SOCIB HF Radar system

Applications and validation

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Balearic Islands Coastal Observing and Forecasting System

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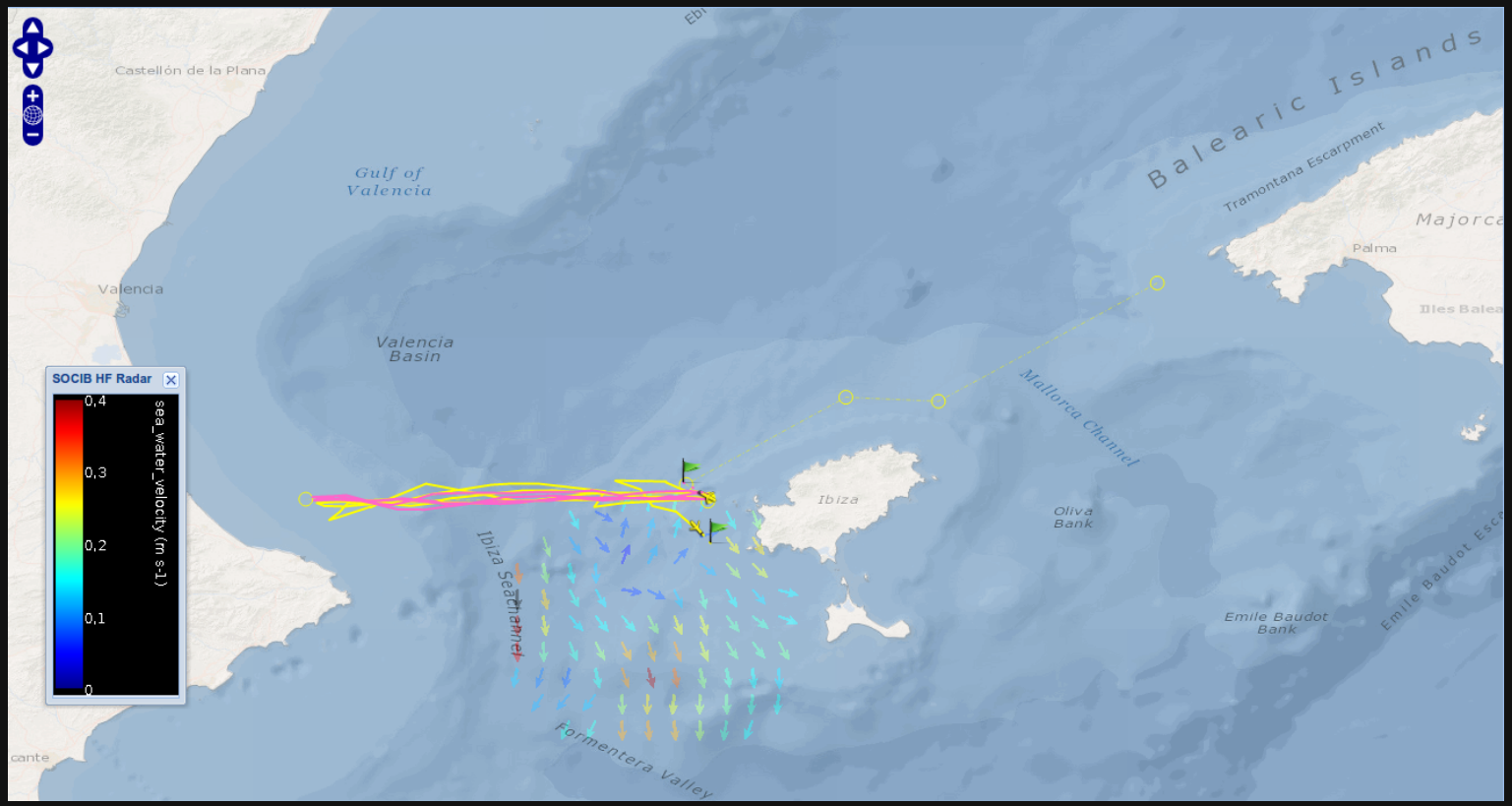
@SOCIB_data

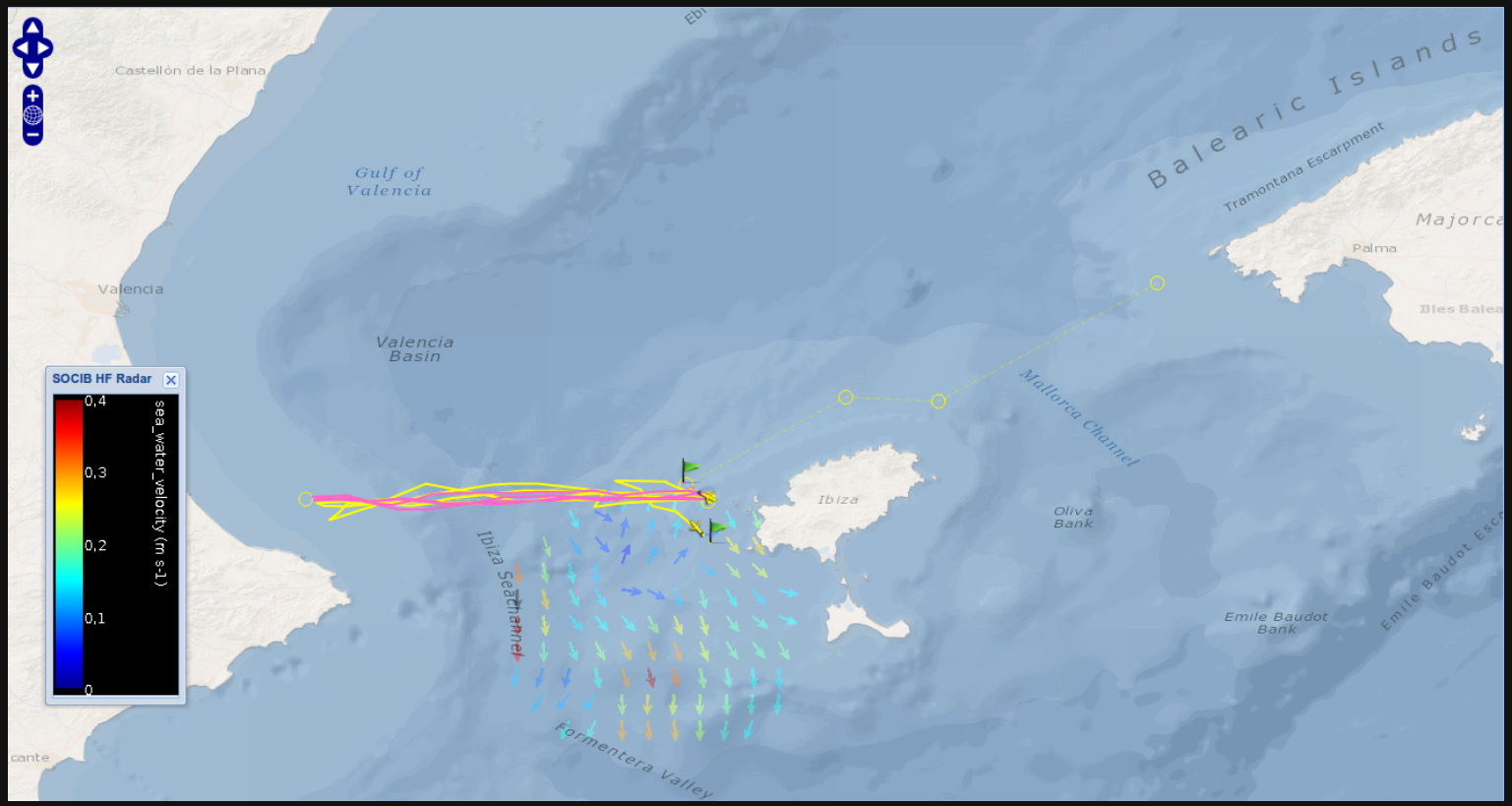
Context

HF Radar complements the Coastal Ocean Observing and Forecasting System

Location: Ibiza Channel



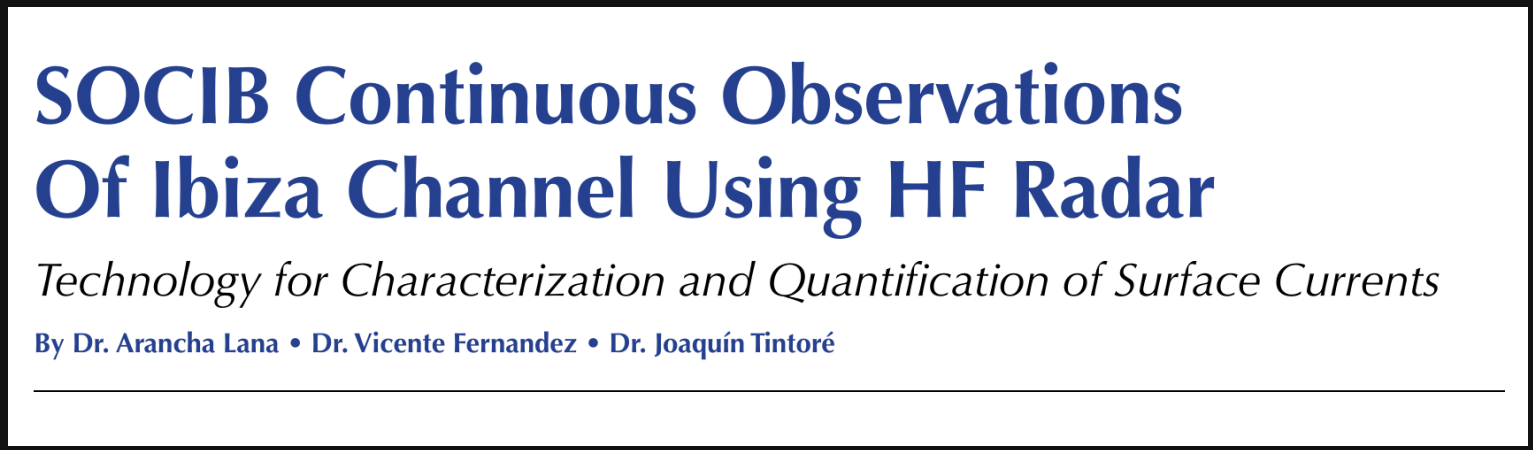
Location: Ibiza Channel



See talk Wednesday at 15:15 by Emma Heslop: *"High sub-seasonal variability at circulation "choke" point in the Mediterranean"*

More details

Lana et al. (2014). SOCIB Continuous Observations Of Ibiza Channel Using HF Radar Technology for Characterization and Quantification of Surface Currents, *Sea Technology*. Accepted



SOCIB Continuous Observations Of Ibiza Channel Using HF Radar

Technology for Characterization and Quantification of Surface Currents

By Dr. Arancha Lana • Dr. Vicente Fernandez • Dr. Joaquín Tintoré

and SOCIB HF Radar Facility:

http://socib.es/?seccion=observingFacilities&facility=radar

Data access & visualisation

Characteristics

CODAR SeaSonde system
Two radial stations
with combined TX-RX antennas

TX center frequency: 13.5 Mhz

Bandwidth: 90 kHz

Grid resolution: 3 km

Averaging radius (radials): 6 km

Temporal resolution: hourly
(75 min moving average)

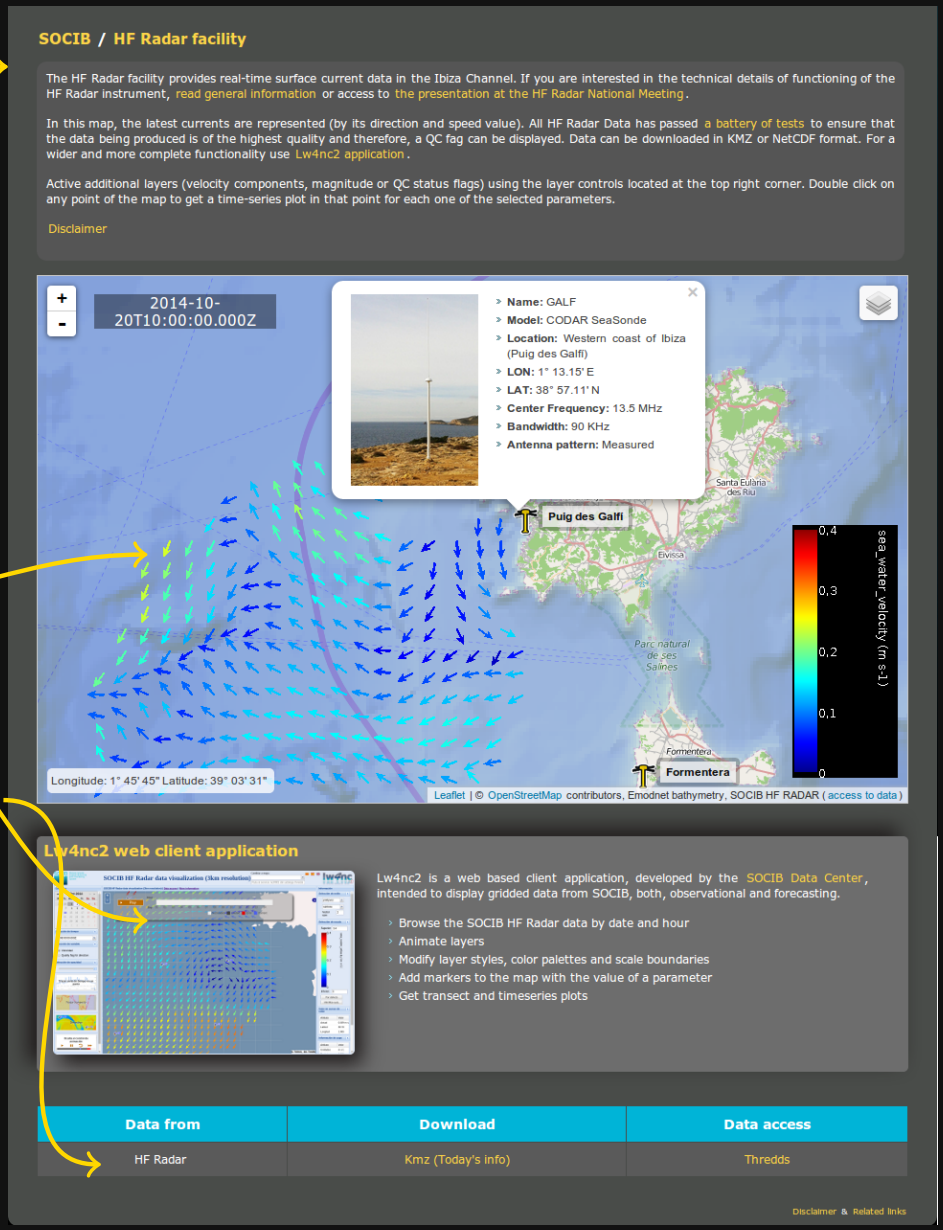
Temporal coverage: 1st June 2012
– ongoing

Data access: 2 clicks

HF Radar facility

Data access: 2 clicks

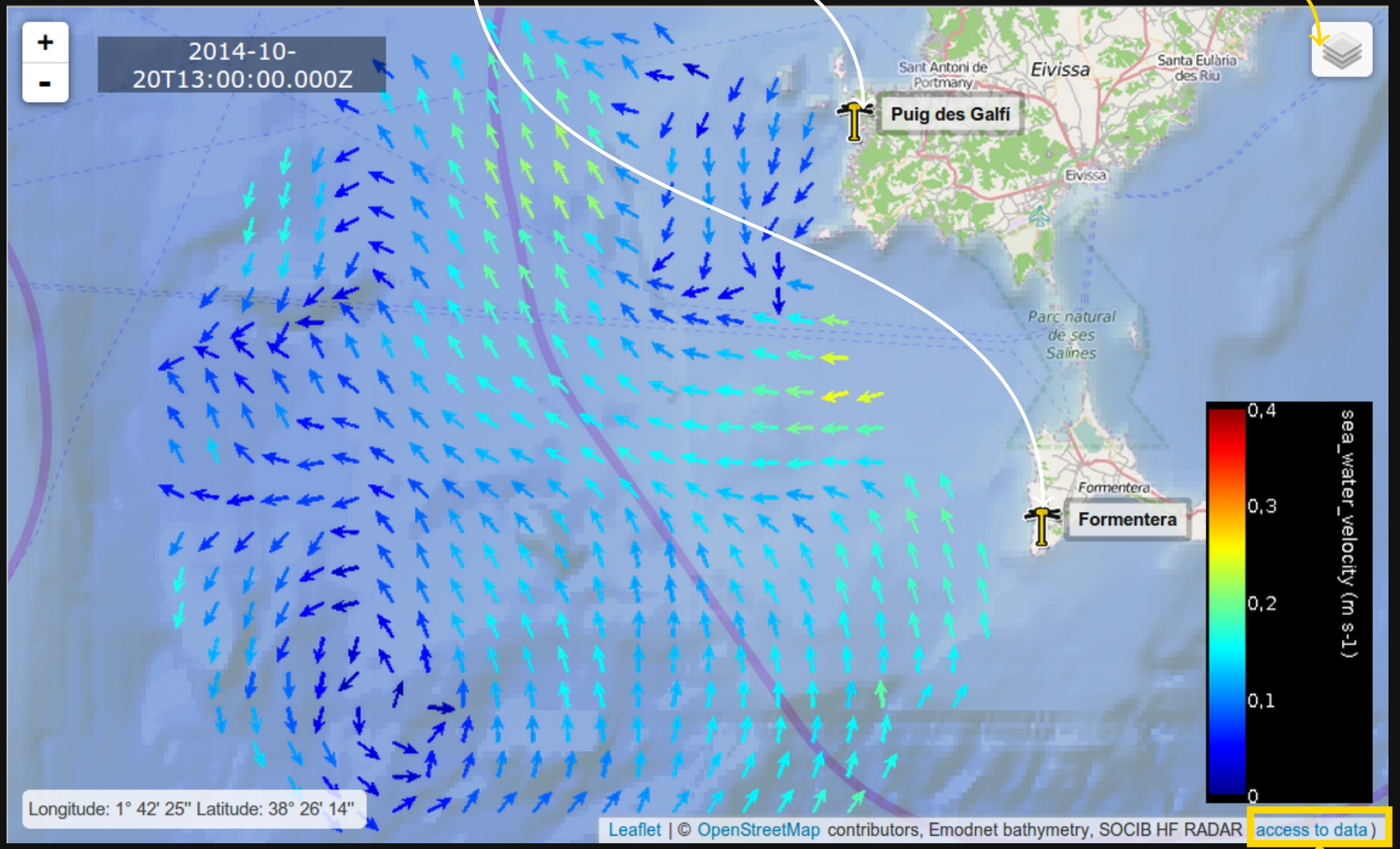
- System description
- HF Radar facility
- Visualisation tool
- Access to data (thredds)



Data access: 2 clicks

Antennas FORM and GALF

Select layer



Direct data access

Data access: 2 clicks

Format: NetCDF CF-1.6 compliant

Coordinates: lon, lat, time

Variables: U, V, sea water speed

Quality flags: for each variable + for individual antennas

CODAR parameters: covariance,
signal-to-noise ratio,
radial vector count, . . .

Quality control & validation

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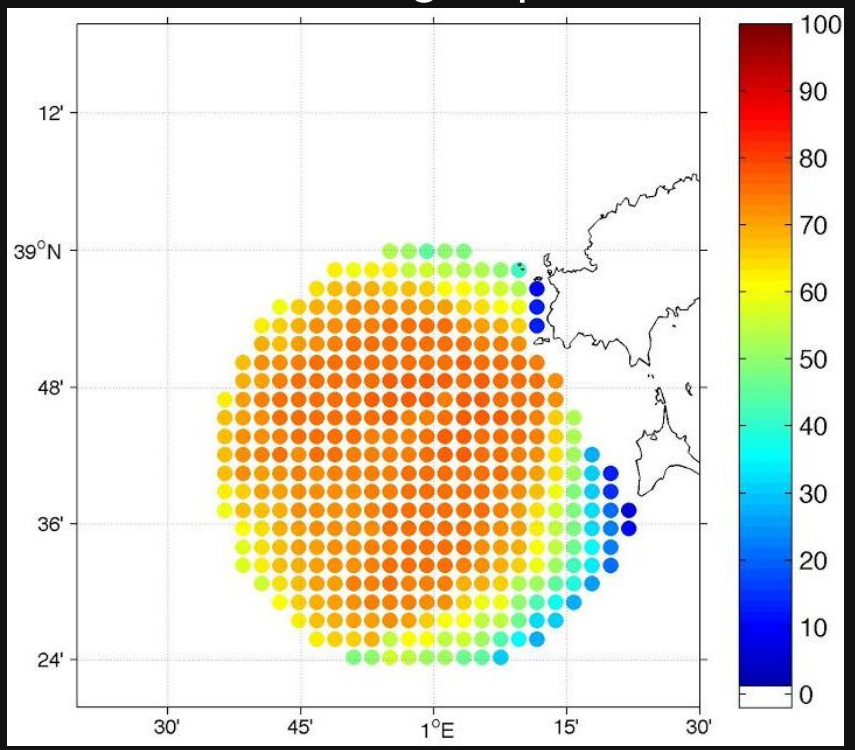
Automated QC procedure

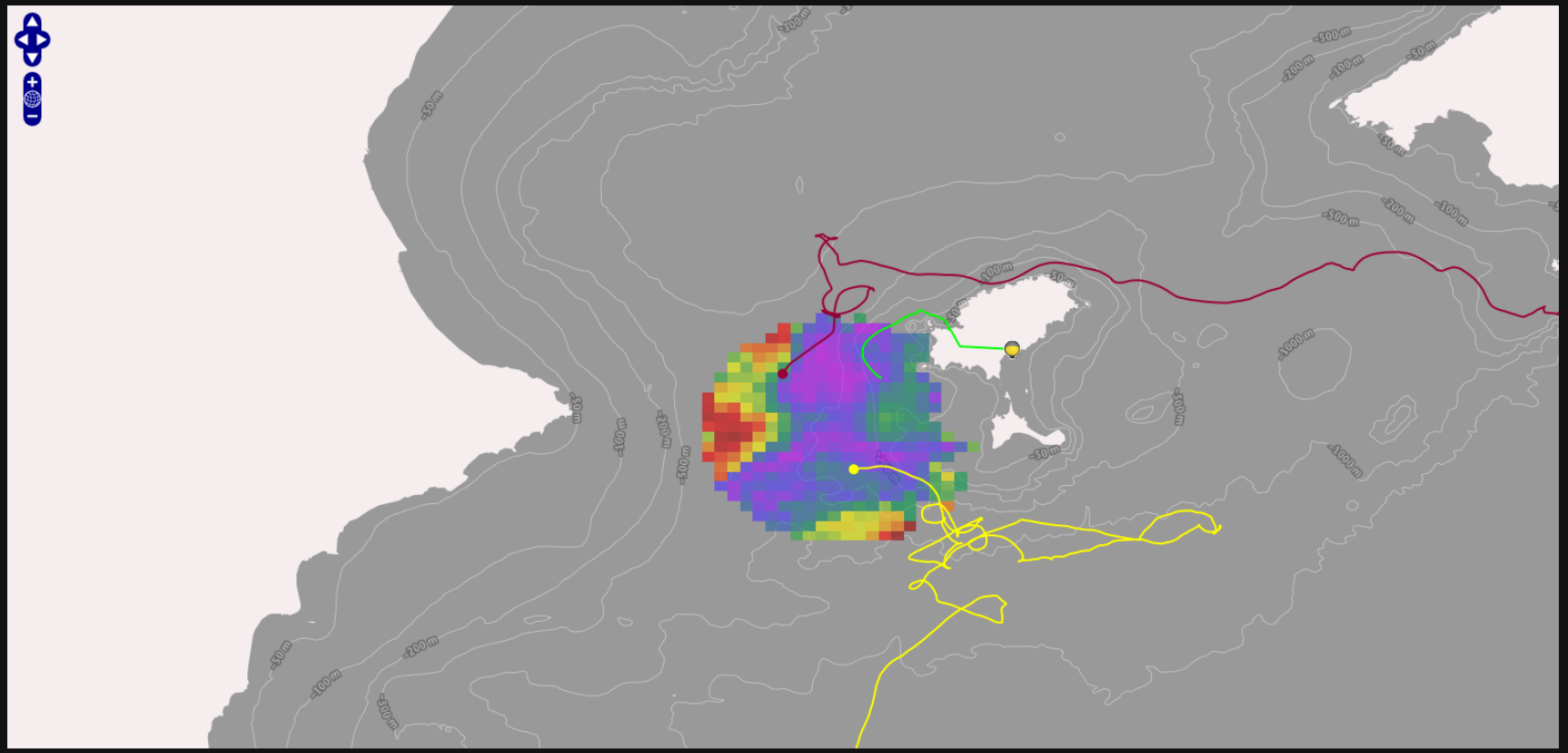
- ✓ CODAR QC procedures
- ✓ SOCIB Data Center procedures and flags for all radial and total data, based on:

1. System functioning diagnostic parameters at each radial station (signal-to-noise ratio, average radial bearing, radial vector count)
2. Battery of tests for individual total vector (range, gradient, spike)

Percentage of data flagged as *Good* at each grid point

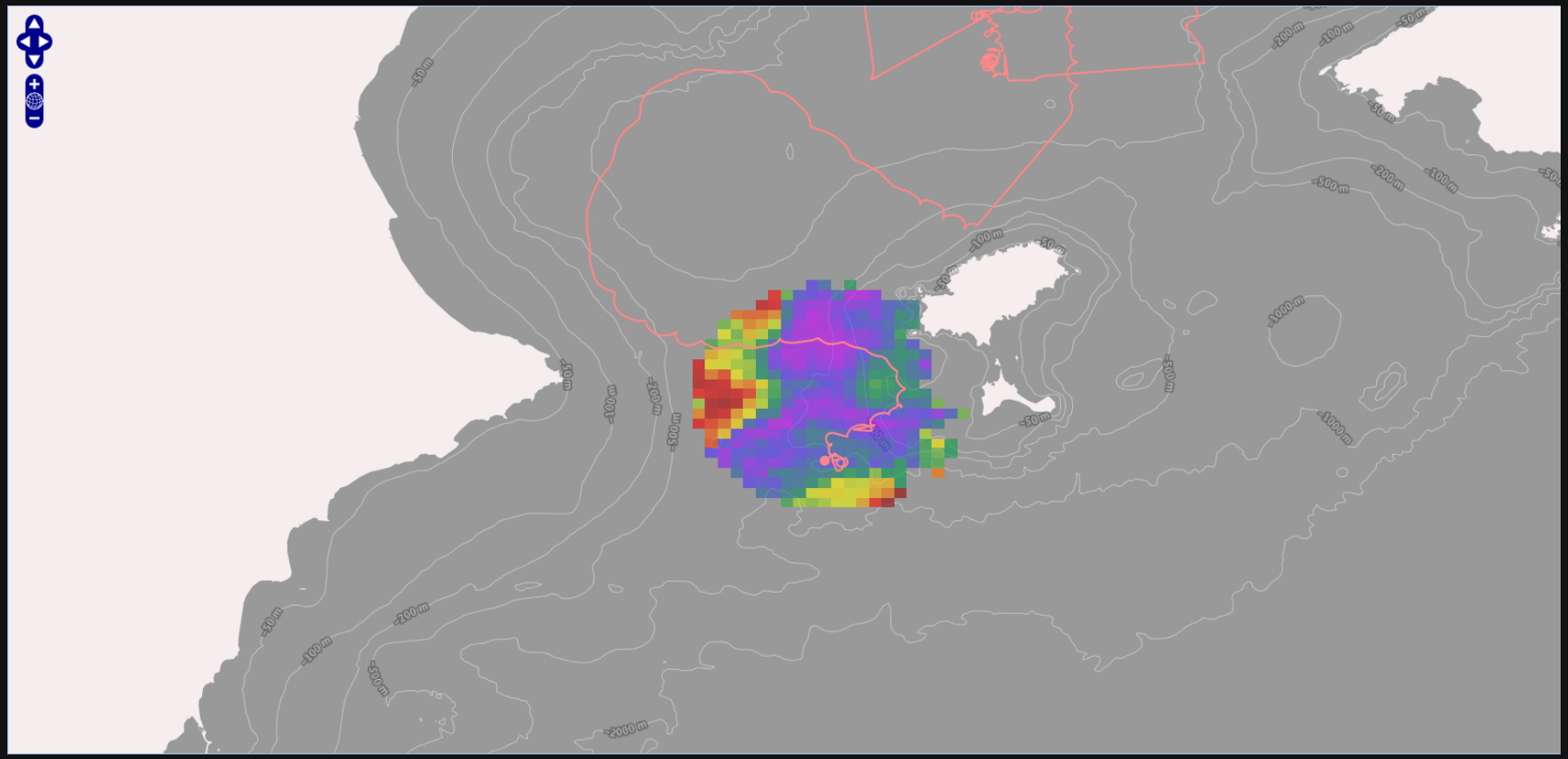


Validation experiments



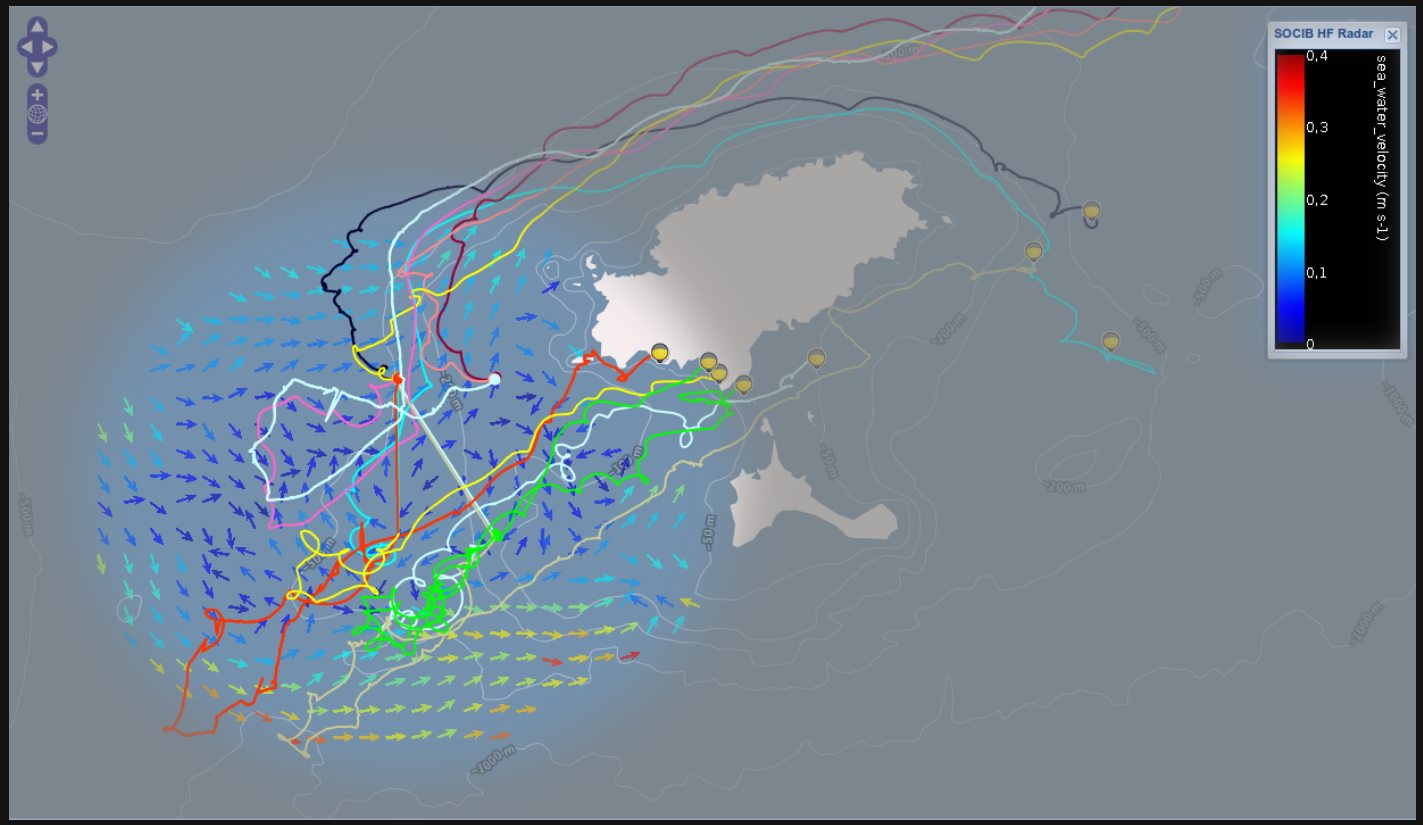
- TOSCA, October 2012: 3 drifters

Validation experiments



- TOSCA, October 2012: 3 drifters
- G-AltiKa, August 2013: 1 drifter + Glider + 40 Hz altimetry

Validation experiments



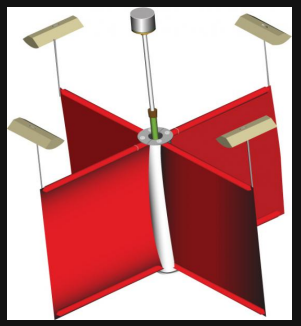
- TOSCA, October 2012: 3 drifters
- G-AltiKa, August 2013: 1 drifter + Glider + 40 Hz altimetry
- Radar-Exp: September 2014: 13 drifters with different shapes and drogue types

Radar-Exp design

CODE-DAVIS (MetOcean)

Surface (1 m) current tracker

Low wind-exposure

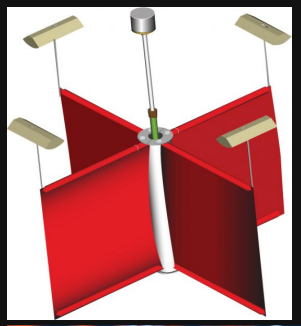


Radar-Exp design

CODE-DAVIS (MetOcean)

Surface (1 m) current tracker

Low wind-exposure



MD03i (Albatros)

Surface (1 m) current tracker

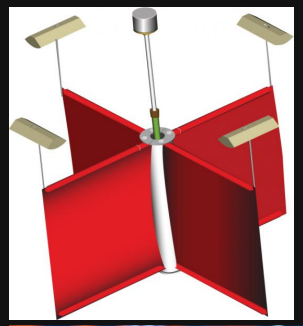
Low wind-exposure

Radar-Exp design

CODE-DAVIS (MetOcean)

Surface (1 m) current tracker

Low wind-exposure



MD03i (Albatros)

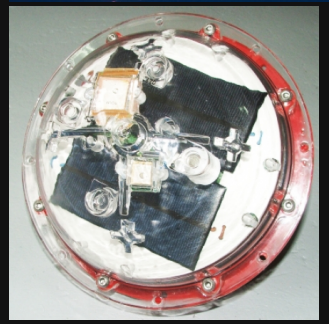
Surface (1 m) current tracker

Low wind-exposure

ODi (Albatros)

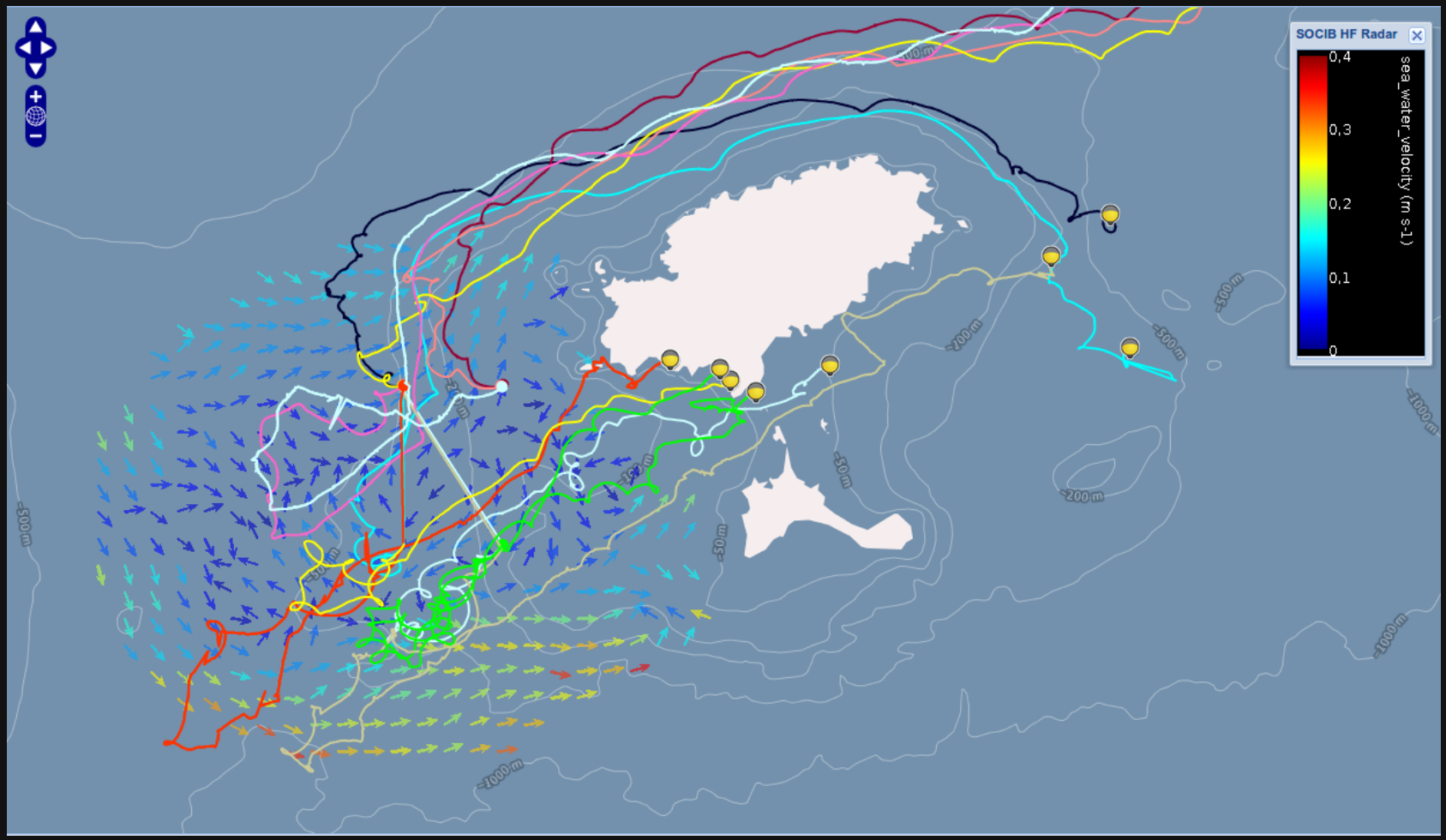
Surface current tracker

High wind-exposure



Radar-Exp design

3 types of drifters
at 4 different locations



Radar-Exp Results

Radial velocities interpolated at drifter positions

N = total number of position
GALF, FORM = radial stations

	N		Correlation coefficient (%)	
	GALF	FORM	GALF	FORM
CODE	611	566	73.3	60.9

Work in progress

Radar-Exp Results

Radial velocities interpolated at drifter positions

N = total number of position
GALF, FORM = radial stations

	N		Correlation coefficient (%)	
	GALF	FORM	GALF	FORM
CODE	611	566	73.3	60.9
MD03i	971	876	68.8	75.3

Work in progress

Radar-Exp Results

Radial velocities interpolated at drifter positions

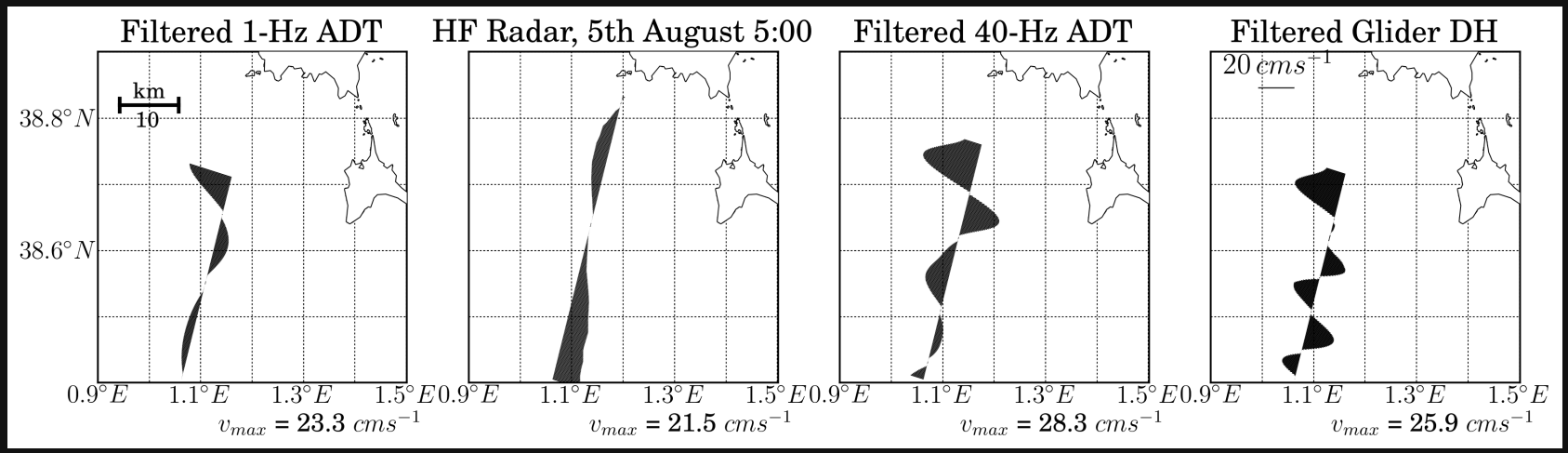
N = total number of position
GALF, FORM = radial stations

	N		Correlation coefficient (%)	
	GALF	FORM	GALF	FORM
CODE	611	566	73.3	60.9
MD03i	971	876	68.8	75.3
ODi	697	446	74.3	64.4

Work in progress

Scientific results

Multi-platform experiment

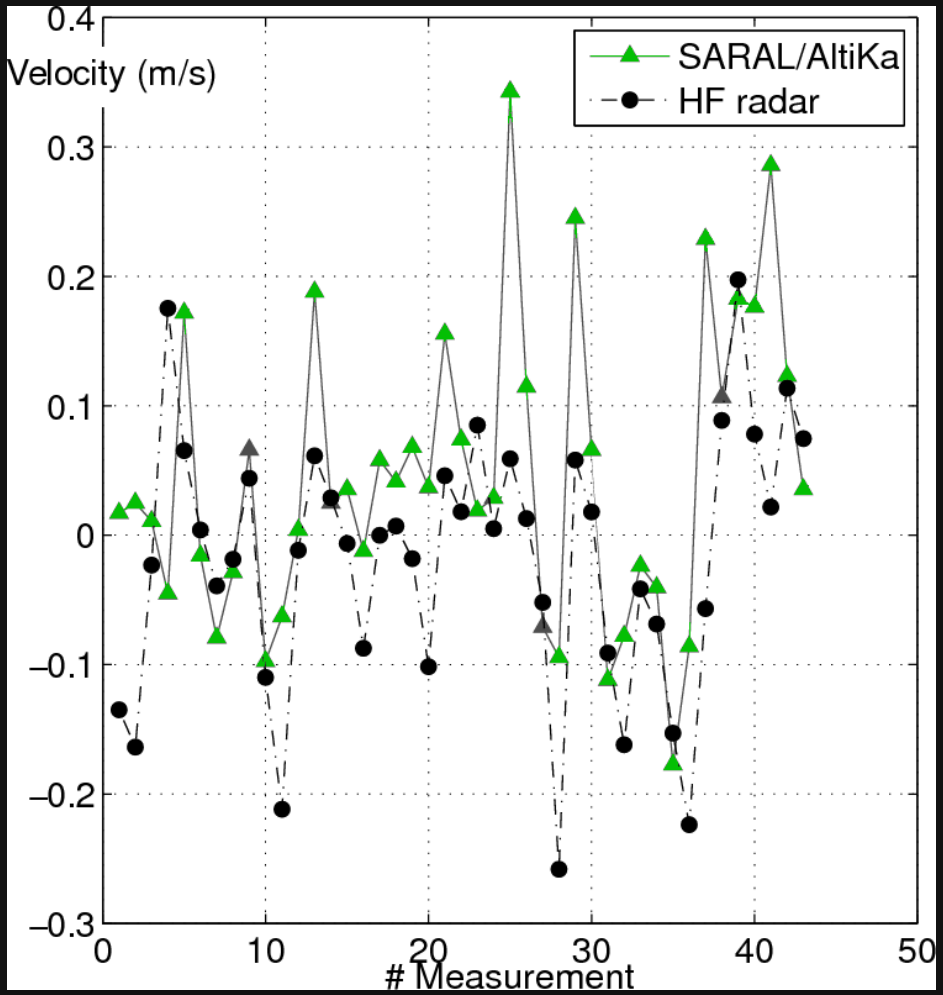


- Radar velocity closest to coast
- Northwestward current: approx. 20 cm/s
- Shown by three platforms

Troupin et al. (2014). Illustration of the emerging capabilities of SARAL/AltiKa in the coastal zone using a multi-platform approach, *Advances in Space Research*.

doi: doi:10.1016/j.asr.2014.09.011

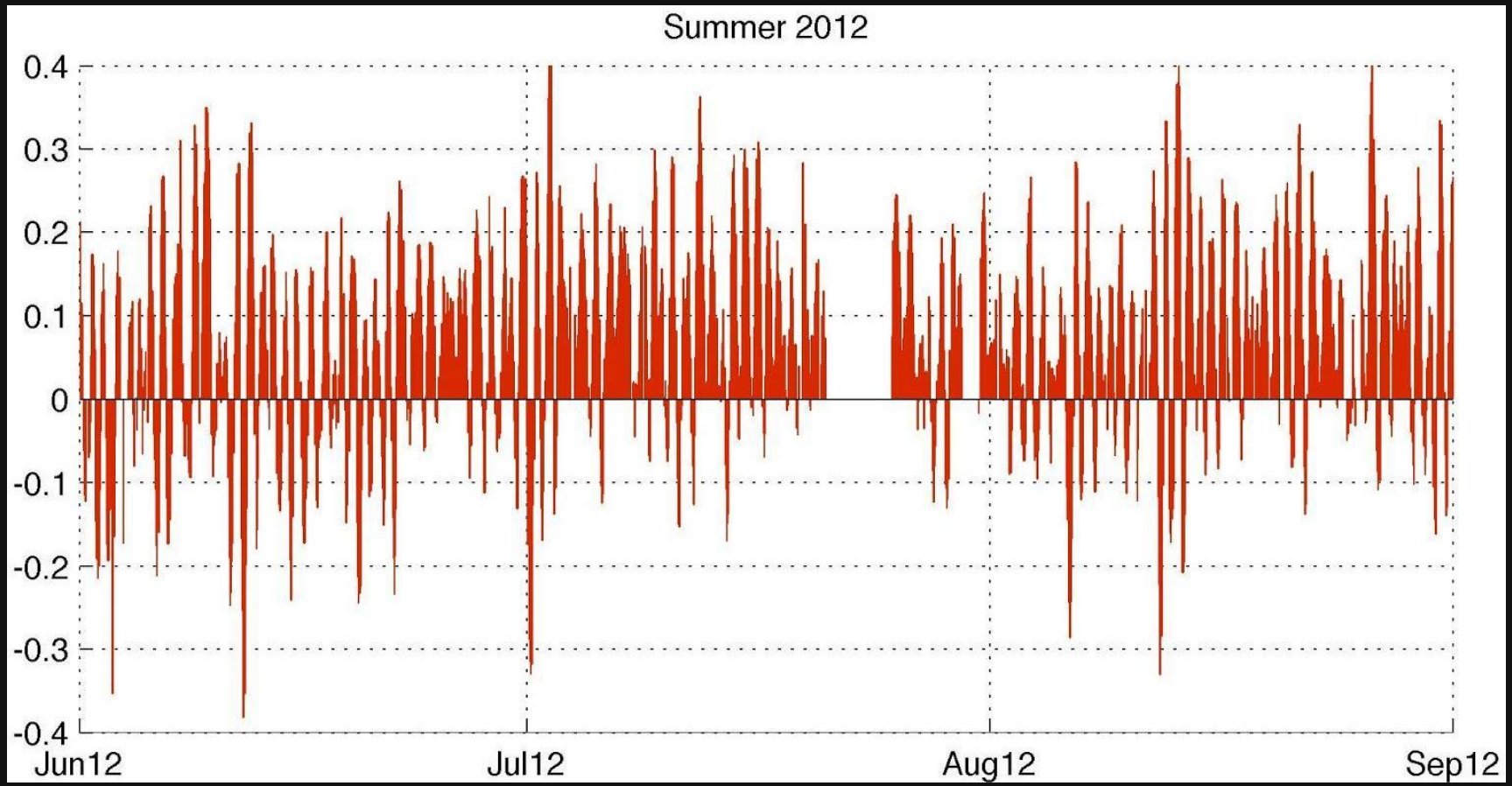
Comparison with recent SARAL/AltiKa altimeter



- Good agreement between HF radar and SARAL/AltiKa velocity (significant correlations above 70%)

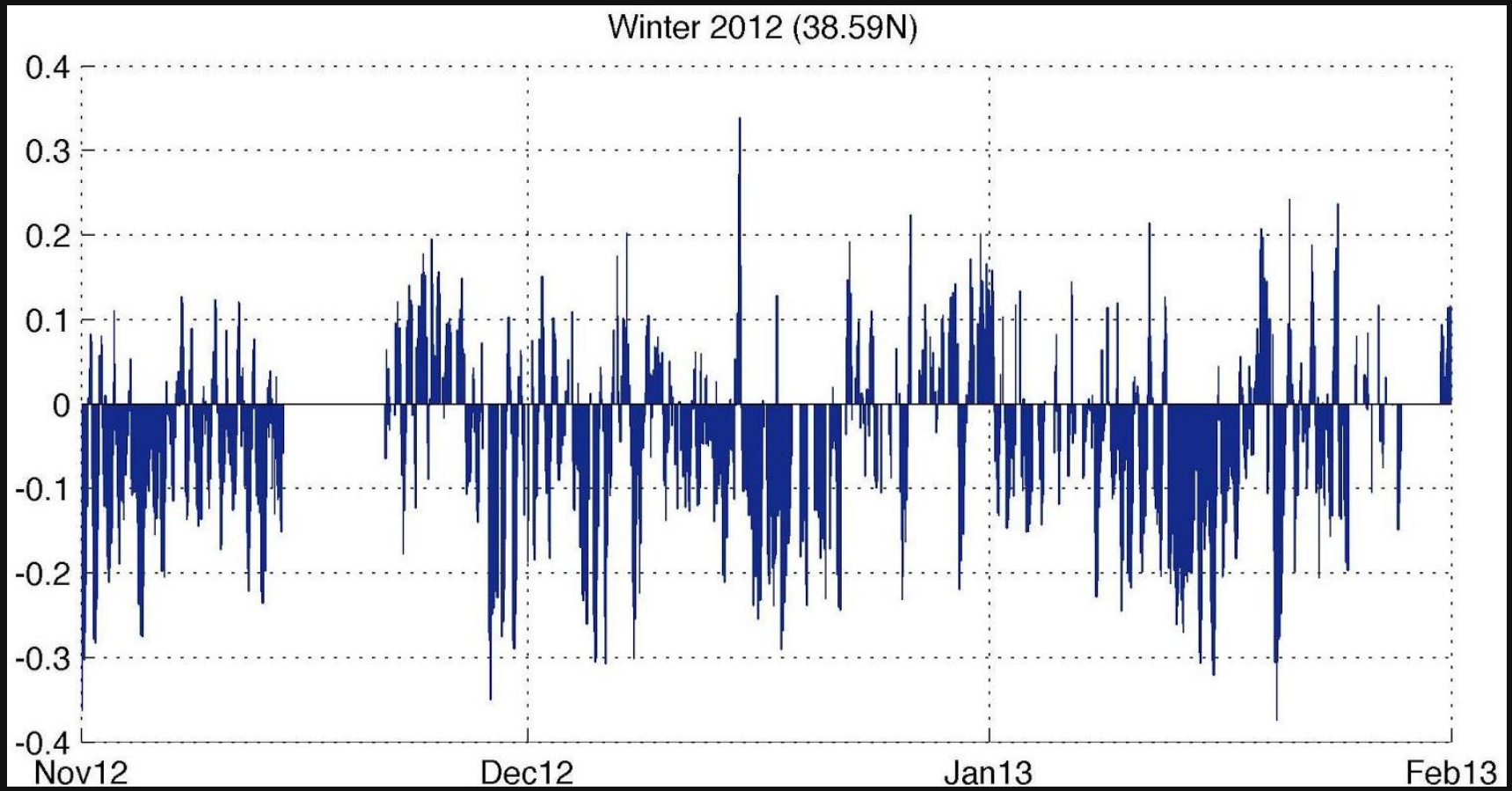
Pascual et al. (2014). Assessing SARAL/AltiKa near-real time data in the coastal zone: comparisons with HF radar and Jason-2 observations. *Marine Geodesy*. Under review.

Meridional transport in the Ibiza Channel



Summer: dominant northward current

Meridional transport in the Ibiza Channel

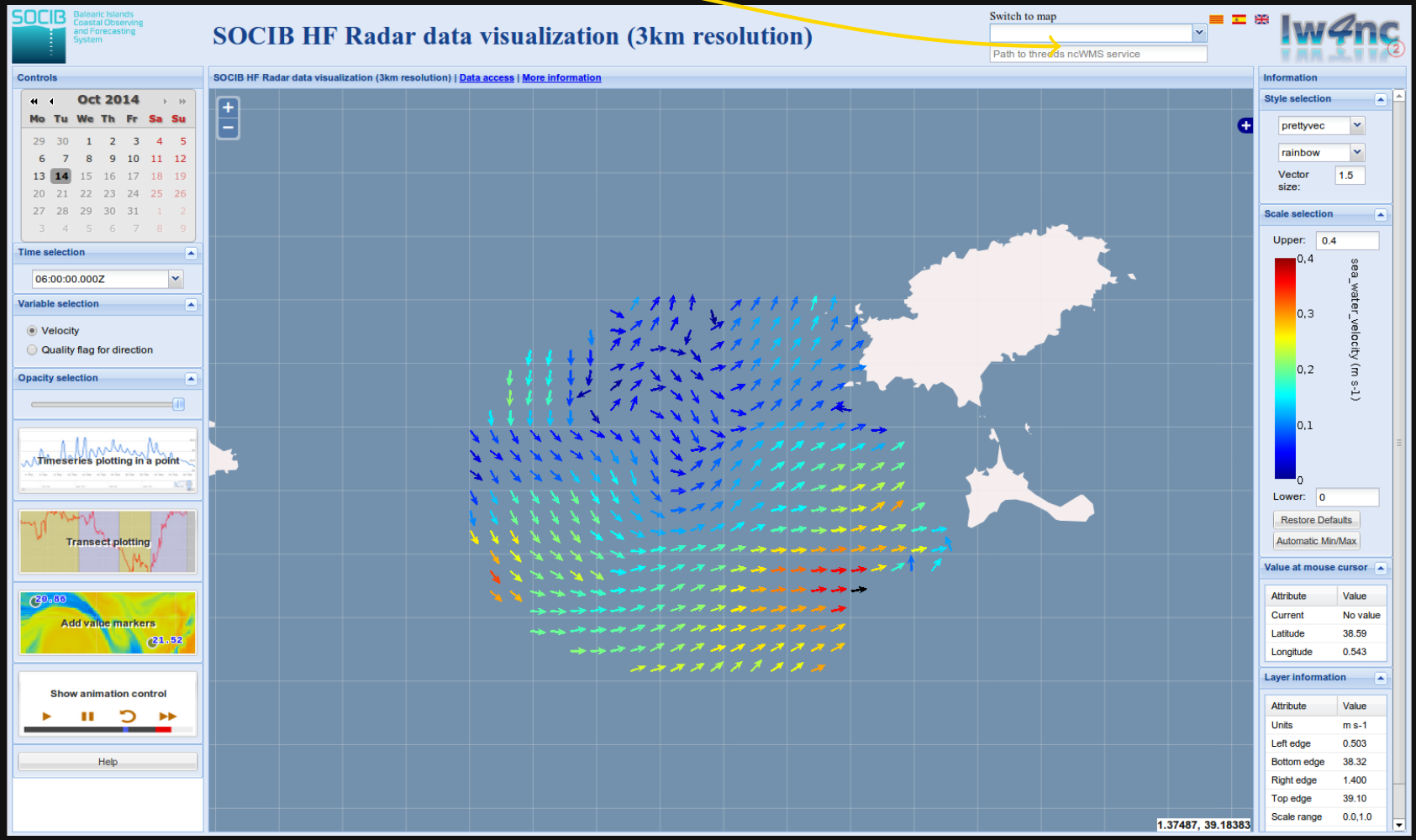


Winter: southward current, weaker

Web-based Applications

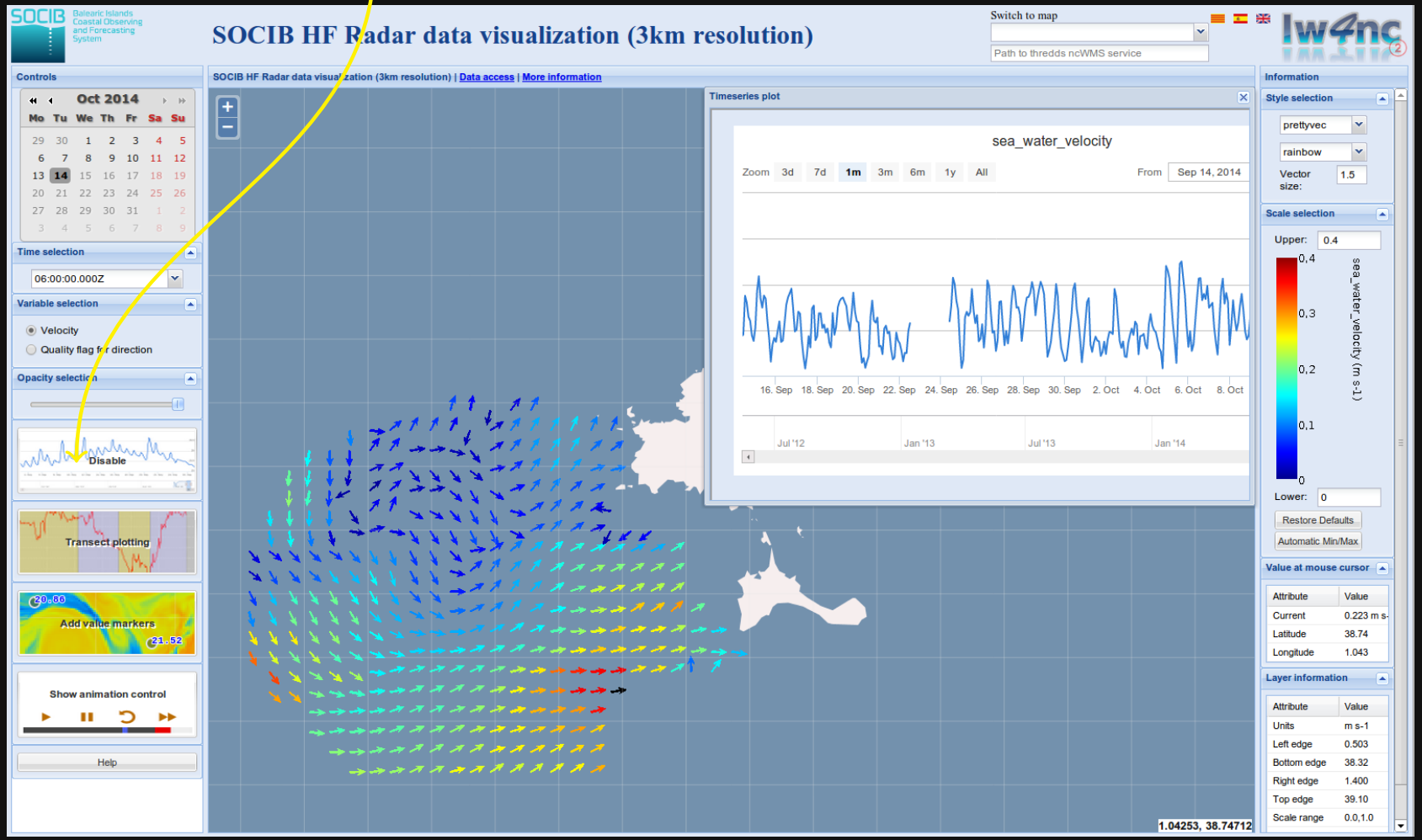
Lightweight NetCDF viewer

Select data source



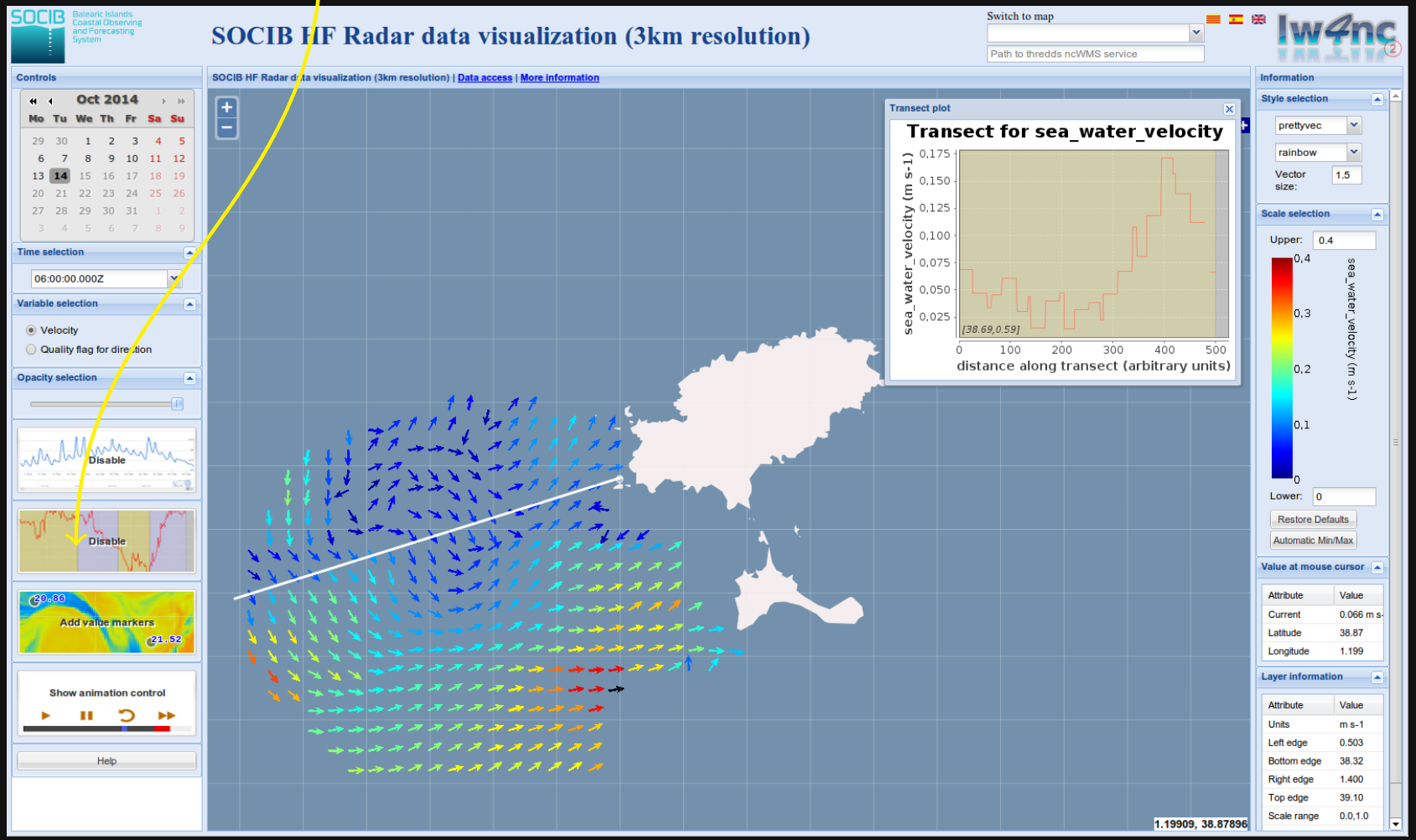
Lightweight NetCDF viewer

Extract time series



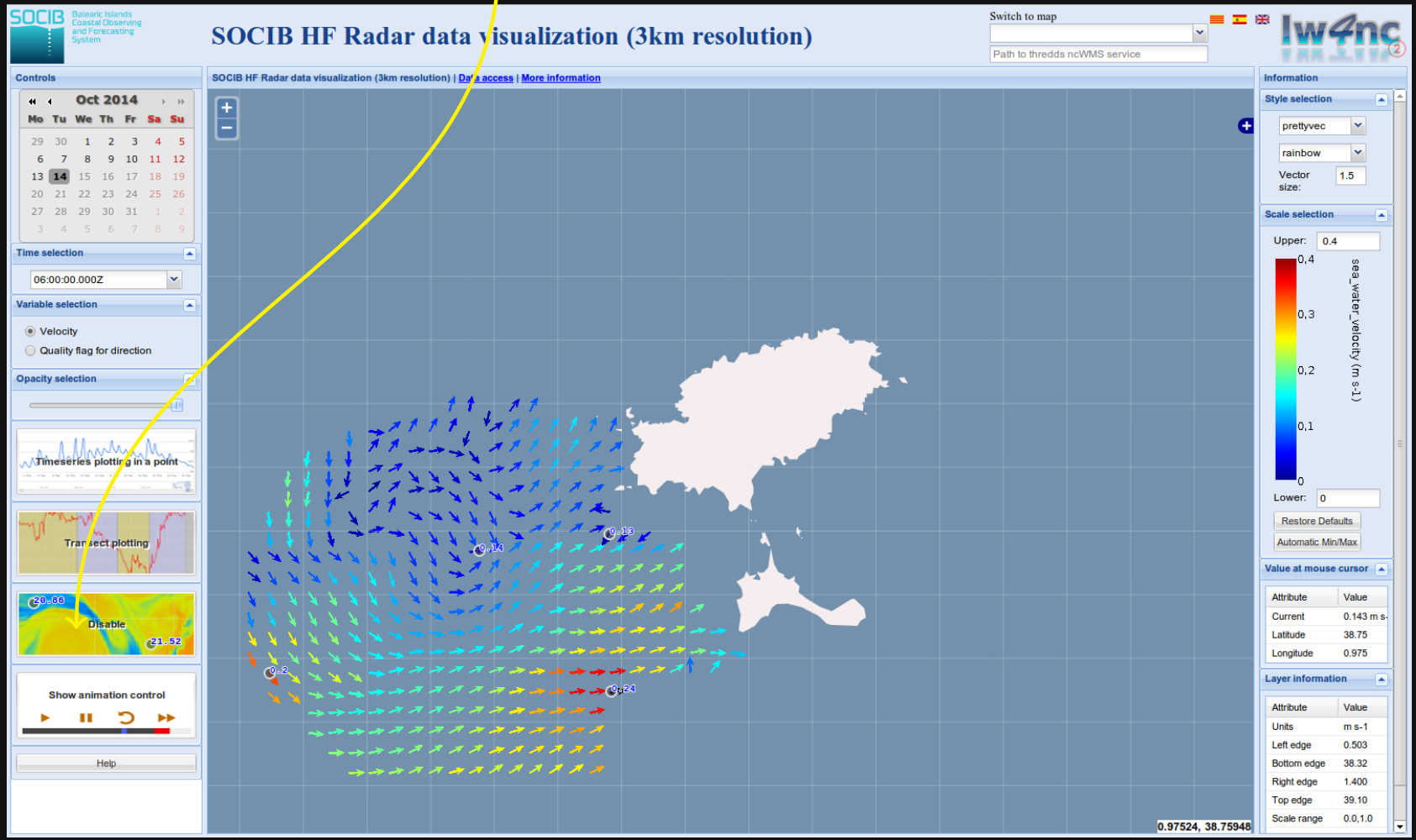
Lightweight NetCDF viewer

Extract transect



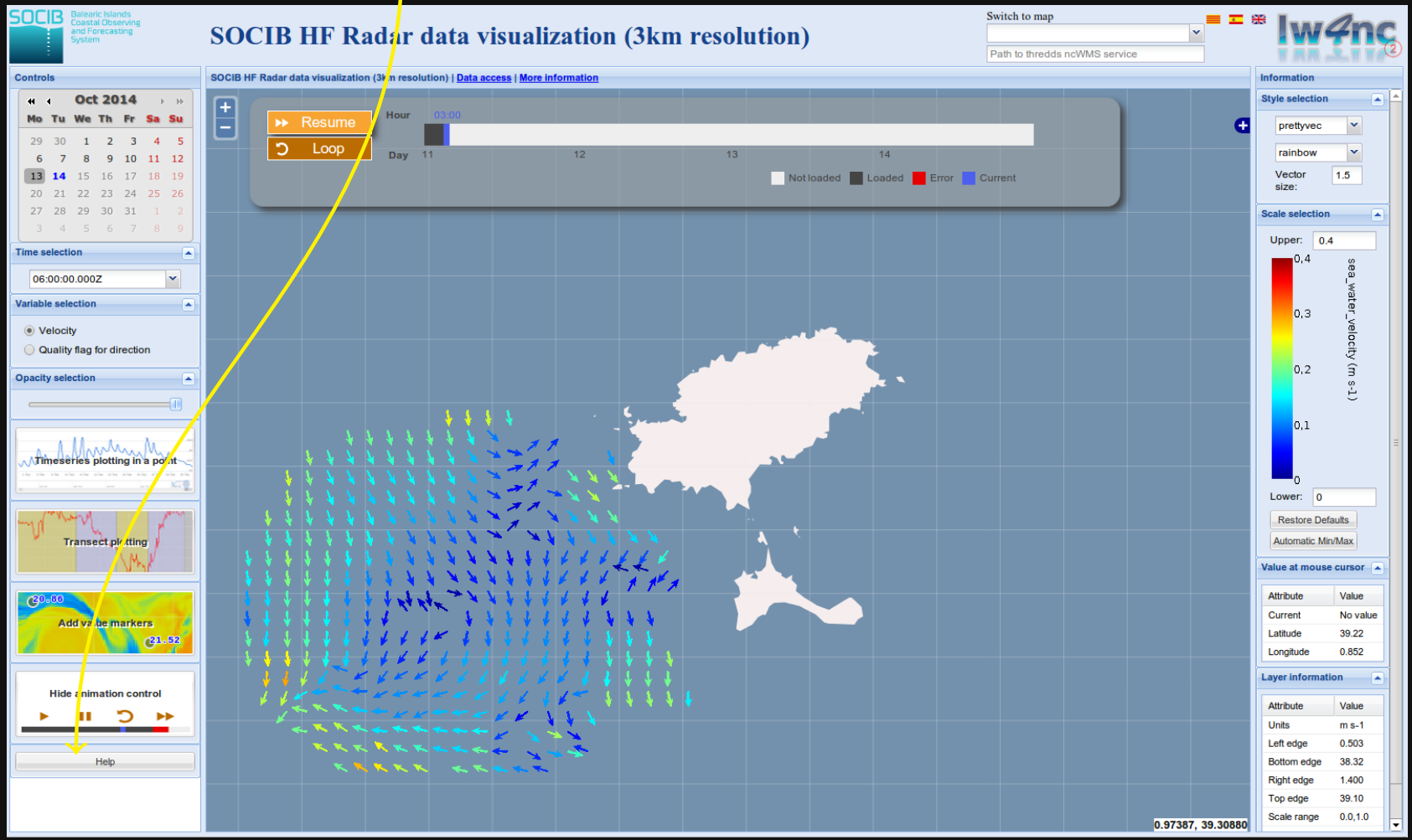
Lightweight NetCDF viewer

Extract values at markers

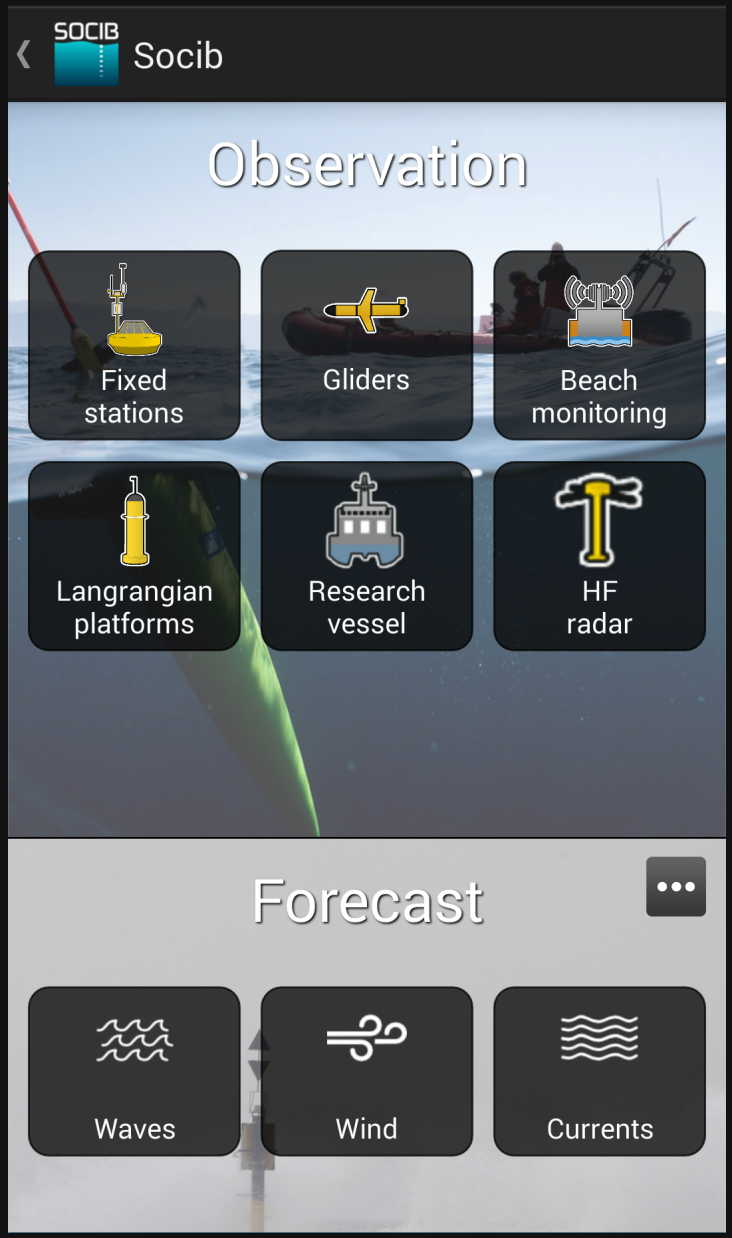


Lightweight NetCDF viewer

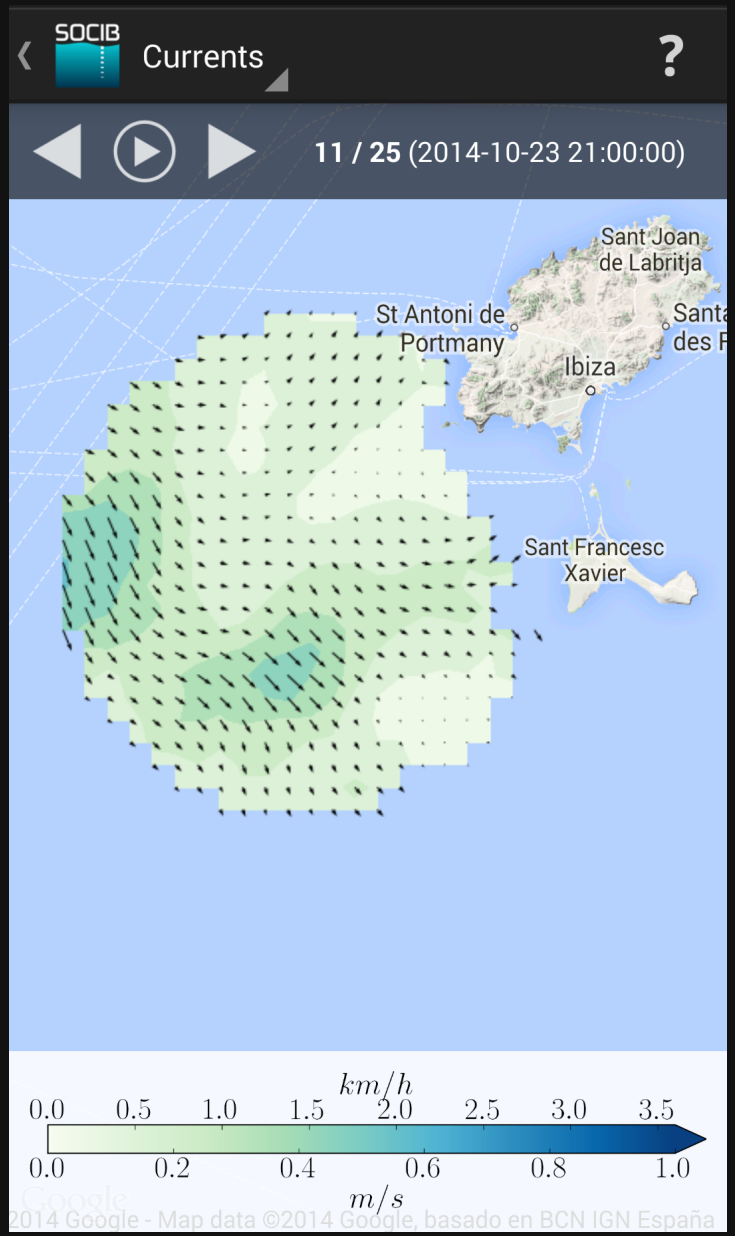
Generate animation



Smart-phone app



Smart-phone app



Messages

- HF radar as a component of a multi-platform system
- Quality control: strive for standard procedures, flags, criteria, . . .
- relevant scientific results
- Validation: dedicated experiments
- Efficient visualisation tools and apps

Future work

Validation using oceanographic buoy in Ibiza Channel

Comparison with ocean forecast model

Assimilation of radar velocities in forecast model

Increase number of users

non-scientists

Thanks
for your attention

✉ data.centre@socib.es
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