

Report on HFR - EUSKOOS Historical data files QA/QC

Data provider information:

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- acknowledgements: These data were collected and made freely available by the Copernicus project and the programs that contribute to it. Data collected by Euskalmet and processed by AZTI within EuskOOS and JERICO-NEXT projects.

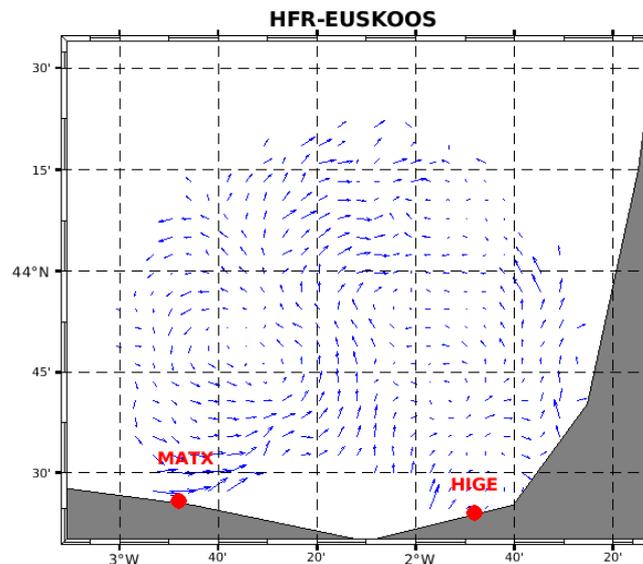
System: **EUSKOOS**

Sites: **MATX**

Data set: **Radials**

Data source: Radials from the provider

Period: 01-Jan-2009 – 31-12-2022



RESULTS OF HIST DATA INSPECTION

General comments:

The antenna has been functioning for more than 11 years. The general functioning has been pretty continuous, but some weeks/months of non-functioning gaps exist in the dataset.

The AVR_B_QC thresholds is set to [140-220] degrees and it should be checked by the provider in order to guarantee the best functioning of this QC. The provider has already been informed about this.

The antenna has been calibrated every two years. But the calibration patterns used for each time varies for some punctual and short periods, as for Dec 2013. The provider has also been informed about this.

A change in the Bearing Angle and Range Resolution has been observed in the raw dataset during 2017. For this reason, the available Temporal Aggregated (TA) file covers just a period from Jan-2009 to May 2017, to compile the netcdf file characteristics.

year	General comment	Periods to be reflagged	Reason for new fagging	Sugg. Flag
After exchanges with the provided the following periods where reflagged:				
Year	General comment	Periods to be reflagged	Reason	New Flag

During the analyzed period, the spatio/temporal 80-80% objective for data availability has not been reached. But it is worth it to note that from 2012 to 2015 and in 2021, the 80% availability objective has been reached in the central radials.

The data provider has been informed about the quality flag =4 for some periods. We suspect that it could be related to the threshold limits of the AVR_B_QC. It's modification could change the quality flag of these periods.

Spatial Coverage vs. Temporal coverage: objective of USCG 80-80% data availability

Period	General comments	Nb. analysed hours	80%-80% obj.
2010	25.40 % spatial availability 80% of time	170*	n
2011	47.36 % spatial availability 80% of time	362*	n
2012	27.48% spatial availability 80% of time	336*	n
2013	60.27 % spatial availability 80% of time	309*	n
2014	42.64 % spatial availability 80% of time	325*	n
2015	29.97% spatial availability 80% of time	299*	n
2016	33.51% spatial availability 80% of time	303*	n
2018	28.81% spatial availability 80% of time	334*	n
2019	23.77% spatial availability 80% of time	189*	n
2020	45.61 % spatial availability 80% of time	351*	n
2021	60.04 % spatial availability 80% of time	102*	n
2022	44.34% spatial availability 80% of time	344*	n

*A subsample dataset (1 hour per 8 available hours) has been analysed for plotting purposes

Annex I Applied QA/QC tests

QC Flag	Short name	Short description
Variable name		
-	Syntax	Syntax check: this test will ensure the proper formatting and the existence of all the necessary fields within the total NetCDF file. This test is performed on the NetCDF files and it assesses the presence and correctness of all data and attribute fields and the correct syntax throughout the file. This test is performed by the European HFR Node before pushing data to the distribution platforms.

AVRB_QC	Average Radial Bearing	Average Radial Bearing: this test labels the entire data file with a ‘good_data’ flag if the average radial bearing of all the vectors contained in the data file lies within a specified margin around the expected value of normal operation. Otherwise, the data file is labeled with a “bad_data” flag. The value of normal operation has to be defined within a time interval when the proper functioning of the device is assessed. The margin has to be set according site-specific properties. This test is applicable only to DF systems. Data files from BF systems will have this variable filled with “good_data” flags (1) and the explanation “Test not applicable to Beam Forming systems” in the comment attribute.
CSPD_QC	Velocity Threshold	Velocity Threshold: this test labels radial velocity vectors whose module is bigger than a maximum velocity threshold with a “bad data” flag and total vectors whose module is smaller than the threshold with a “good data” flag.
MDFL_QC	Median Filter	Median Filter: for each source vector, the median of all velocities within a radius of <RCLim> and whose vector bearing (angle of arrival at site) is also within an angular distance of <AngLim> degrees from the source vector's bearing is evaluated. If the difference between the vector's velocity and the median velocity is greater than a threshold, then the vector is labeled with a “bad_data” flag, otherwise it is labeled with a “good_data” flag.
OWTR_QC	Over Water	Over water: This test labels radial vectors that lie on land with a “bad data” flag and radial vectors that lie on water with a “good data” flag.
RDCT_QC	Radial Count	Radial Count: test labeling the entire data file having a number of radial velocity vectors bigger than the threshold with a “good data” flag and data file having a number of radial velocity vectors smaller than the threshold with a “bad data” flag.
TIME_QC	Temporal Derivative	Temporal Derivative: for each radial bin, the current hour velocity vector is compared with the previous and next hour ones. If the differences are bigger than a threshold (specific for each grid cell and evaluated on the basis of the analysis of one-year-long time series), the present vector is flagged as “bad data”, otherwise it is labelled with a “good data” flag. Since this method implies a one-hour delay in the data provision, the current hour file should have the related QC flag set to 0 (no QC performed) until it is updated to the proper values when the next hour file is generated.
VART_QC	Variance Threshold	Variance Threshold: this test labels radial vectors whose temporal variance is bigger than a maximum threshold with a “bad data” flag and total vectors whose temporal variance is smaller than the threshold with a “good data” flag. This test is applicable only to Beam Forming (BF) systems. Data files from Direction Finding (DF) systems will apply instead the “Temporal Derivative” test reporting the

		explanation "Test not applicable to Direction Finding systems. The Temporal Derivative test is applied." in the comment attribute.
QCflag	Overall QC	

Annex II QC Flags

Code	Meaning	Comment
0	No QC was performed	-
1	Good data	All real-time QC tests passed.
2	Probably good data	-*
3	Bad data that are potentially correctable	These data are not to be used without scientific correction.*
4	Bad data	Data have failed one or more of the tests.
5	Value changed	Data may be recovered after transmission error.
6	Not used	-
7	Nominal value	-
8	Interpolated value	Missing data may be interpolated from neighbouring data in space or time.
9	Missing value	-

*These two are to be used after examination of the hist data sets and exchanges with the data provider

Annex III Figures for the QA/QC tests

Fig A – Temporal series of the spatial average of the current velocity module (top panel), its standard deviation (middle panel) and the grid points of the total coverage (bottom panel). Black dots are the values obtained considering all the data in the domain, in green those considering only data with QC flag =1 (good data).

Fig B - Temporal series of the QC flags for all the grid nodes with data

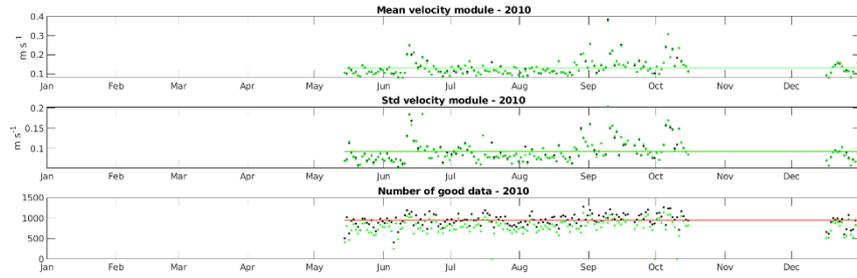
Fig D - Spatial (x-axis) vs. temporal (y-axis) coverage 80/80 annual metric. Allows to check if the system has reached the goal of providing surface currents over the 80% of the area during 80% of the time.

Fig E – Map of the % of availability of data in each grid point and contour showing the area of temporal availability >80%

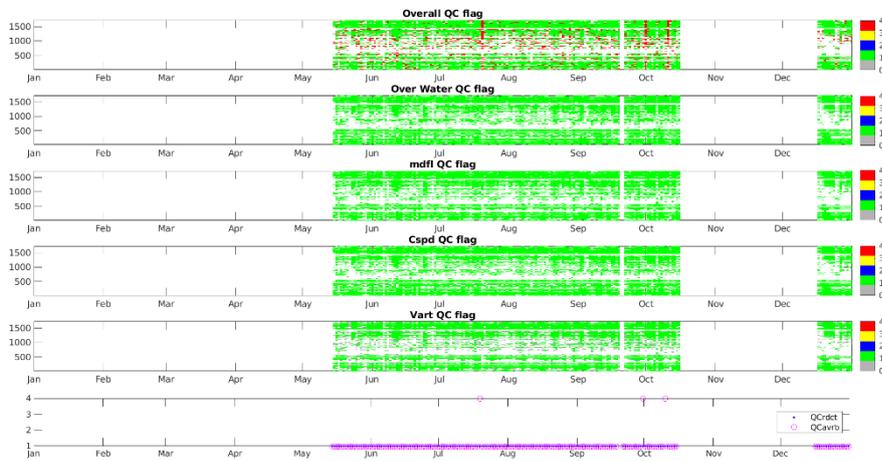
* The "Fig C" is not missing; these letters have been assigned on purpose, to be in accordance with total figure names (where there are also Fig C and Fig F, which are no relevant in the radial case)

Period: 2010

A

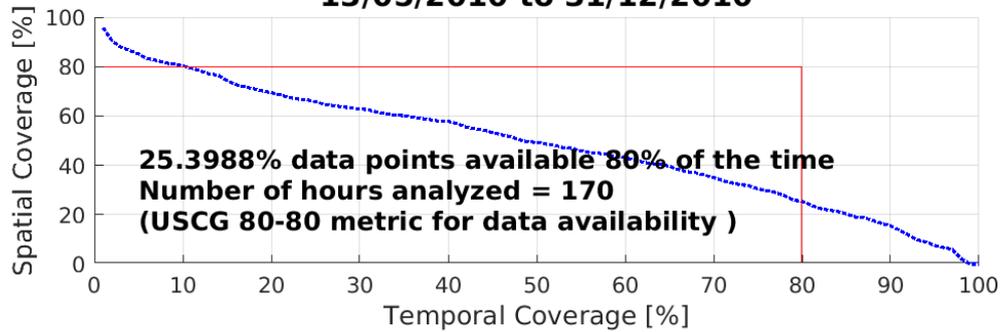


B



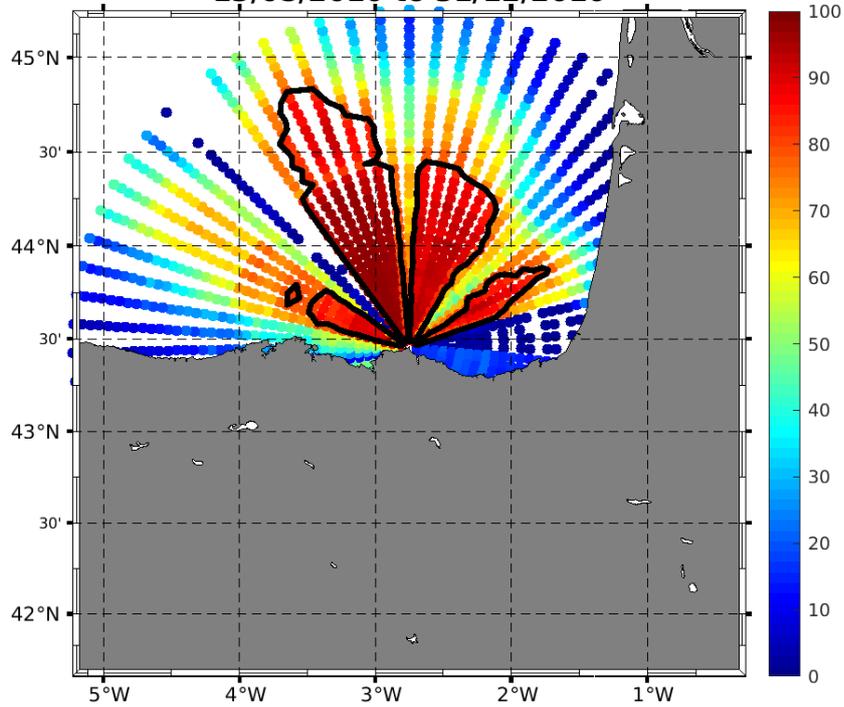
D

HFR-EUSKOOS: Spatial Coverage vs. Temporal Coverage 13/05/2010 to 31/12/2010



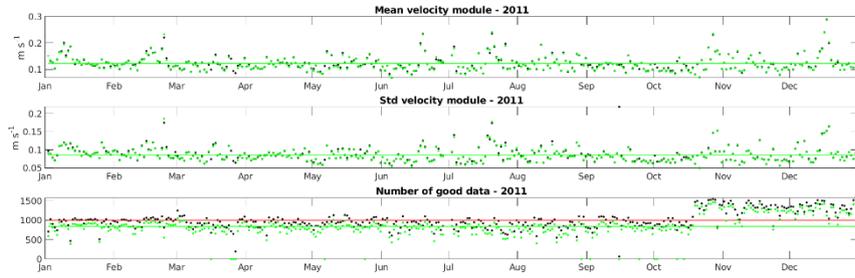
E

HFR-EUSKOOS: Percent Total Vector Coverage (contour showing >80%) 13/05/2010 to 31/12/2010

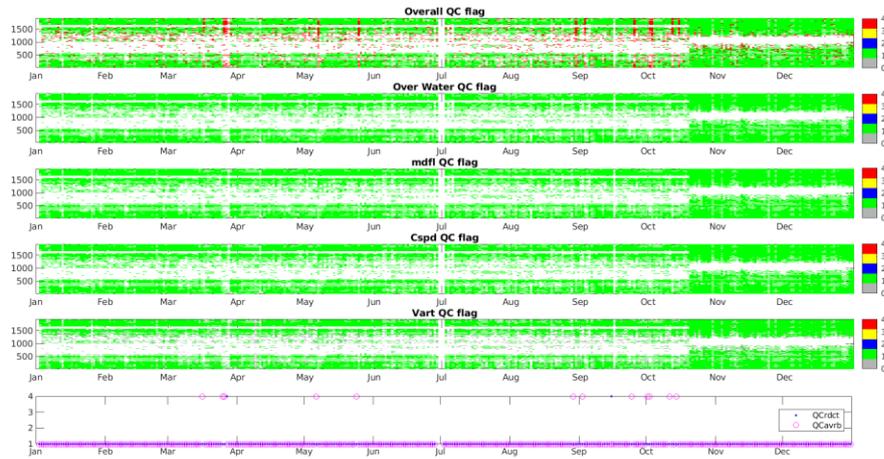


Period: 2011

A

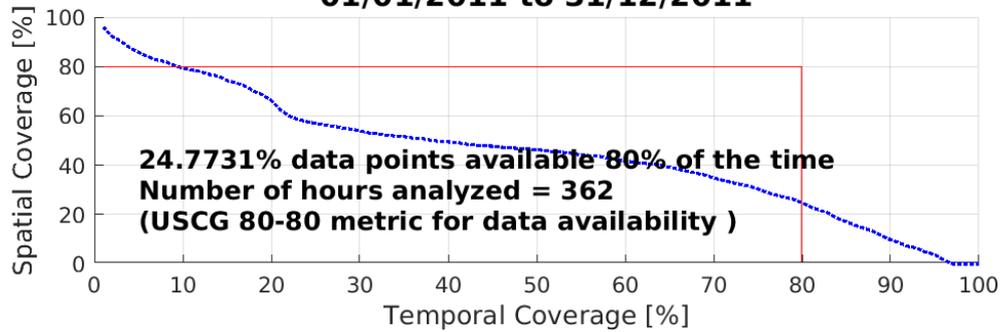


B



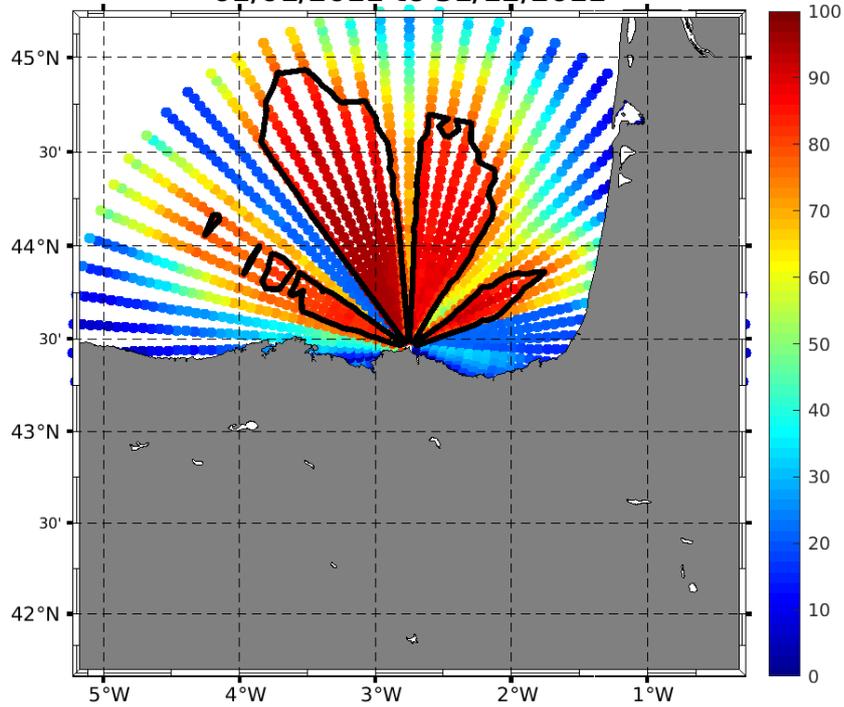
D

**HFR-EUSKOOS: Spatial Coverage vs. Temporal Coverage
01/01/2011 to 31/12/2011**



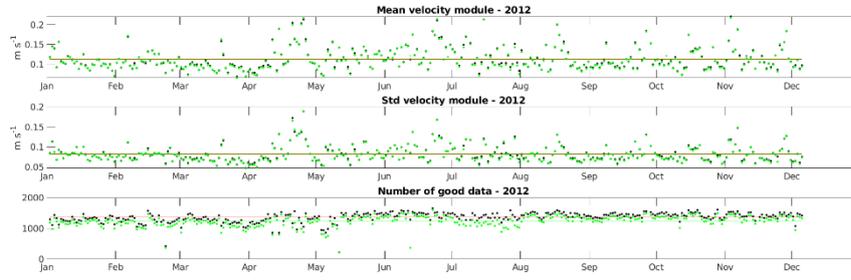
E

HFR-EUSKOOS: Percent Total Vector Coverage (contour showing >80%) 01/01/2011 to 31/12/2011

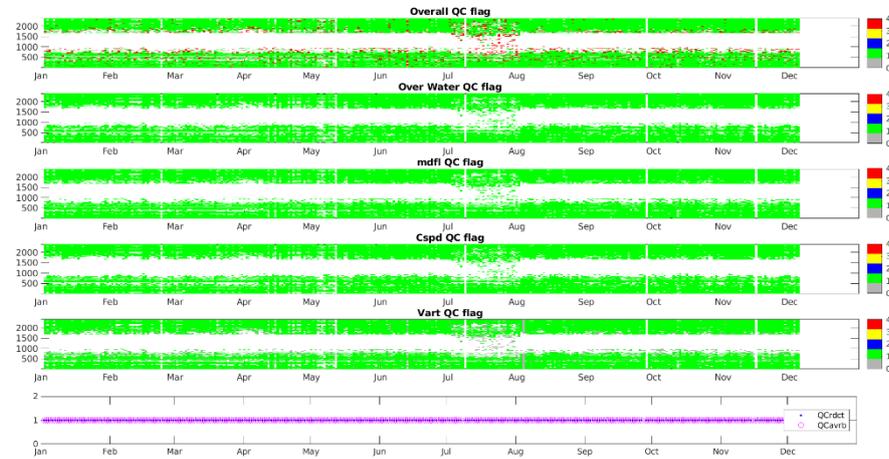


Period: 2012

A

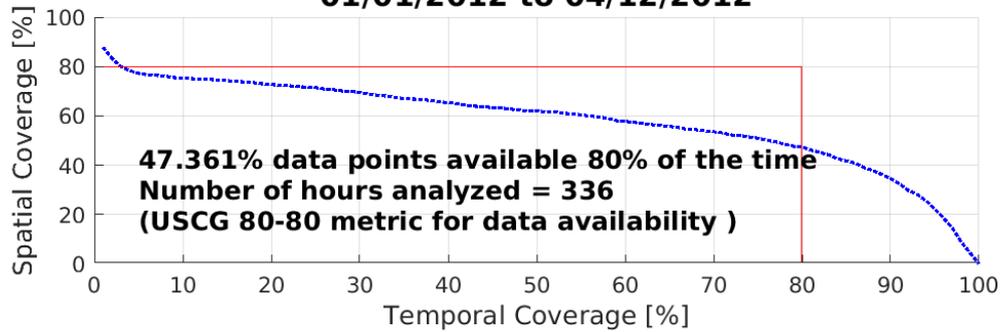


B



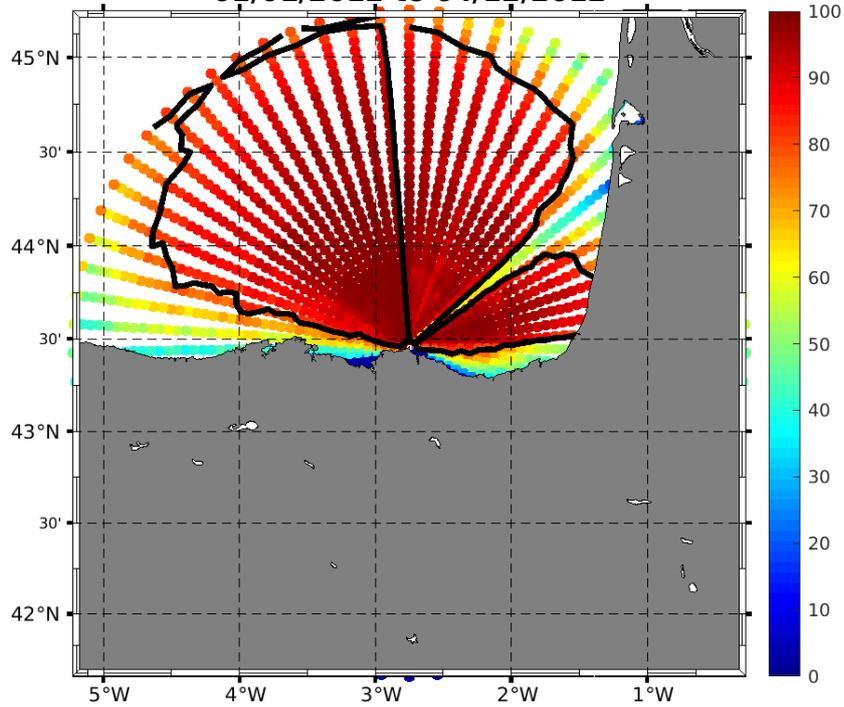
D

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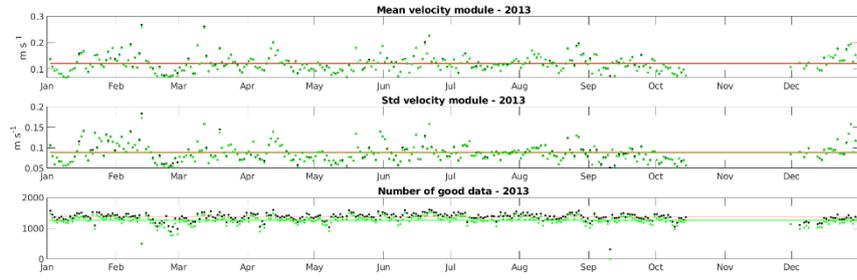
E

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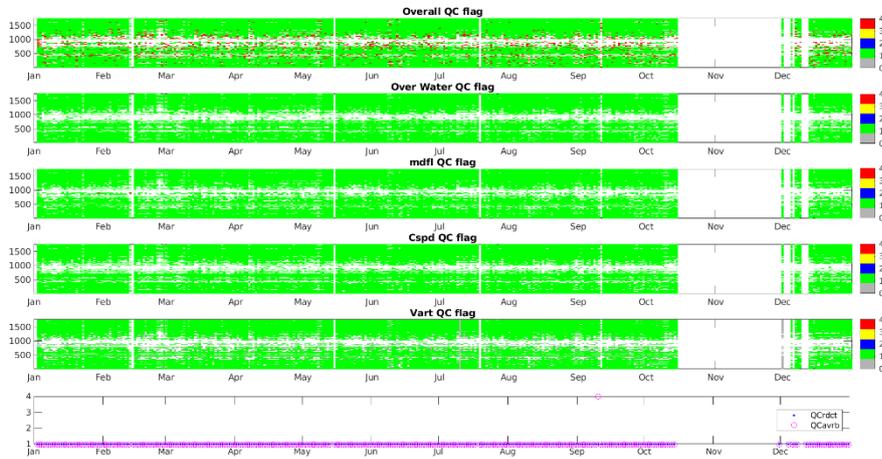


Period: 2013

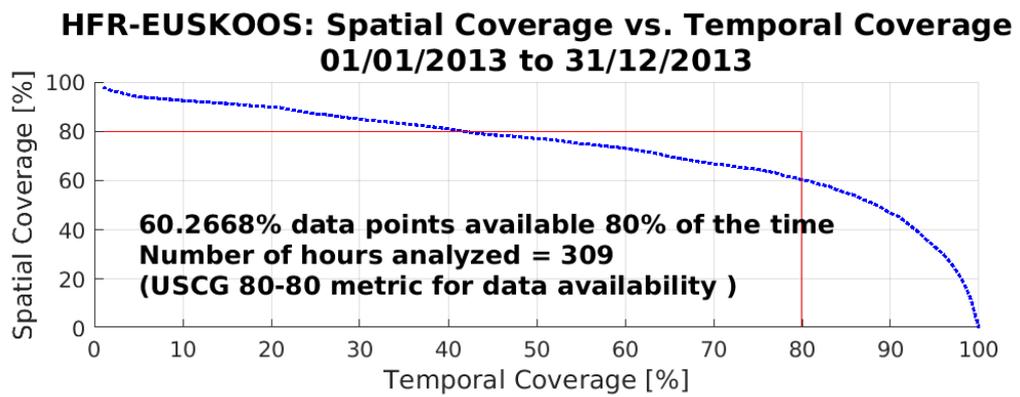
A



B

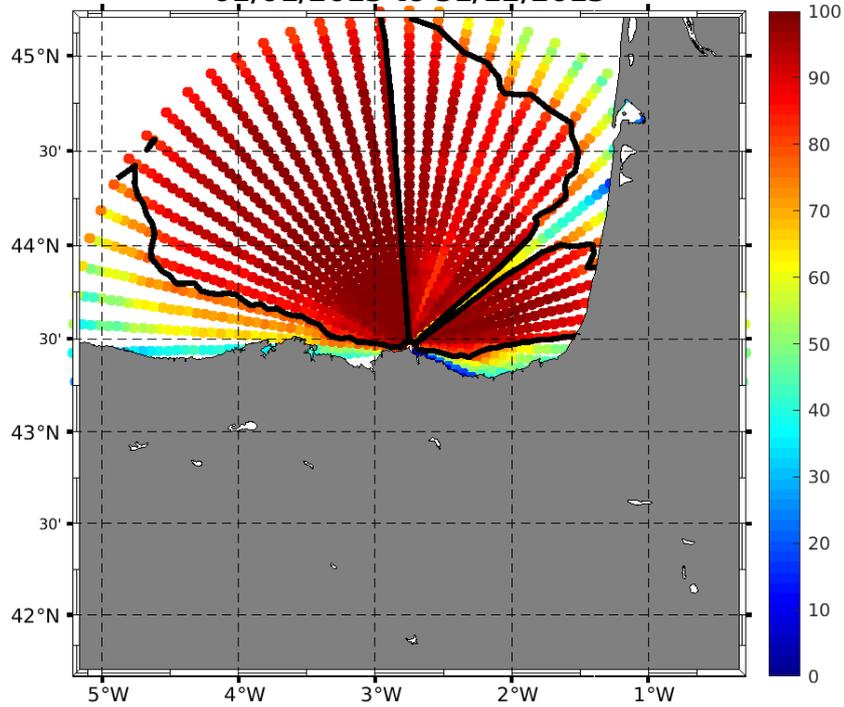


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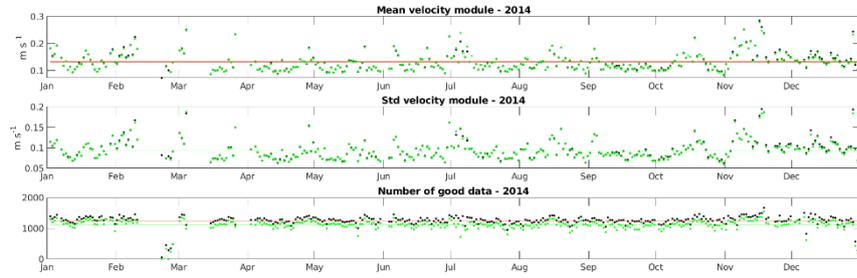
E

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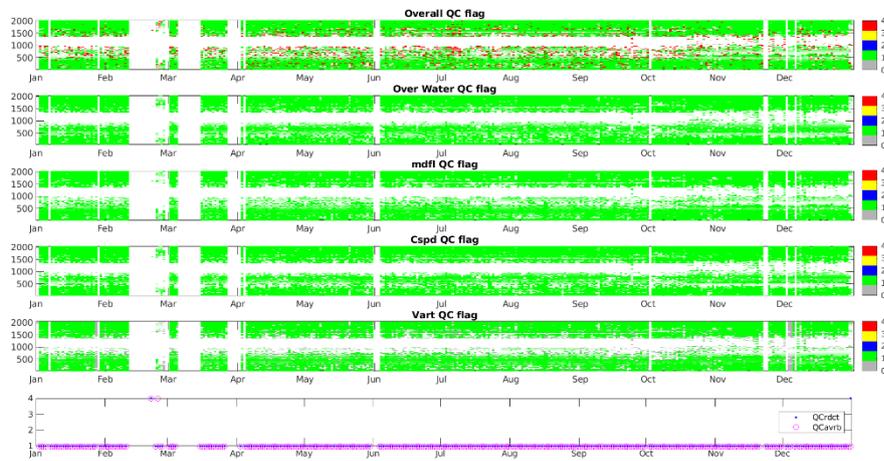


Period: 2014

A

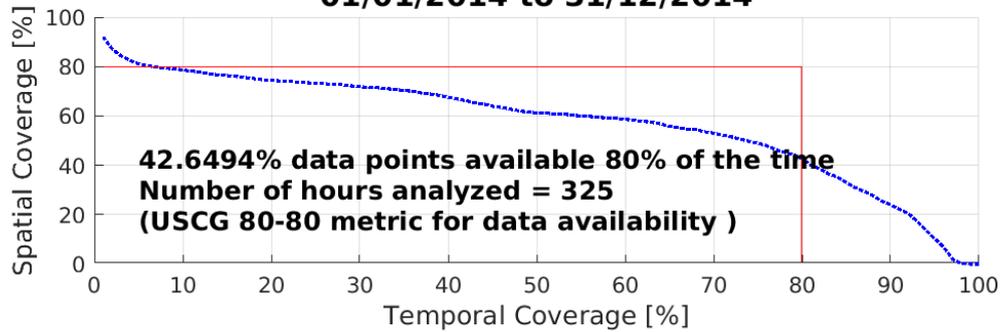


B



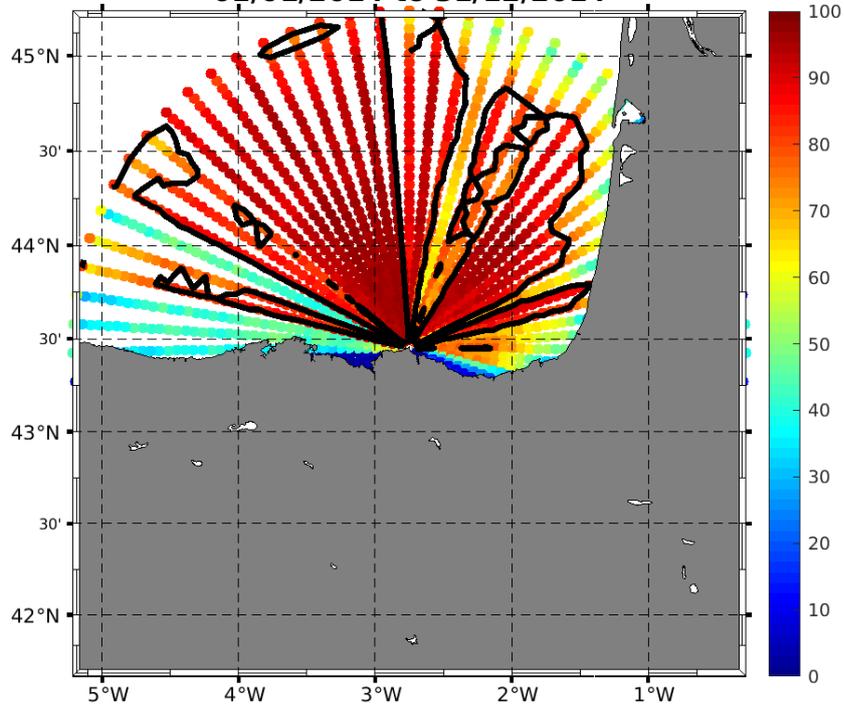
D

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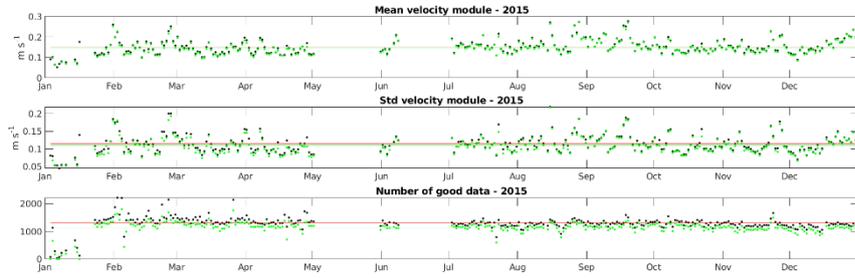
E

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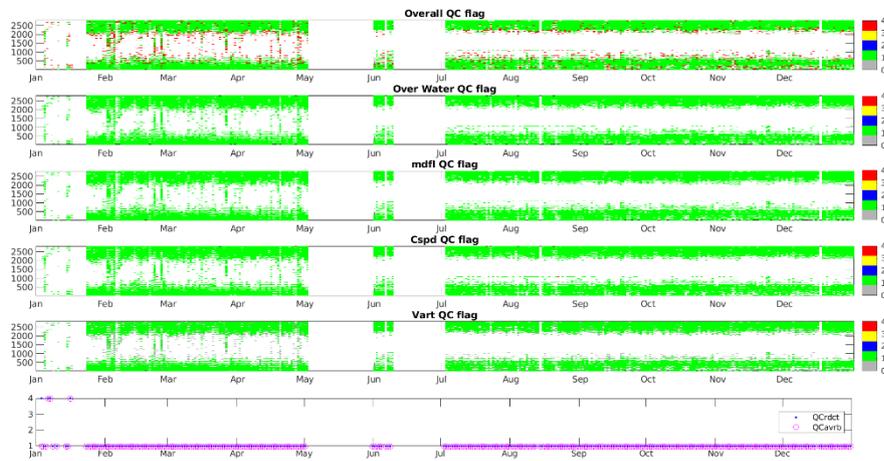


Period: 2015

A

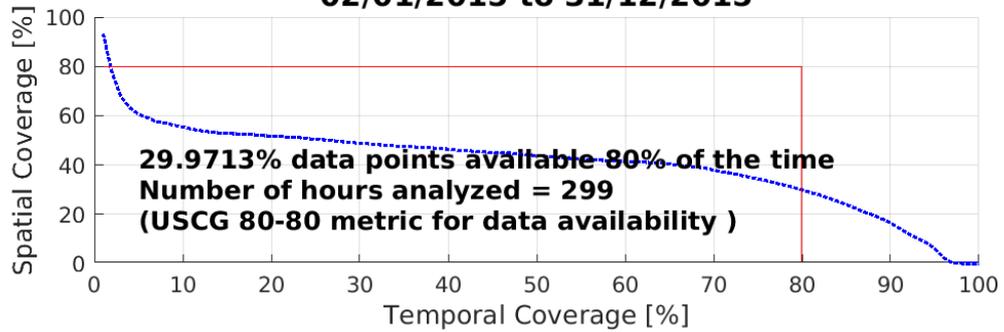


B



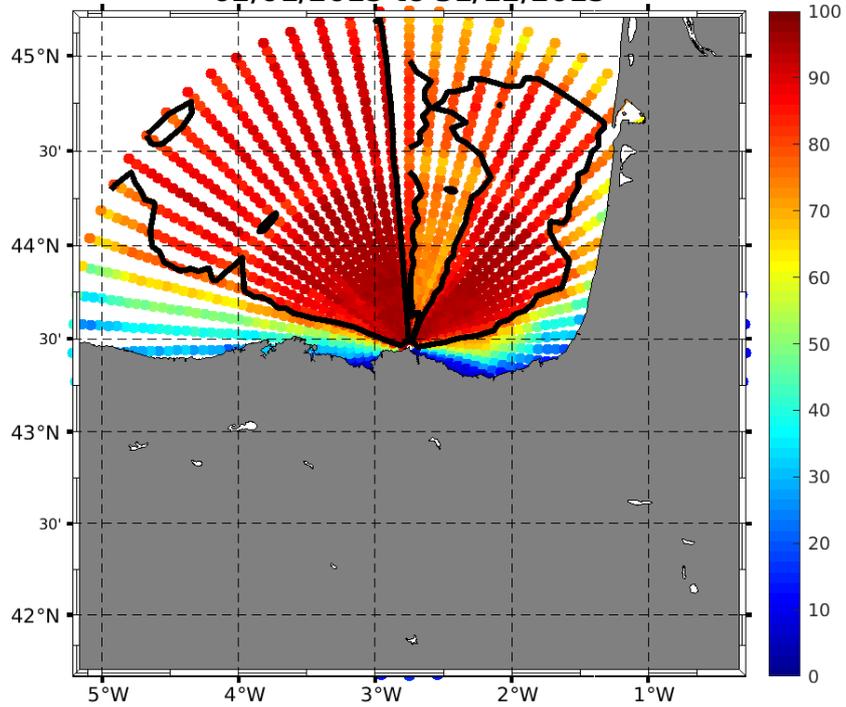
D

HFR-EUSKOOS: Spatial Coverage vs. Temporal Coverage 02/01/2015 to 31/12/2015



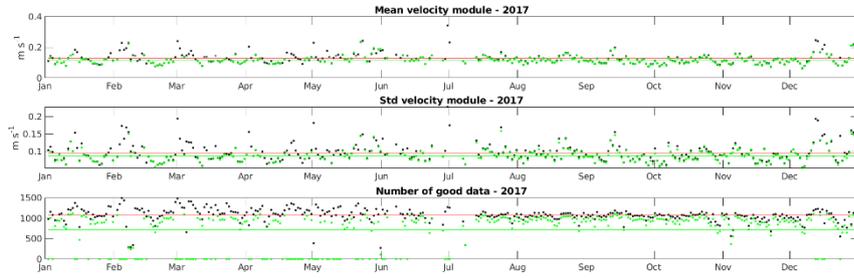
E

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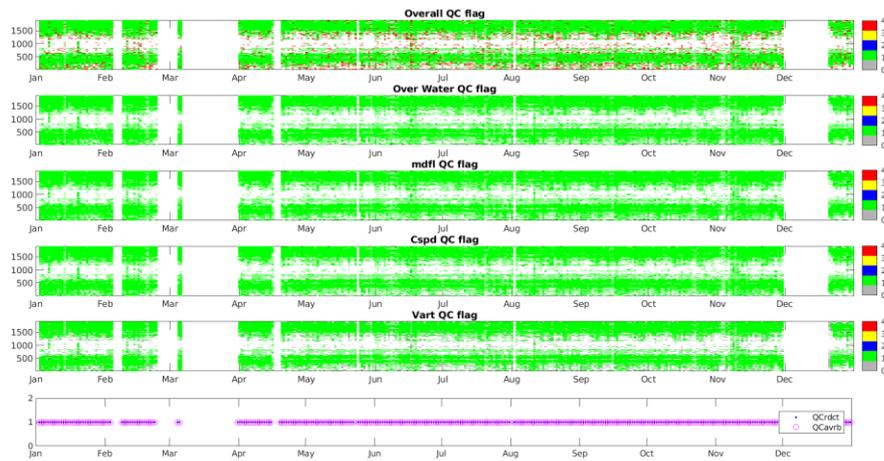


Period: 2016

A

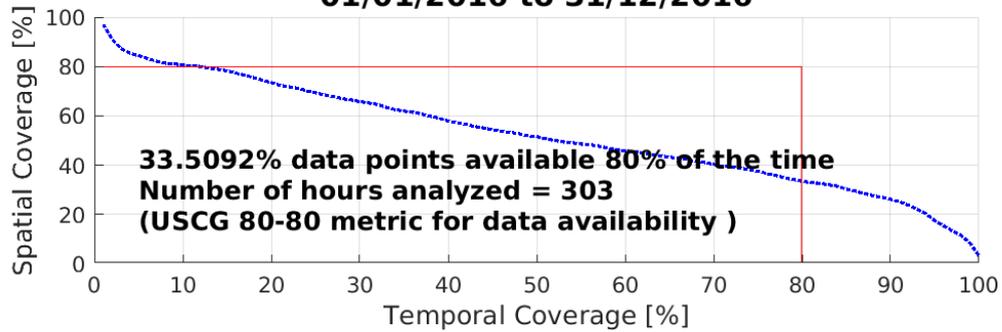


B



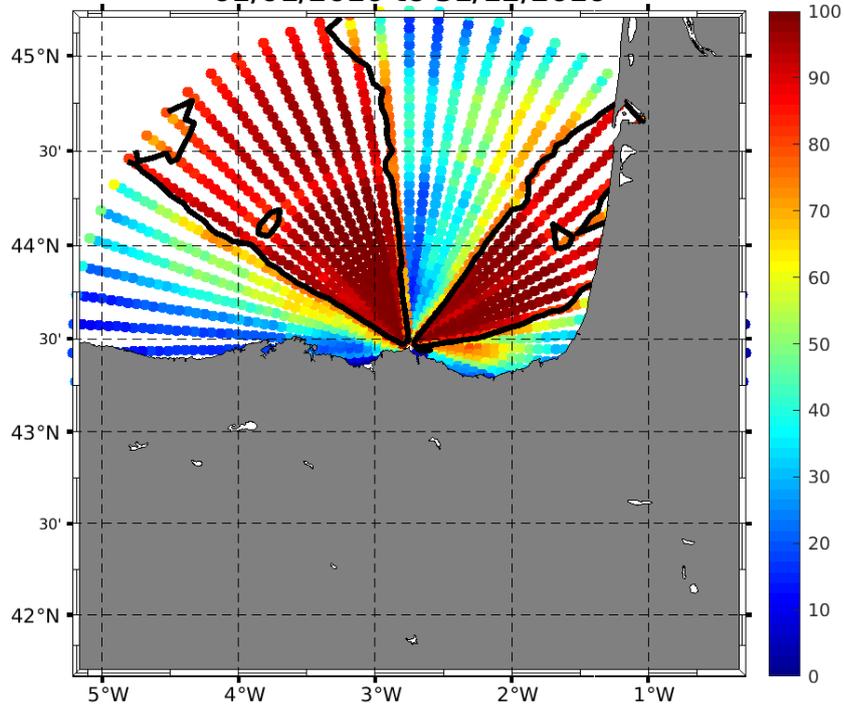
D

HFR-EUSKOOS: Spatial Coverage vs. Temporal Coverage 01/01/2016 to 31/12/2016



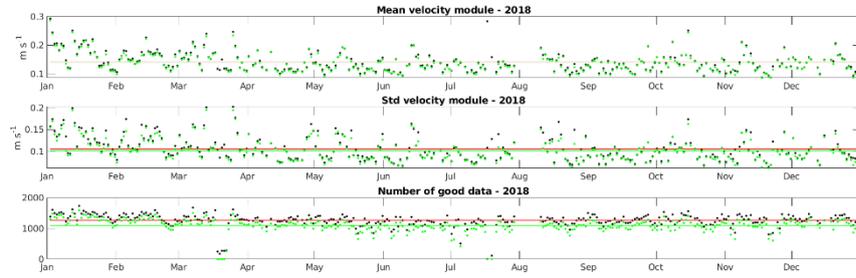
E

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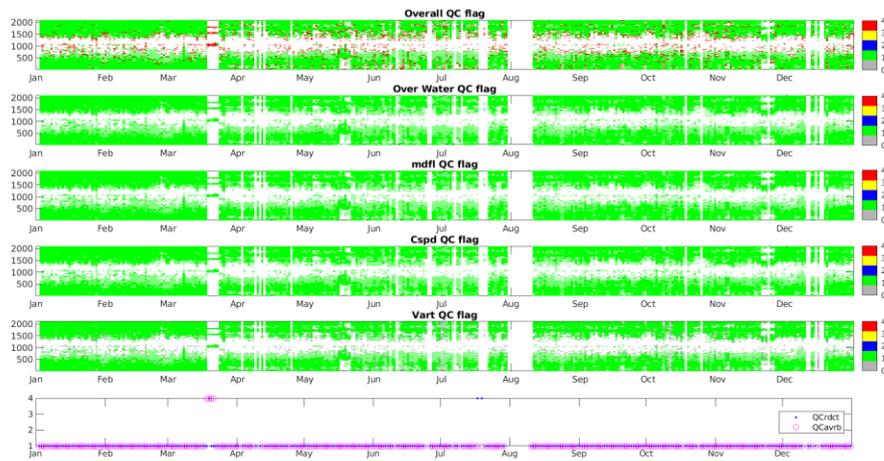


Period: 2018

A

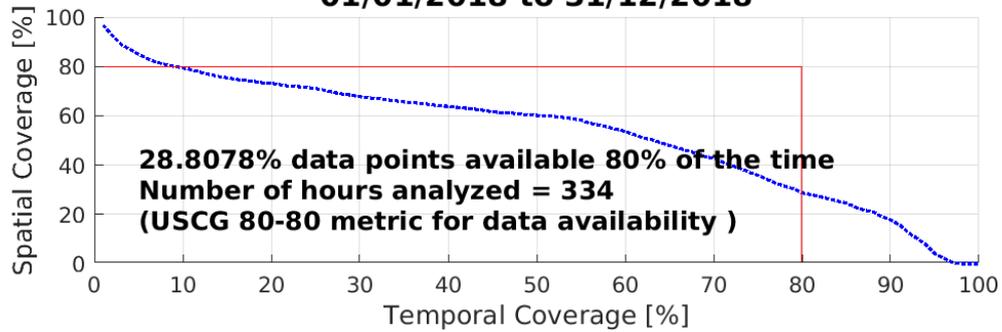


B



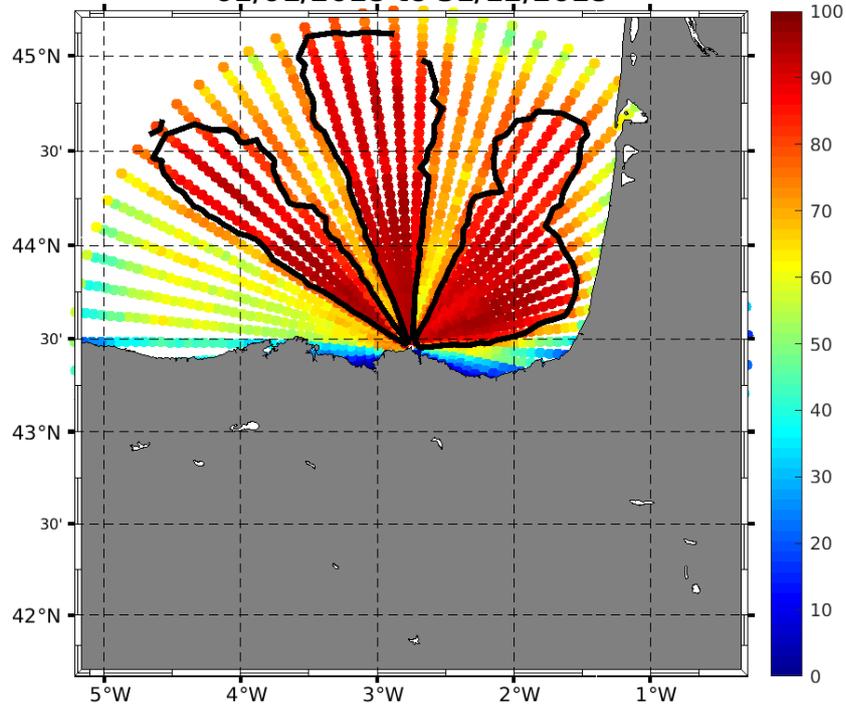
D

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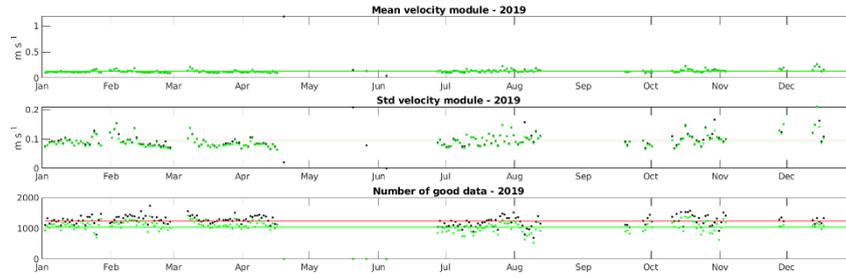
E

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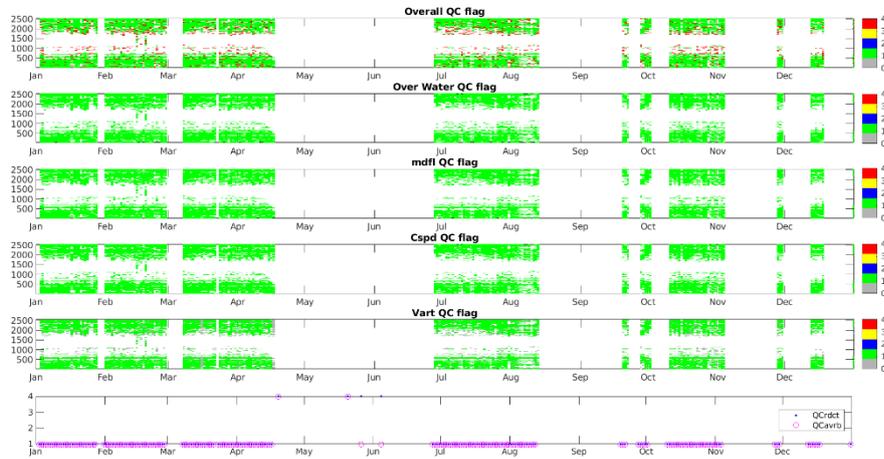


Period: 2019

A

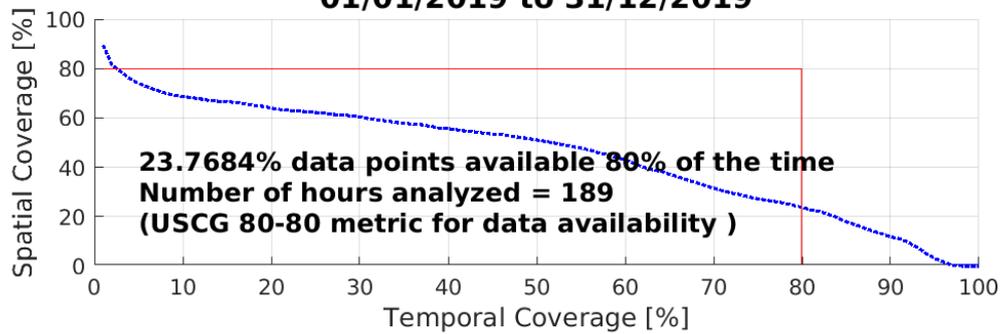


B



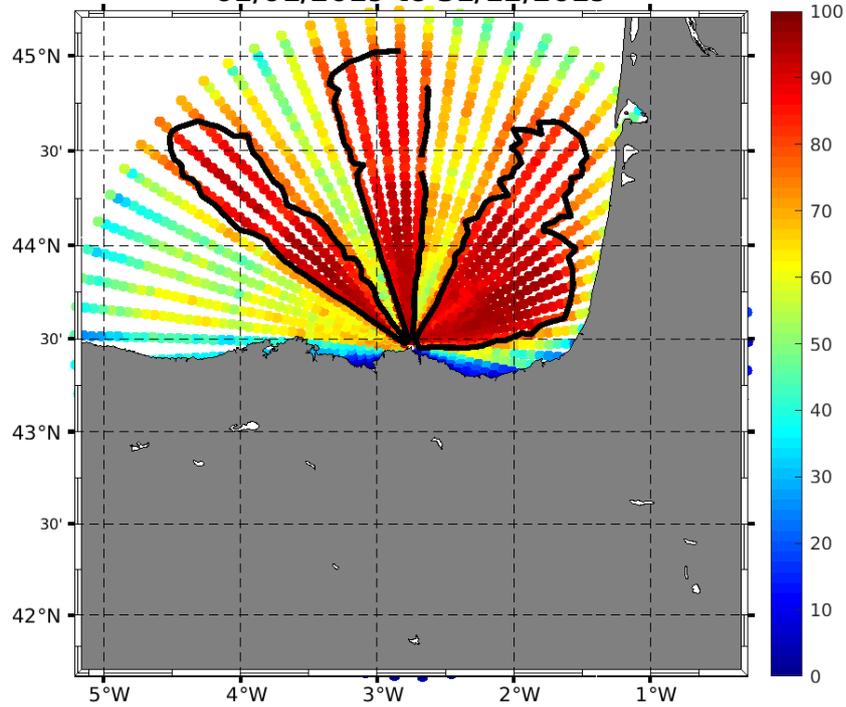
D

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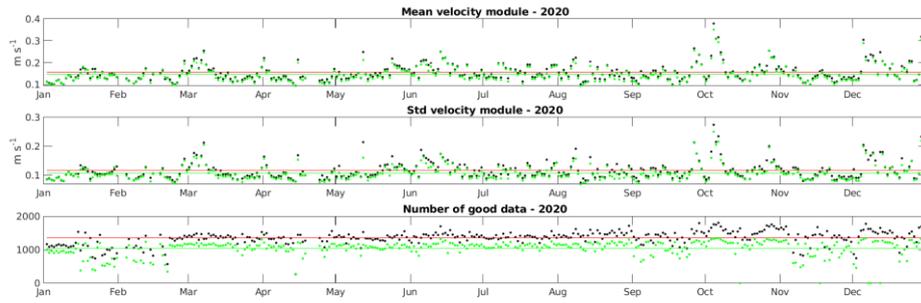
E

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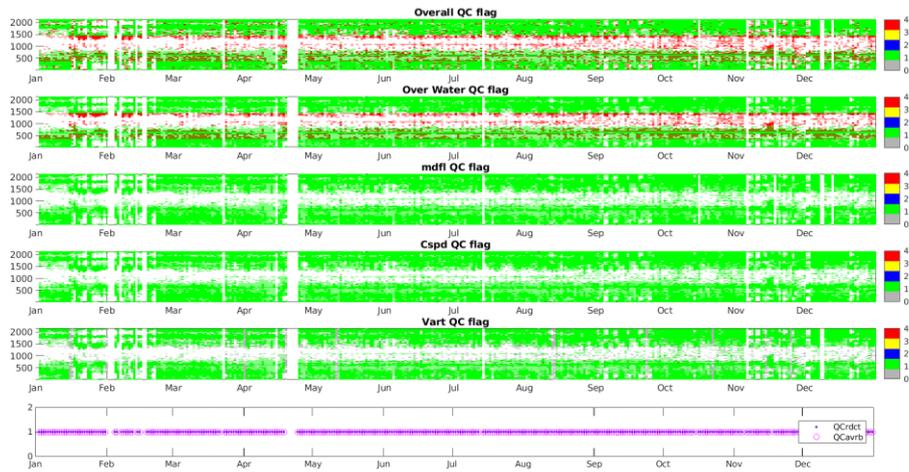


Period: 2020

A

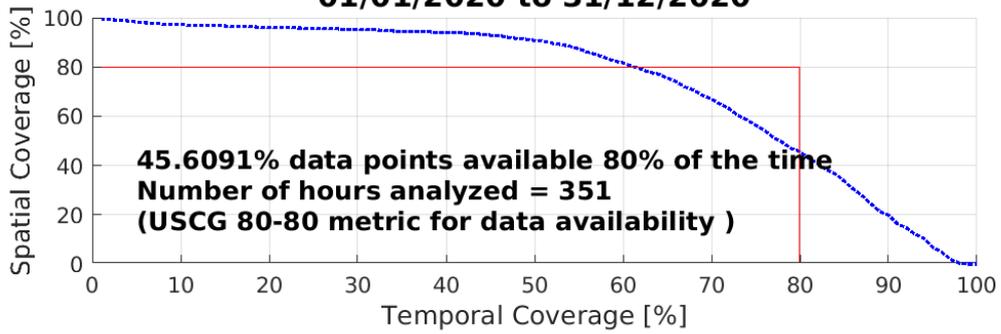


B



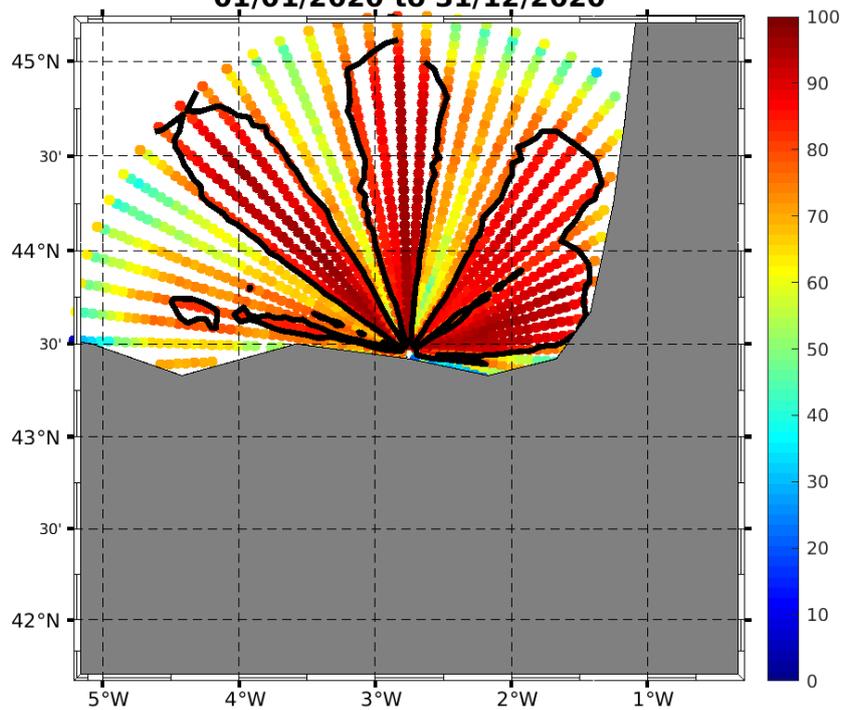
D

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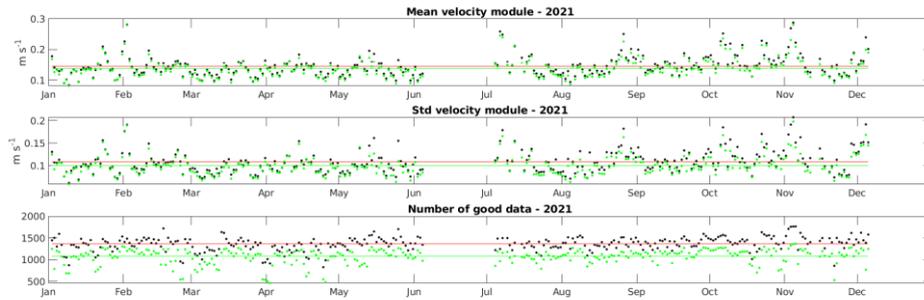
E

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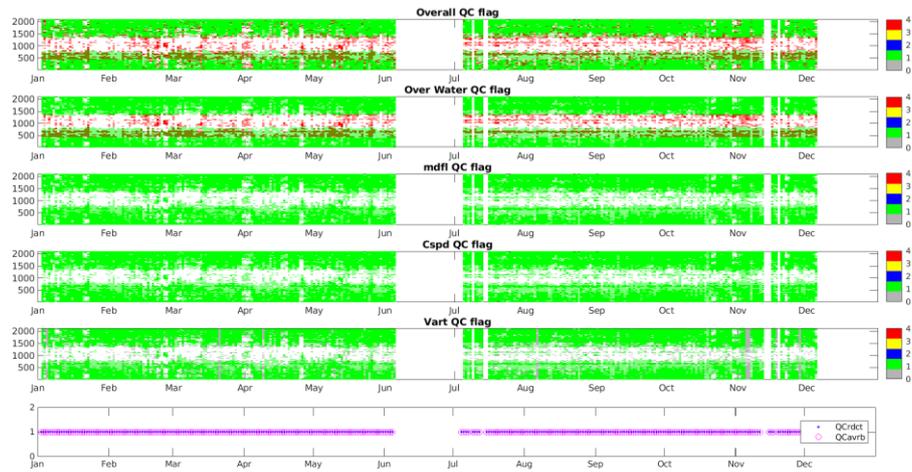


Period: 2021

A

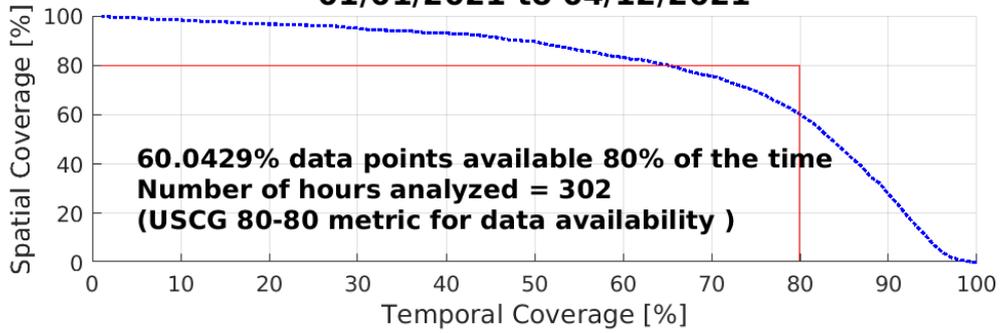


B



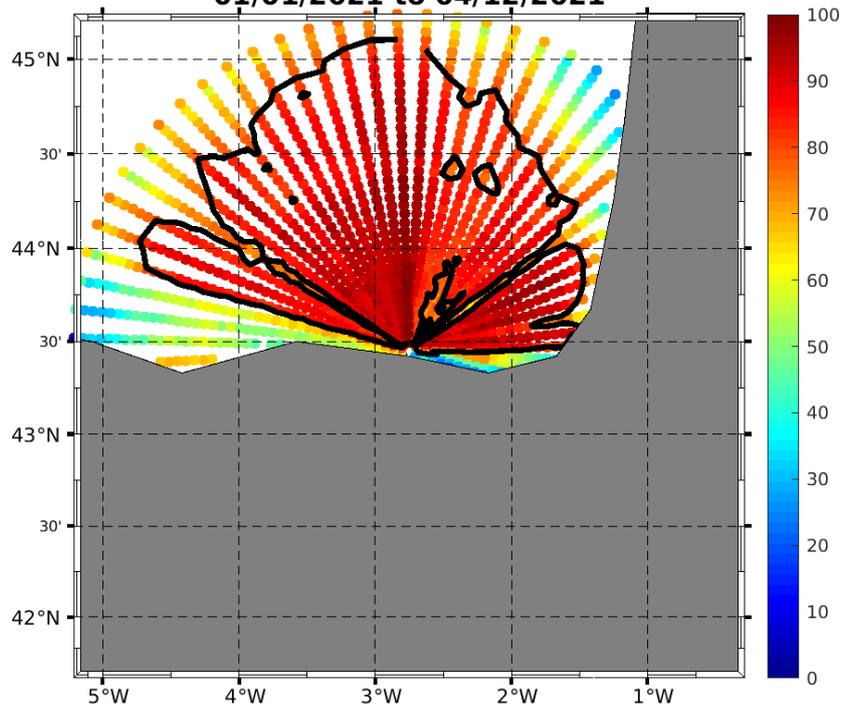
D

HFR-EUSKOOS: Spatial Coverage vs. Temporal Coverage 01/01/2021 to 04/12/2021



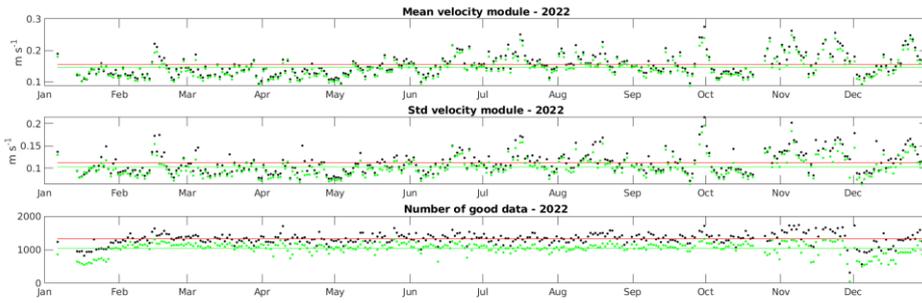
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HFR-EUSKOOS: Percent Total Vector Coverage (contour showing >80%) 01/01/2021 to 04/12/2021

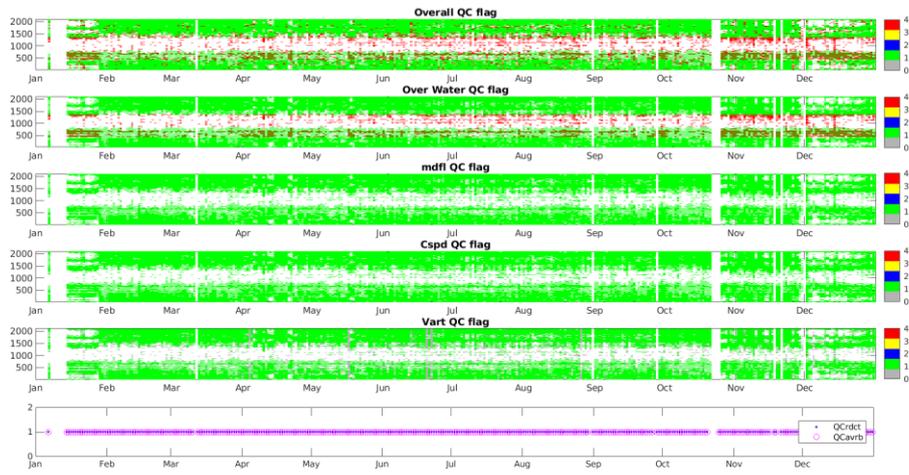


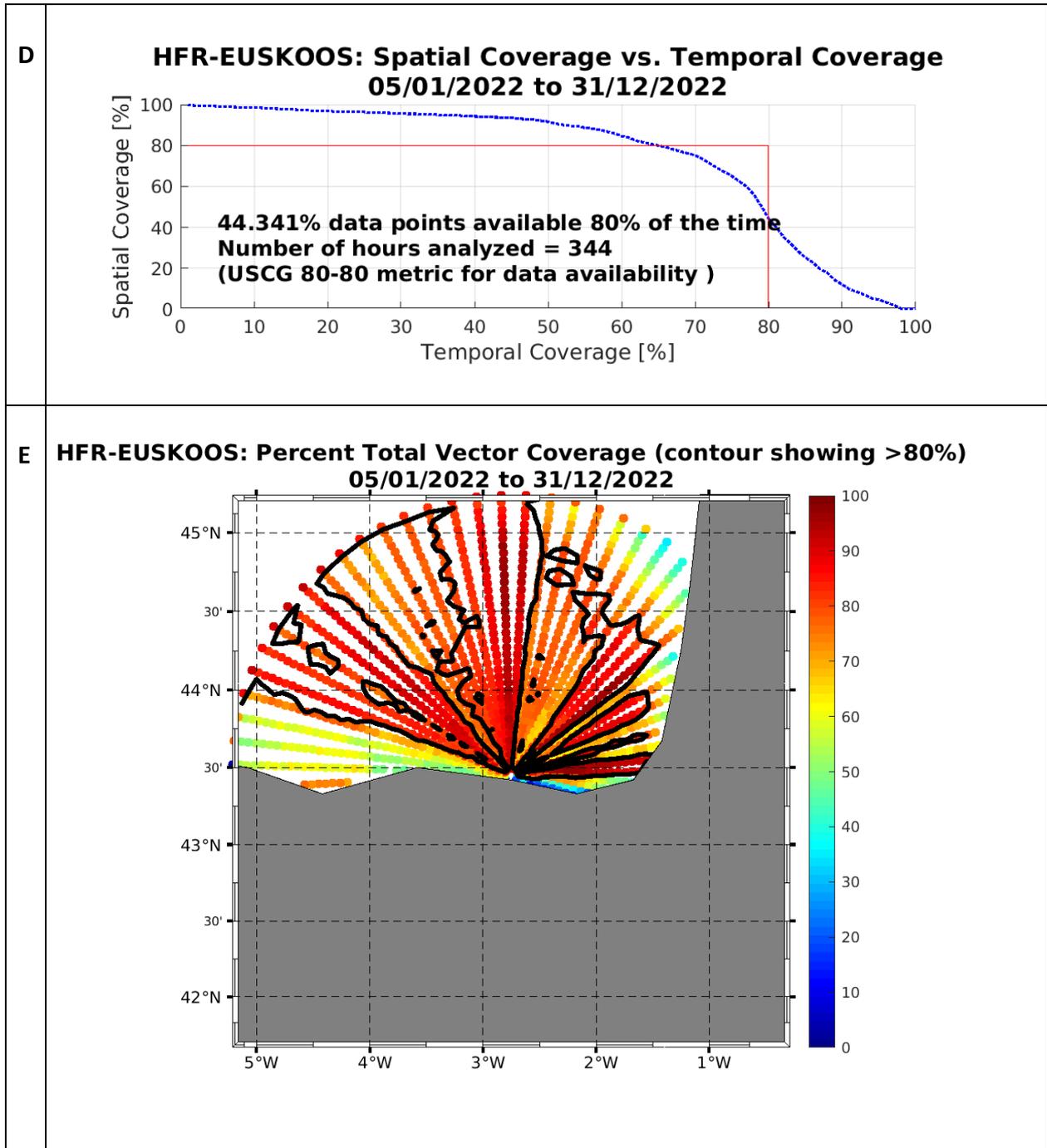
Period: 2022

A



B





Version of the report	Changes made by	Nature of changes
VR2021_04	L. Solabarrieta & A. Rubio	Report generation
VR2022_05	L. Solabarrieta & I.Manso	Update 2021
VR2023_05	L. Solabarrieta & I.Manso	Update 2022

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 Other possible contacts: solabarrieta@azti.es; arubio@azti.es; jmader@azti.es; imanso@azti.es