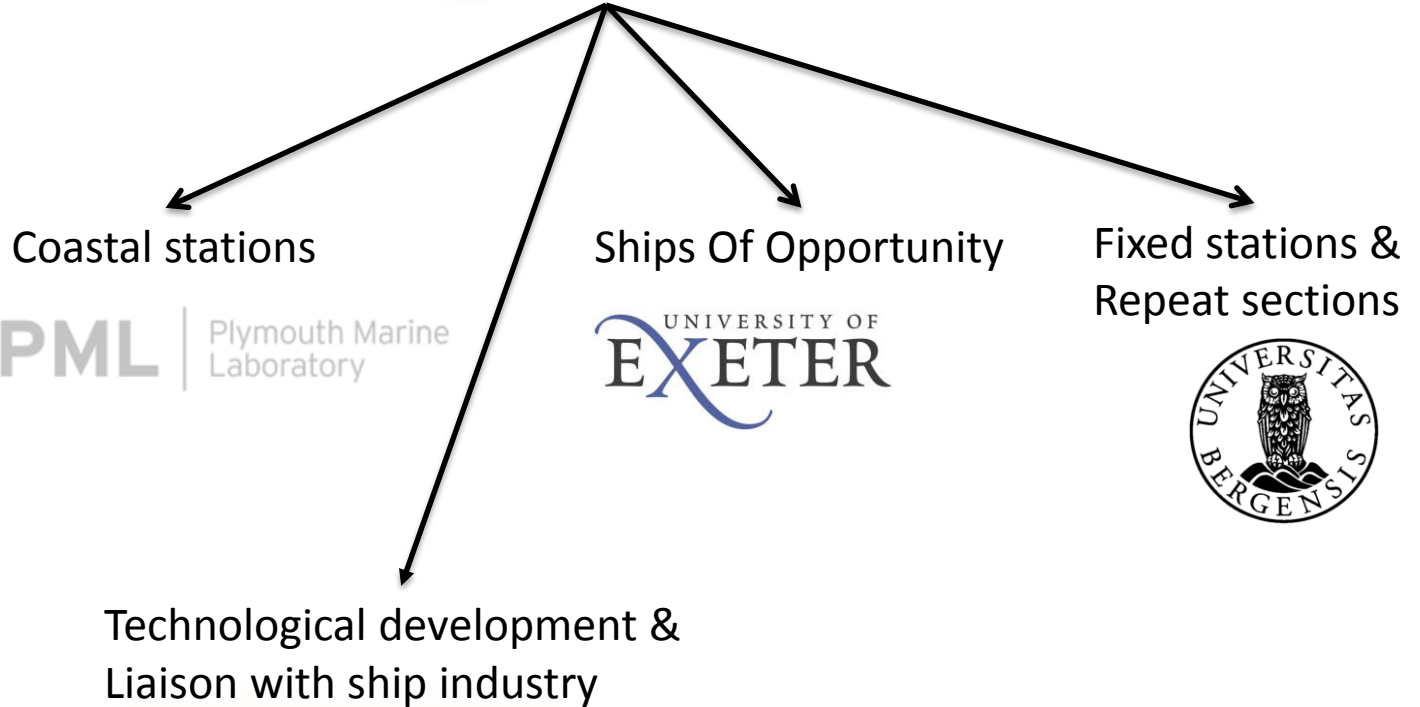
- OTC is Co-lead by Norway and UK (Uni. Of Bergen & Uni. Of Exeter)



- Countries present at recent MSA (19/01/2015):
Belgium, Finland, France, Germany, Italy, Norway, Sweden, UK
Chair: Mario Hoppema (AWI, Germany)

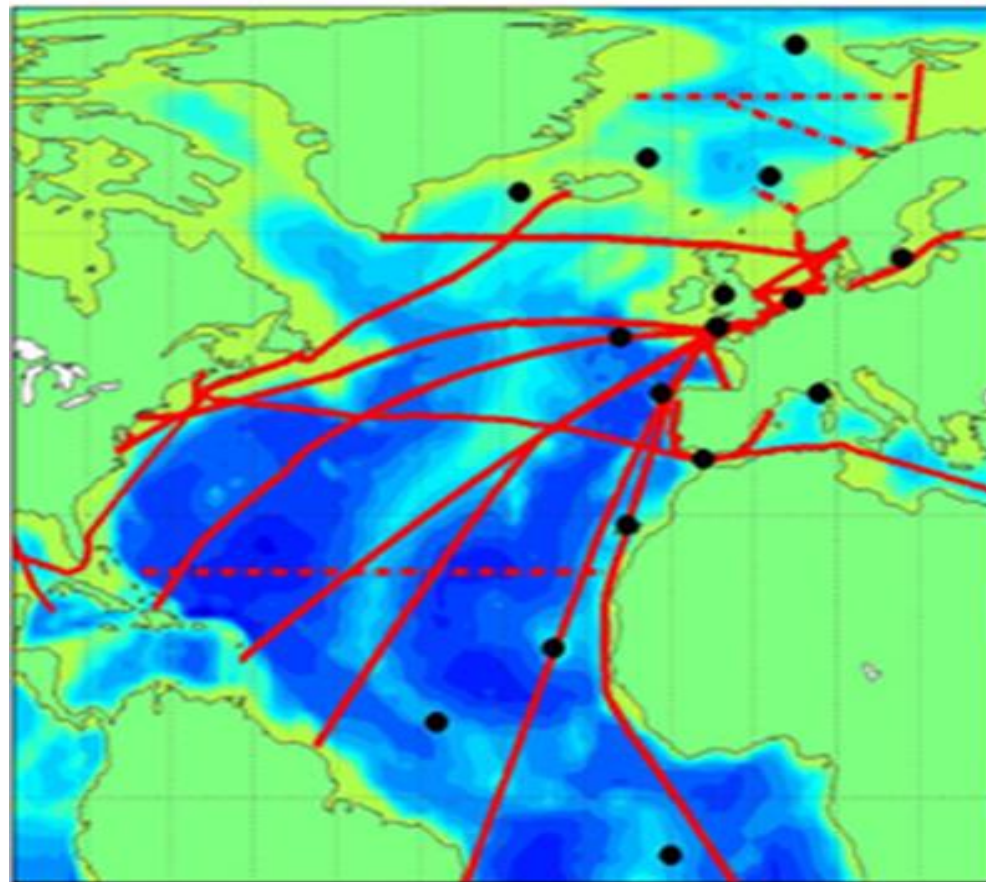
OTC Structure

OTC Coordination



OTC & marine MSA

- OTC at operational capacity by 2016
- Focus on North Atlantic, Baltic and Med but marine ICOS will have a global reach



Marine network

OTC & marine MSA

Challenges

- ❑ Decision to fund the OTC by UK and Norway will be announced in June
- ❑ Marine MSA stations funding
- ❑ Diverse environments (i.e. coastal, open ocean) and type of measurements (e.g. fixed stations, underway measurements) → different parameters, equipment, methodologies

ICOS *OTC Variables presented in 2013*

Type	Parameter	Frequency	Accuracy
Core	pCO ₂ (Air)		1 μatm (!! 0.1 μatm)
Core	pCO ₂ (Sea)		1 μatm
Core	Barometric pressure	Continuous	0.5 mbar
Core	Salinity		0.05 PSU
Core	Temperature		0.05 °C
Core	NO ₃ +NO ₂ , PO ₄ , SiO ₄	Periodical	1 μM
Core	Dissolved Inorganic Carbon		1 μmol/kg
Core	Total Alkalinity		1 μmol/kg
Additional	Atmospheric flask samples		
Additional	Chl-a		
Desirable	pH		0.001 units (???)
Desirable	Total Dissolved Gases	Continuous	
Desirable	Meteo	As described in the 2013 Stakeholders meeting	

ICOS *OTC*

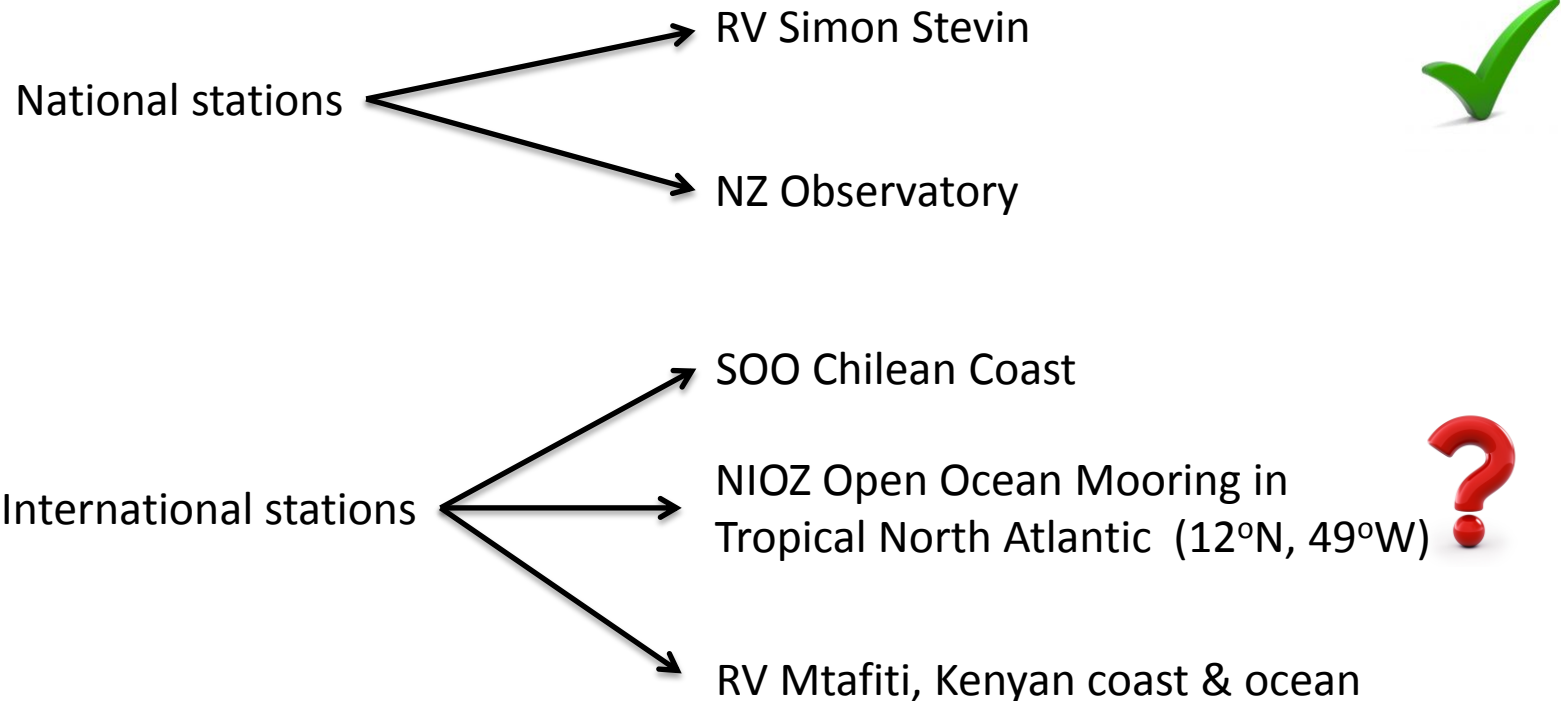
Variables for coastal stations as proposed by PML Apr. 2015

Type	Parameter	Frequency (†)	Precision
Core	Seawater $p\text{CO}_2$	Every 30 min	$\pm 4 \mu\text{atm}$
Core	Atmospheric $x\text{CO}_2$	As above	$\pm 0.5 \text{ ppmv}$
Core	Atmospheric P	As above	$\pm 0.5 \text{ mbar}$
Core	SST	As above	$\pm 0.01 \text{ }^\circ\text{K}$
Core	Salinity	As above	± 0.01
Core	pH	Periodic (1 per day)	± 0.01
Core	Nutrients (NO_3^- ; PO_4^{-3} ; SiO_2^-)	Periodic (1 per day)	$\pm 0.1 \mu\text{M}$
Core	Dissolved Inorganic Carbon	Periodic (1 per day)	$\pm 3 \mu\text{M}$
Core	Total Alkalinity	Periodic (1 per day)	$\pm 3 \mu\text{M}$
Additional	Seawater CH_4	Periodic (1 per day)	$\pm 0.1 \text{ nM}$
Additional	Atmospheric $x\text{CH}_4$	Periodic (1 per day)	$\pm 0.01 \text{ ppmv}$
Additional	Meteorology (rainfall, irradiance, wind-speed/direction)	Every 20 min	WMO guidelines
Additional	Chlorophyll α	Every 20 min	0.05 mg m^{-3}
Desirable	Dissolved Organic Carbon	Periodic (1 per day)	$1 \mu\text{M}$

VLIZ in ICOS

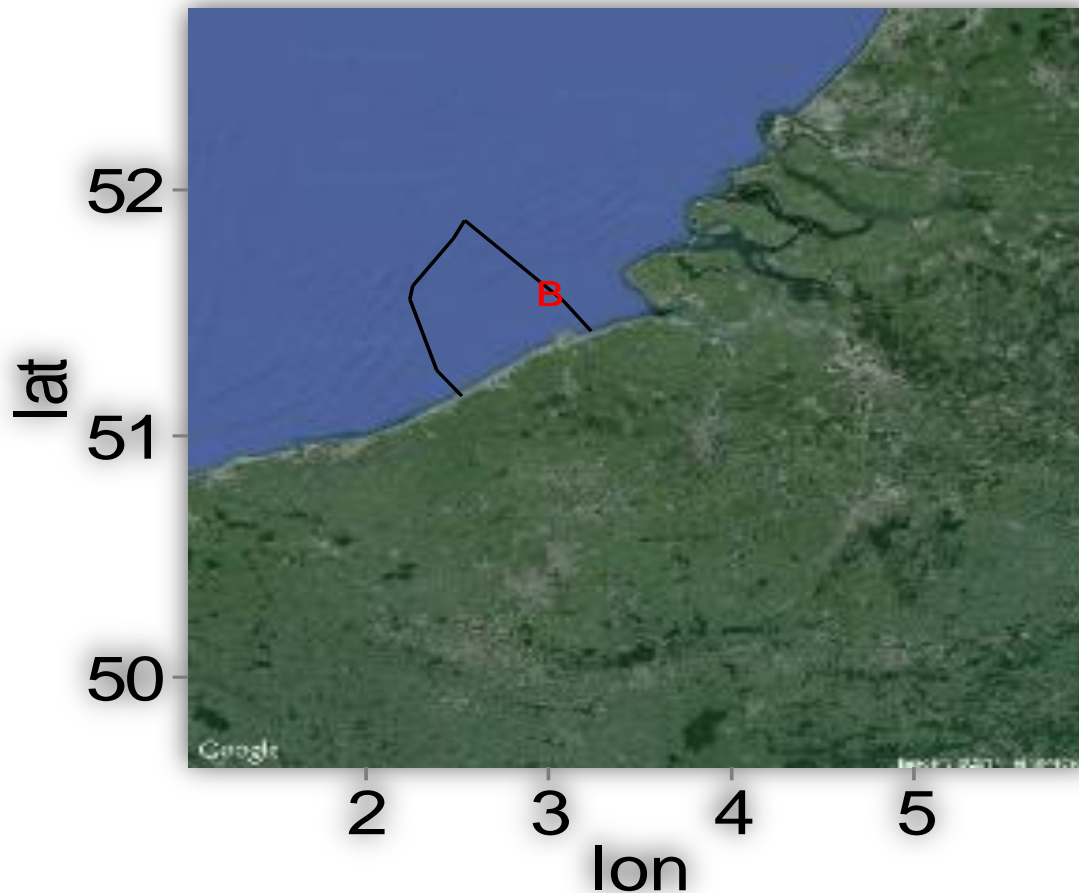
Start: 2013

Scope: Deliver the marine component of ICOS for the Belgian Focal Point (UoA)



VLIZ in ICOS (national)

North Sea Research & Monitoring Network



B North Sea Data & Monitoring station
(Noord Zee Observatorium)

VLIZ in ICOS (national)

RV SIMON STEVIN

pCO₂ (sea & atm)



- Nutrient Analysers
- Fluorimeter



Flow Cytometer



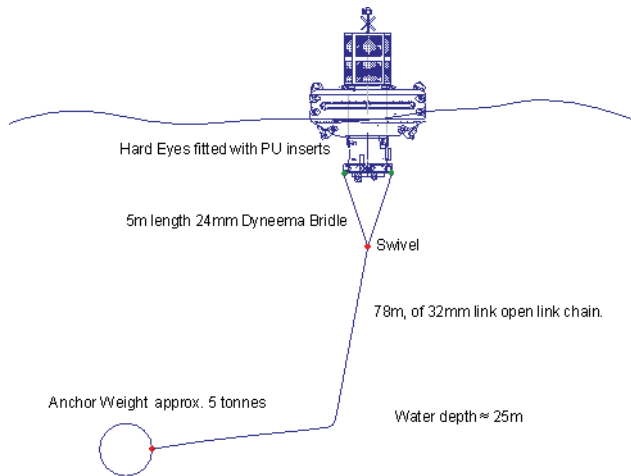
SBE 25 CTD



FRRf

VLIZ in ICOS (national)

NZ Observatorium



- Aanderaa Seaguard
 - O₂, RCM, CTD, Chl-a
- Systea WIZ (Nuts)
- ProOceanus – proCO₂ atmosphere
- Sensorlab SP101 pH sensor
- Vemco VR2C receiver
- C POD passive acoustic receiver

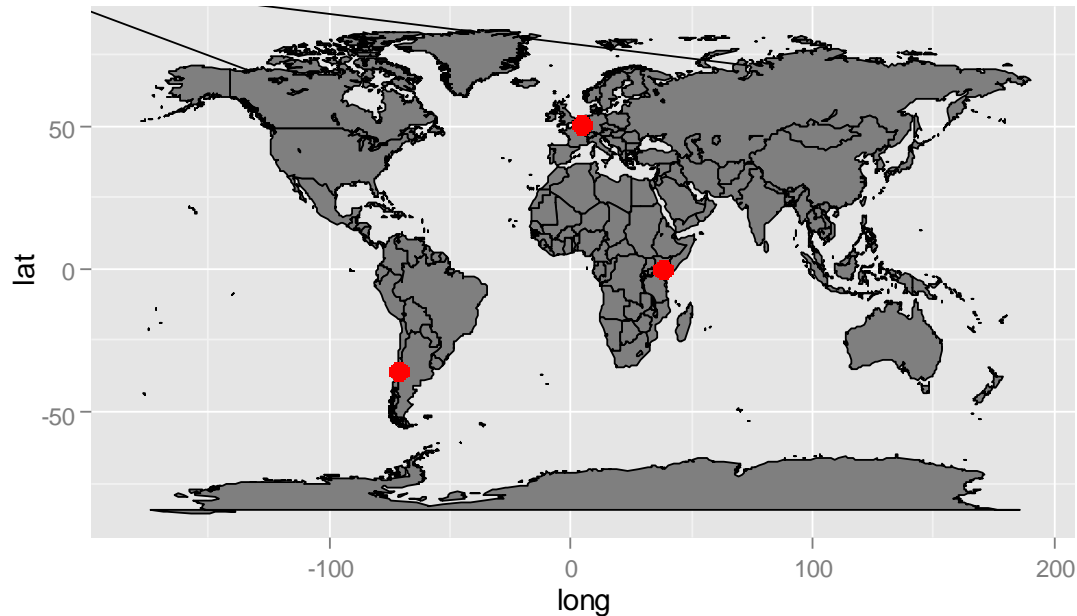
VLIZ in ICOS

Lab facilities @ Marine Station Oostende

- Calibration equipment for Temp & pH sensors
- Total Alkalinity measurements
- Preparation of Stds and reagents

VLIZ in ICOS (international)

- The Netherlands NIOZ:
Demo of pCO₂ sensor deployment on open ocean buoy (≈ 12°N/49°W)

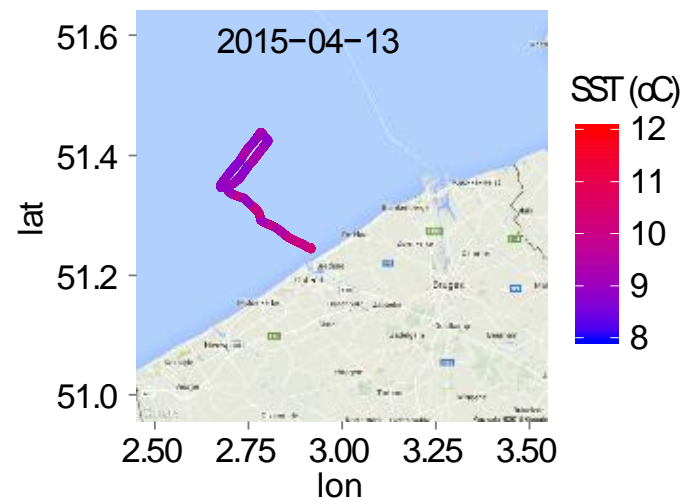
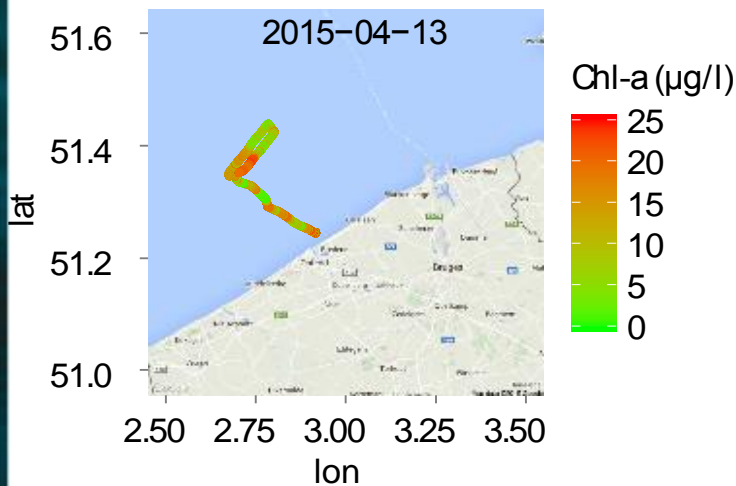
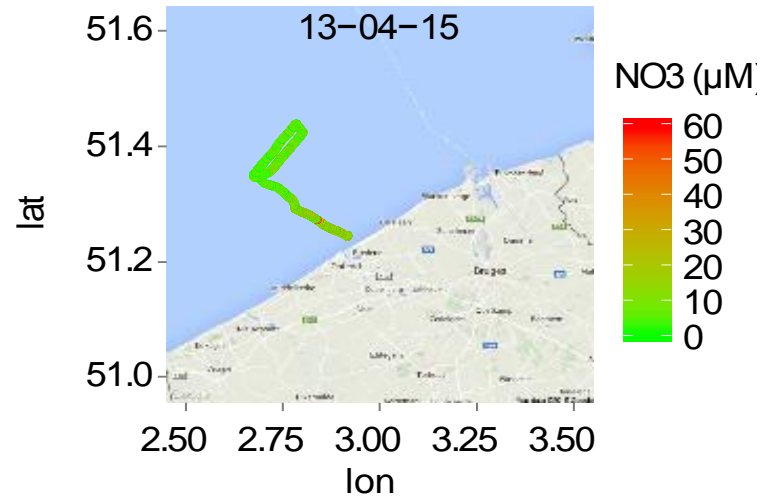
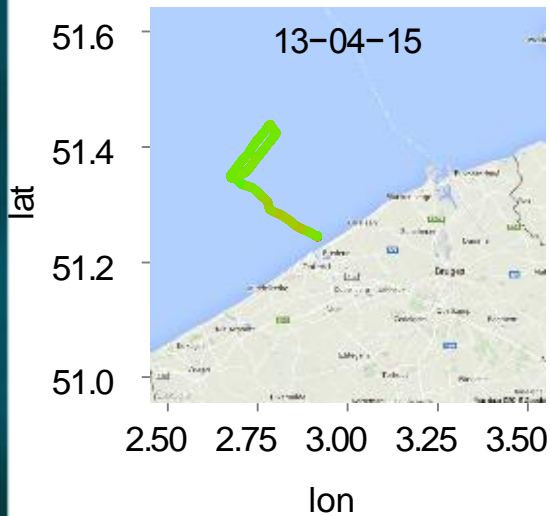


- Chile
ICOS - Univ. of Valparaiso & FOCA project
VOS from Valparaiso to Patagonia

- Kenya
KMFRI on going collaboration
Use of the RV Mtafiti as VOS



Products



Future

- Maintenance of existing stations
- Decide on overseas stations
- Enhance the capability of existing stations
 - Measurements of other GHG (e.g. CH₄)
 - Inter-comparison of sensors and methodologies
- Stronger collaboration with RBINS - OD Nature

Many thanks!!



ICOS

● ● ●
INTEGRATED
CARBON
OBSERVATION
SYSTEM

Thank You !!!



Vlaams Instituut voor de Zee vzw
Flanders Marine Institute