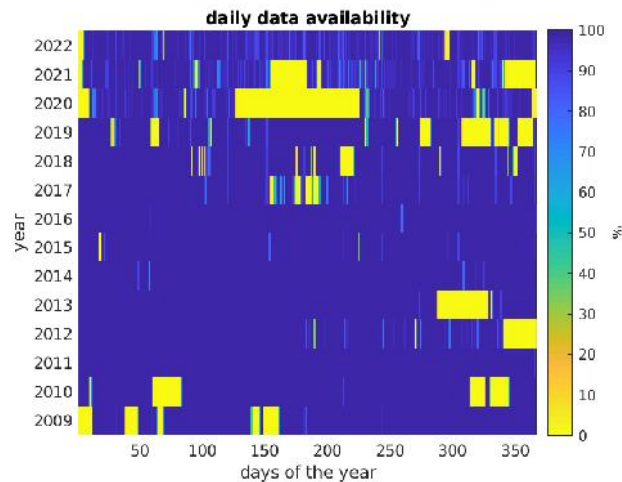
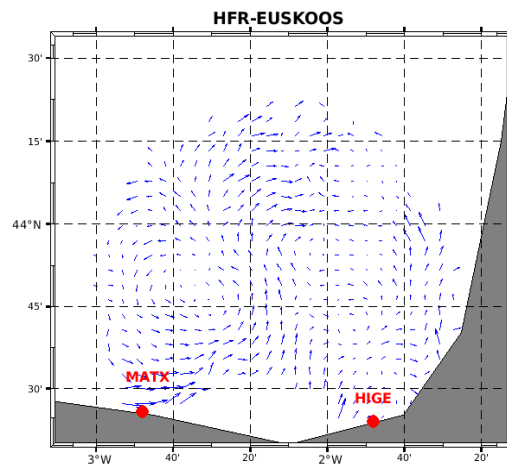


Report on HFR - EUSKOOS Historical data files QA/QC

Data provider information:

- contributors name: Anna Rubio, Lohitzune Solabarrieta, Ivan Manso-Narvarte
- contributors contact: arubio@azti.es, lsolabarrieta@azti.es, imanso@azti.es
- 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, HIGE**
 Data set: **Totals**
 Data source: Totals from the radials combination in de EU Node
 Period: **2009-Jan-12 - 2022-Dec-31**



Daily data % available during the whole time period

INFO ON QA/QC Settings and Calibration

%%% QC info for all the period 12-Jan-2009 – 31-Dec-2022

OceanSITES quality flagging for GDOP threshold QC test. Threshold set to 2.

OceanSITES quality flagging for Data density threshold QC test. Threshold set to 3 radials.

OceanSITES quality flagging for Velocity threshold QC test. Threshold set to 1.2 m/s.

OceanSITES quality flagging for variance threshold QC test. Test not applicable to Direction Finding systems. The Temporal Derivative test is applied. Threshold set to 1.2 m/s.

%%% Calibration info for all the period 12-Jan-2009 – 31-Dec-2022

HIGE: 2020-07-14T00:00:00Z; MATX: 2020-07-14T00:00:00Z

Calibration information is missing for some files. But annual/biannual calibration campaigns have been carried out and processed for this system.

RESULTS OF HIST DATA INSPECTION

General comments:

Periods to be controlled and/or reflagged, occurring in:

2009: unstable year

2010: no good data available until mid-May and from mid-October to mid-December

2012: low data available in December

2013: no data from mid-November to mid-December

2015: no good data available in January and between May and July

2016: no good data available for February-April and November-December

2019: unstable year

2020: no data from May to mid-August

2021: no data in June and December

year	General comment	Periods to be reflagged	Reason for new flagging	Sugg. Flag
2009	Unstable year	24-Jan-2009 – 25-Jan-2009	high mean current values	2
		30-Aug-2009 – 07-Sep-2009	low data availability	3
		23-Dec-2009 – 31-Dec-2009	low data availability	3
2010	No Good data available until 12-May-2010			
2014		03-Feb-2014 – 11-Feb-2014	high mean and std current v	2
		29-Dec-2014 – 31-Dec-2014	low data availability	3
2015		01-Jan-2015 – 16-Jan-2015	low data availability	3

2016		08-Nov-2016 – 29-Nov-2016	low data availability	3
2018		16-Mar-2018 – 22-Mar-2018	low data availability	3
2019	Unstable year	29-Jan-2019 – 13-Feb-2019	unstable data availability – stop after this period	2-3
		18-Apr-2019 – 07-May-2019	low data availability	3
		18-Sep-2019 – 20-Sep-2019	low data availability	3

After exchanges with the provider the following periods were reflagged:

Year	General comment	Periods to be reflagged	Reason	New Flag
2009		2009/02/06 - 2009/02/07	Hardware failure	3
		2009/08/30 - 2009/09/07	Hardware failure	3
		2009/12/23 - 2009/12/31	Hardware failure	3
2010		2010/03/15 - 2010/04/30	Hardware failure	4
2014		2014/12/29 - 2015/01/16	Hardware failure	3
2016		2016/11/08 - 2016/11/29	Hardware failure	3
2018		2018/03/16 - 2018/03/22	Hardware failure	3
2019		2019/01/01 - 2019/12/31	Hardware failure (lack of maintenance)	2

Good spatial/temporal coverage of the system for 9 out of the 14 years (2011, 2012, 2013, 2014, 2017, 2018, 2021, 2022), medium coverage in 3 years (2015, 2016, 2020) and scarce coverage in 3 years (2009, 2010, 2019) where the system has collapsed for several periods.

The annual temporal mean for most of the analyzed years is a cyclonic pattern with higher current velocities over the shelf slope.

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

Period	General comments	Nb. analysed hours	80%-80% obj.
2009	3.8217% spatial availability 80% of time	7615	n
2010	1.0616% spatial availability 80% of time	7486	n
2011	89.8089% spatial availability 80% of time	8758	y
2012	96.603% spatial availability 80% of time	8046	y
2013	96.8153% spatial availability 80% of time	7744	y
2014	87.6858% spatial availability 80% of time	8733	y
2015	42.2505% spatial availability 80% of time	8670	n
2016	14.0127% spatial availability 80% of time	8773	n
2017	90.6582% spatial availability 80% of time	8227	y
2018	88.7473% spatial availability 80% of time	8145	y
2019	1.0616% spatial availability 80% of time	7009	n
2020	64.5435% spatial availability 80% of time	5722	n
2021	81.3163% spatial availability 80% of time	6832	y

2022	79.4055% spatial availability 80% of time	8299	n
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Annex I Applied QA/QC tests

QC Flag Variable name	Short name	Short description
-	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.
DDNS_QC	Data Density Threshold	Data Density Threshold: this test labels total velocity vectors with a number of contributing radials bigger than the threshold with a “good data” flag and total velocity vectors with a number of contributing radials smaller than the threshold with a “bad data” flag.
CSPD_QC	Velocity Threshold	Velocity Threshold: this test labels total 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.
VART_QC	Variance Threshold	Variance Threshold: this test labels total 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.
TIME_QC	Temporal Derivative	Temporal Derivative: for each total 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.
GDOP_QC	GDOP Threshold	GDOP Threshold: this test labels total velocity vectors whose GDOP (Geometrical Dilution Of Precision) is bigger than a maximum threshold with a “bad data” flag and the vectors whose GDOP is smaller than the threshold with a “good data” flag.
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 (first panel), its standard deviation (second panel), the grid points of the total coverage (third panel), and monthly data availability. 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 and percentage of data with each flag (0,1,2,3,4).

Fig C - Maps of the mean velocity module and the mean value of QC flags for the target year (left column) and their standard deviations (right column) for the target year.

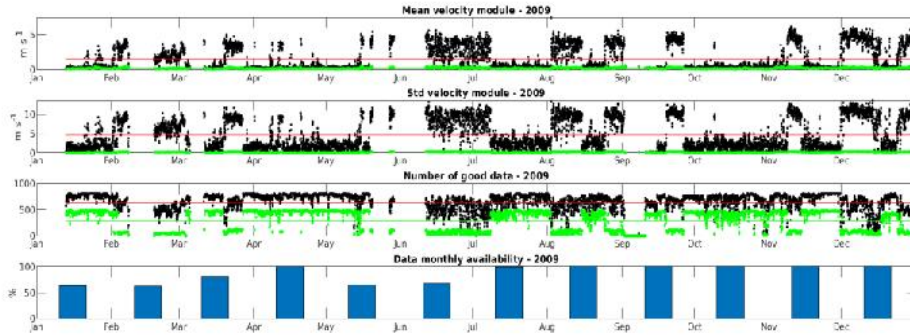
Fig D - Spatial (x-axis) vs. temporal (y-axis) coverage 80/80 annual metric. Allows to check if the system has reached the goal of providing surface currents over the 80% of the area during 80% of the time. The grid points taken in account for the % are the ones inside the GDOP limits defined by the data provider.

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

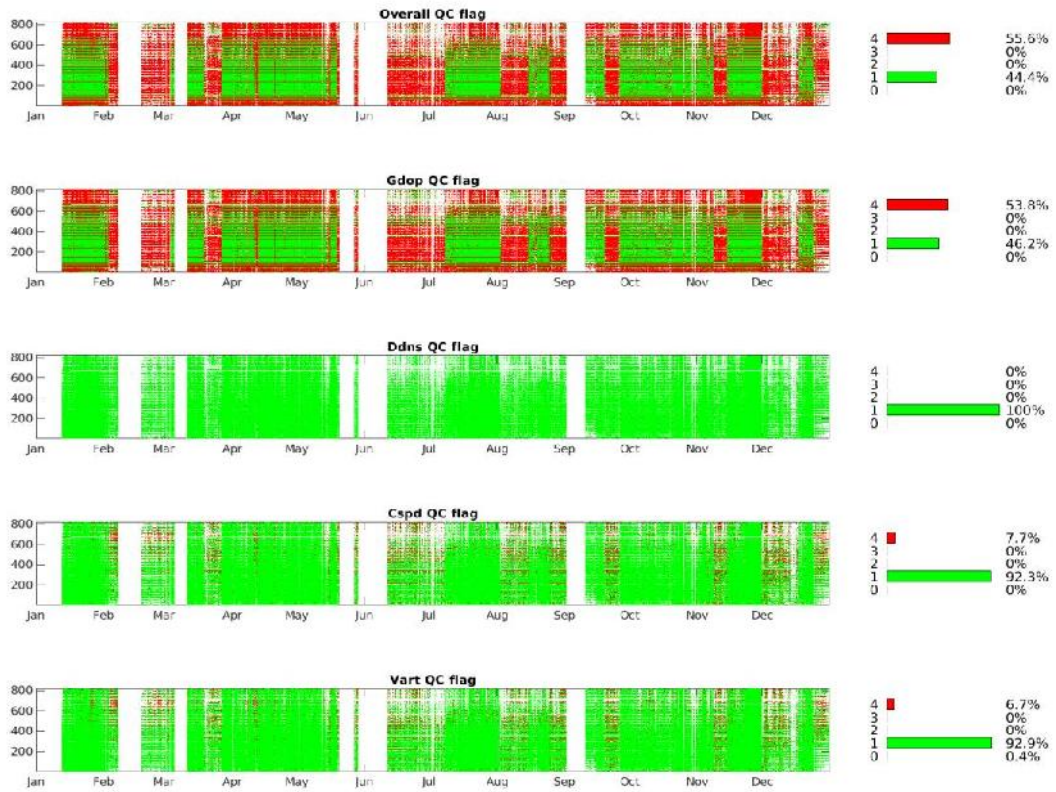
Fig F- Mean surface current maps for the indicated systems and periods. The means are computed in the area of 80% temporal coverage for the target year.

Period: 2009

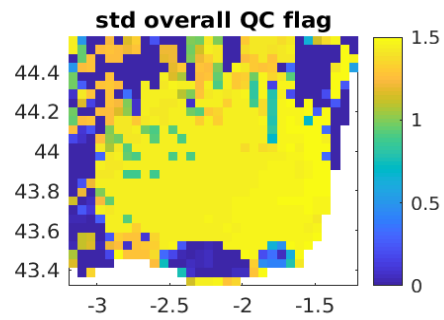
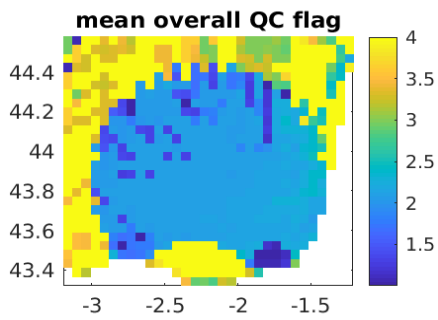
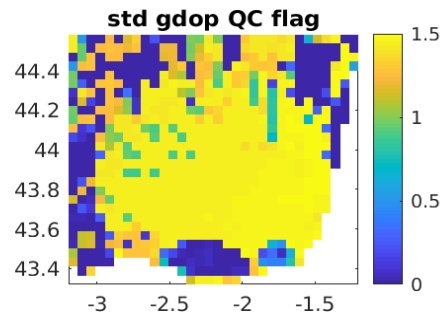
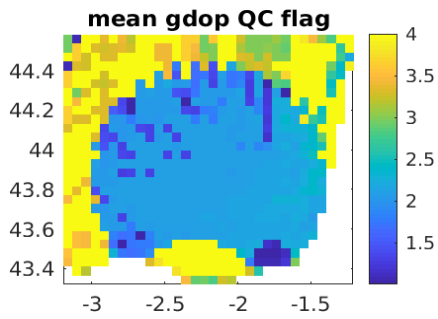
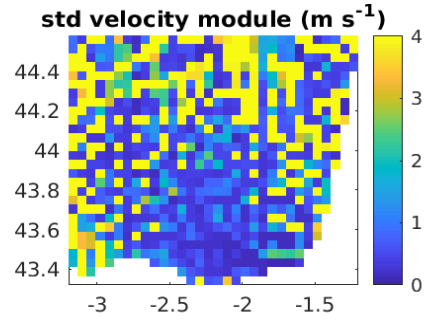
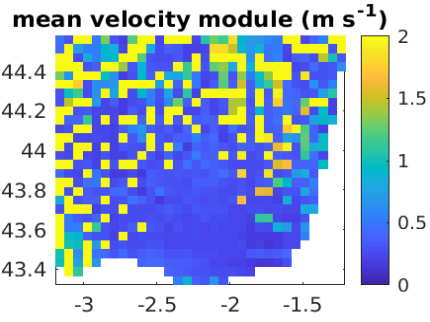
A



B

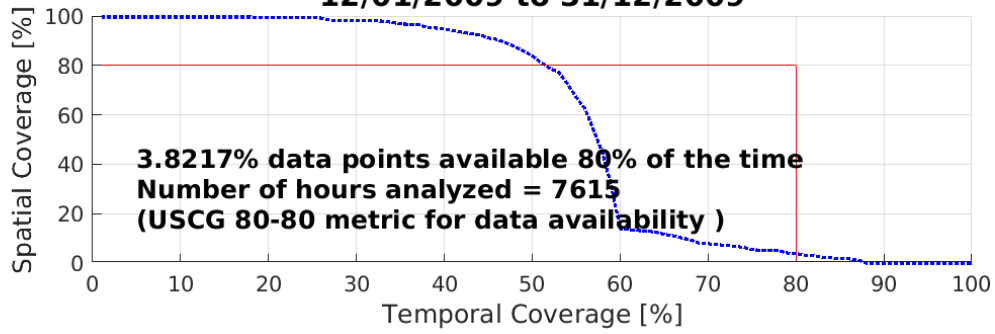


C



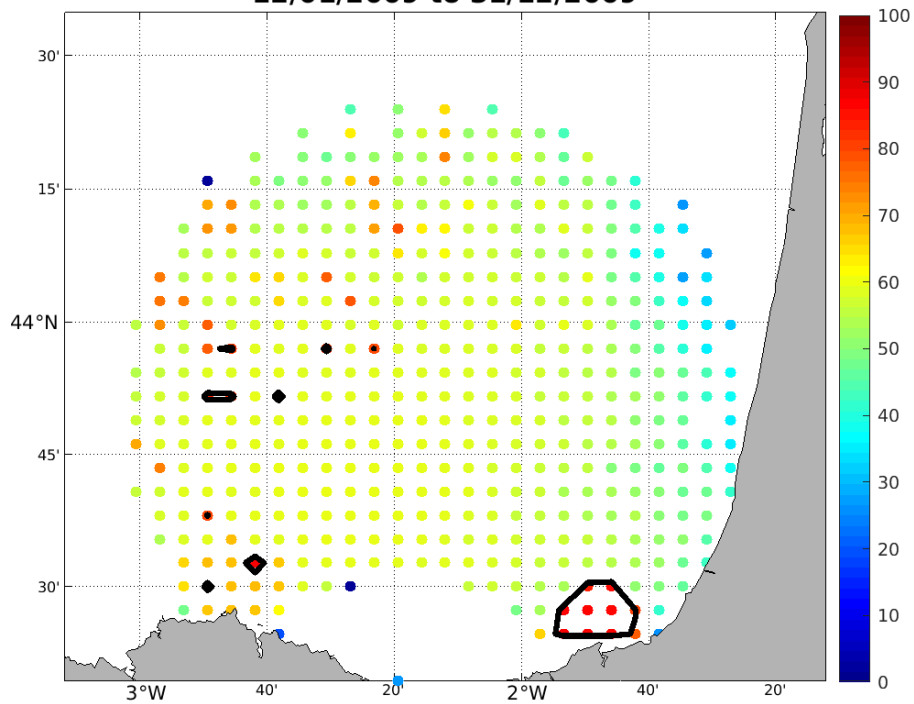
D

HFR-EUSKOOS: Spatial Coverage vs. Temporal Coverage 12/01/2009 to 31/12/2009



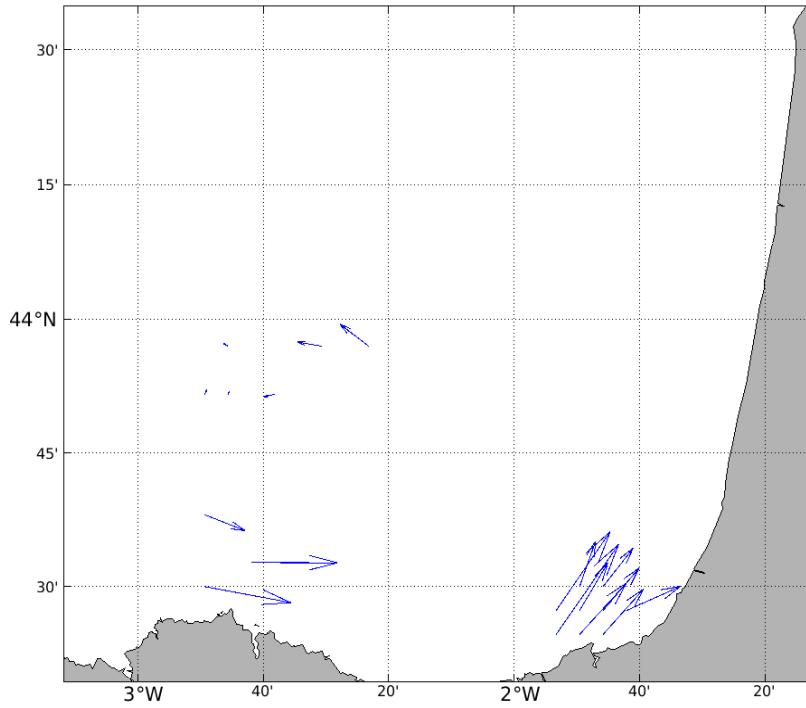
E

HFR-EUSKOOS: Percent Total Vector Coverage (contour showing >80%) 12/01/2009 to 31/12/2009



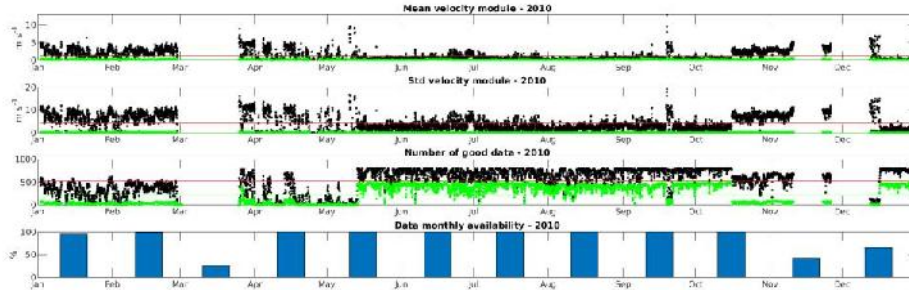
F

HFR-EUSKOOS: HFR Surface current average [m/s] 12/01/2009 to 31/12/2009

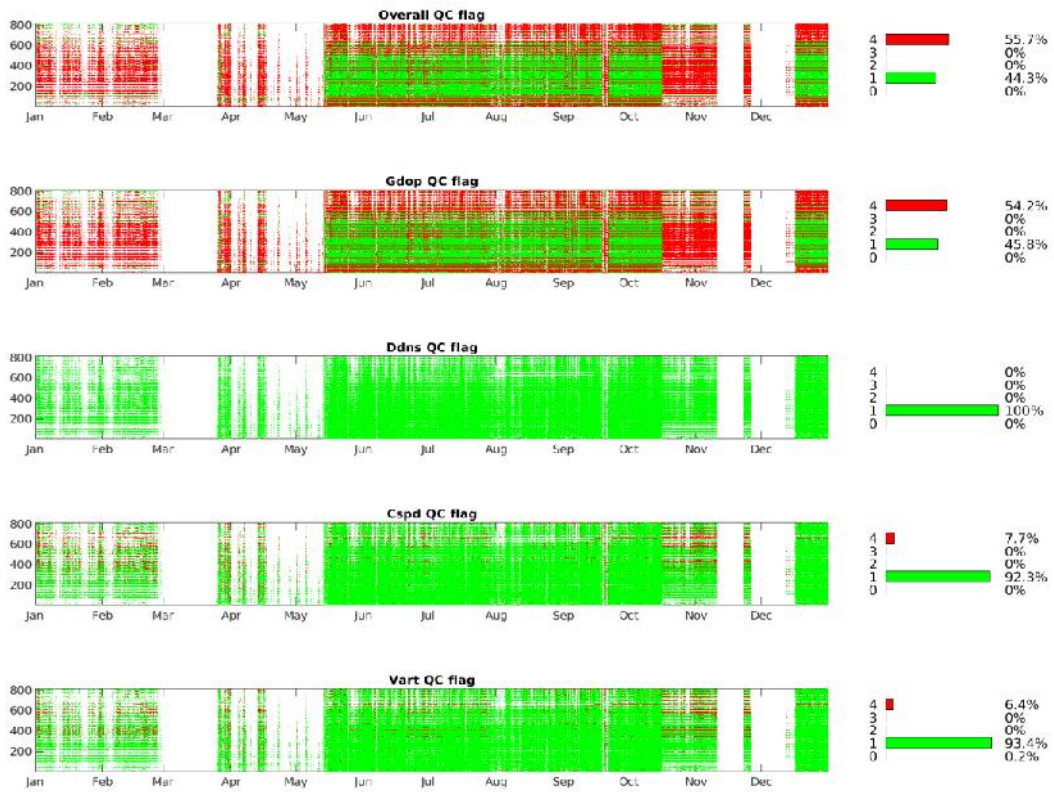


Period: 2010

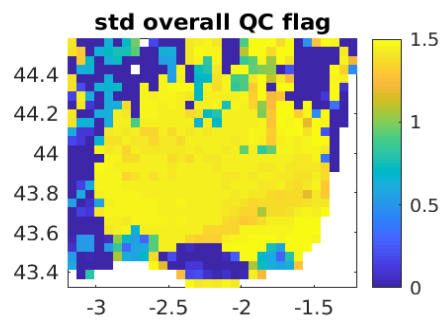
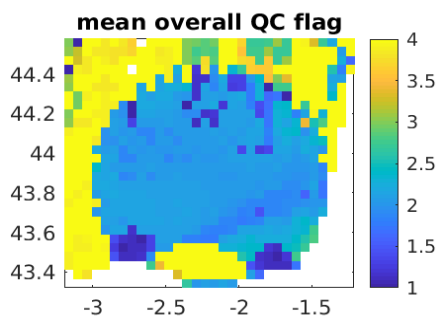
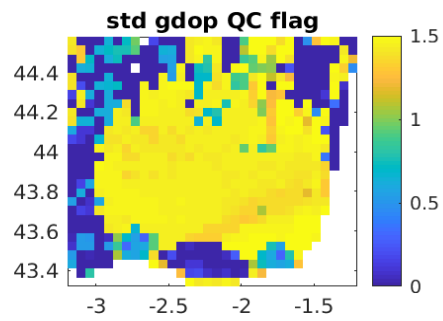
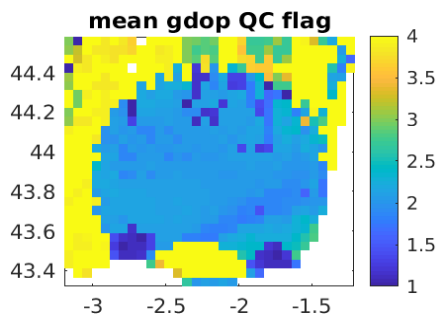
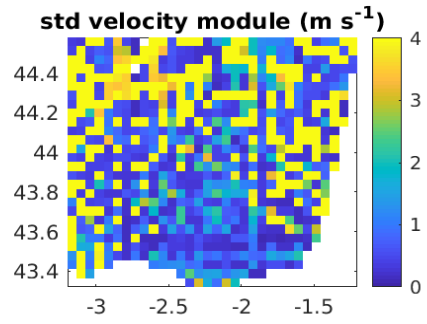
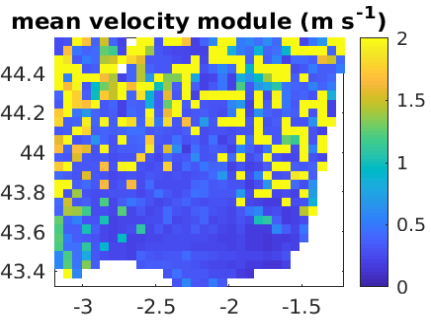
A



B

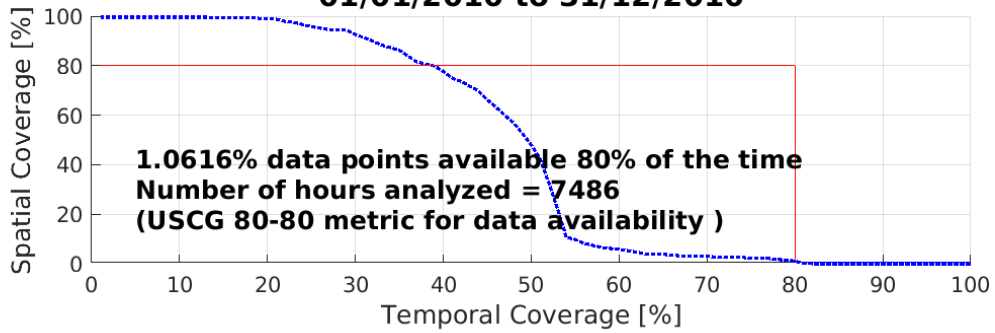


C



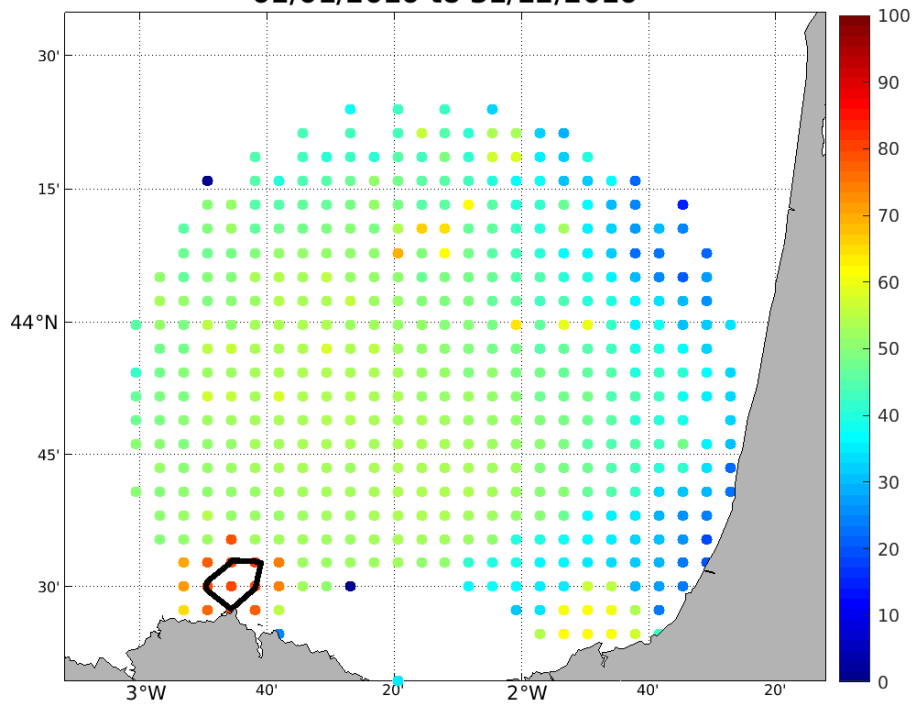
D

HFR-EUSKOOS: Spatial Coverage vs. Temporal Coverage 01/01/2010 to 31/12/2010



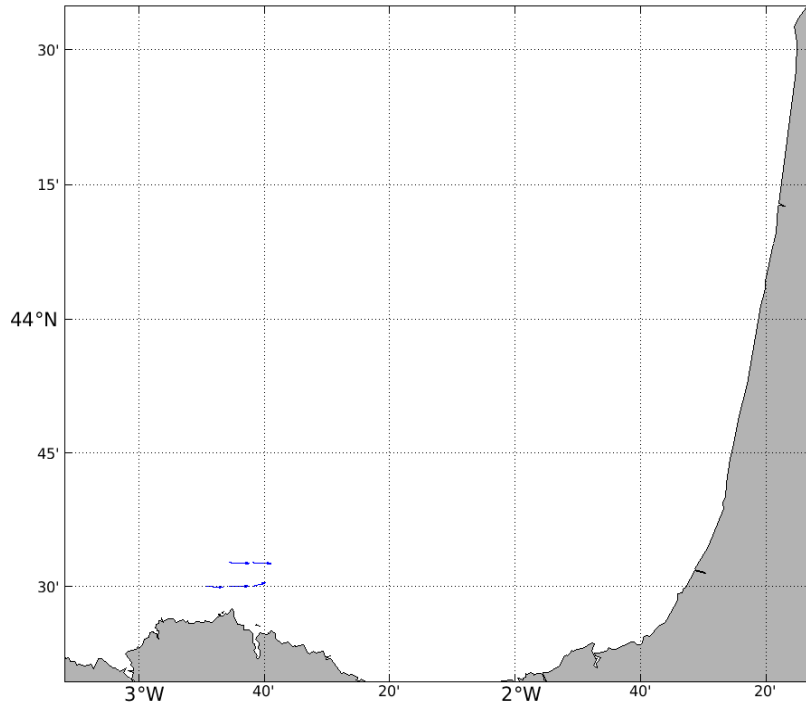
E

HFR-EUSKOOS: Percent Total Vector Coverage (contour showing >80%) 01/01/2010 to 31/12/2010



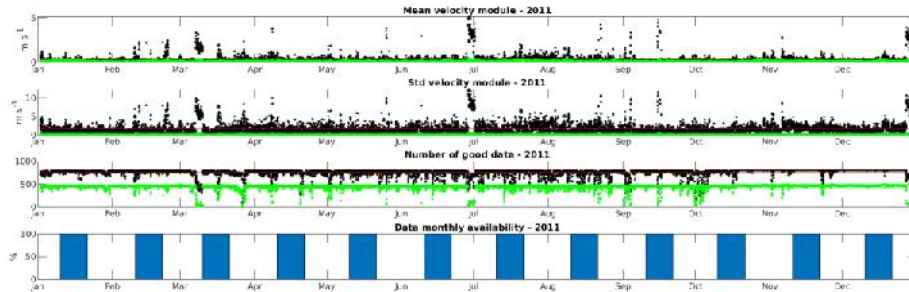
F

HFR-EUSKOOS: HFR Surface current average [m/s] 01/01/2010 to 31/12/2010

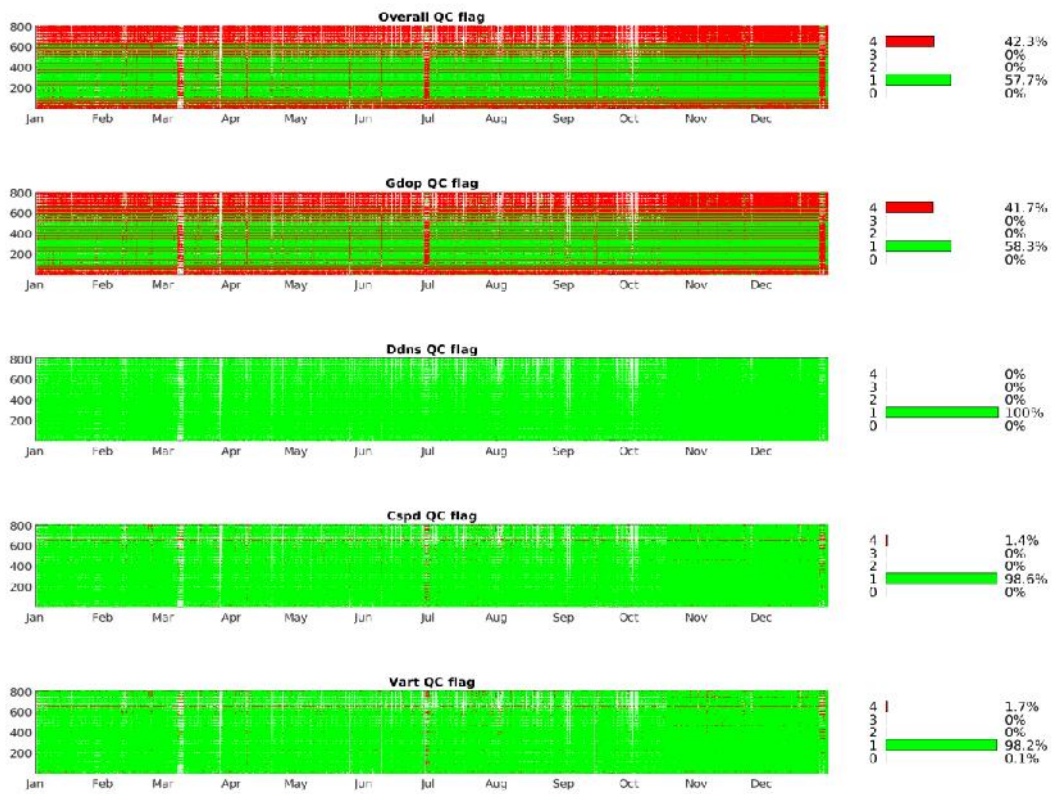


Period: 2011

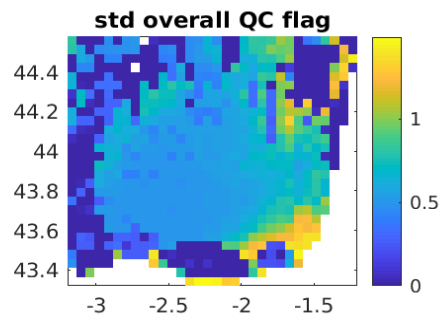
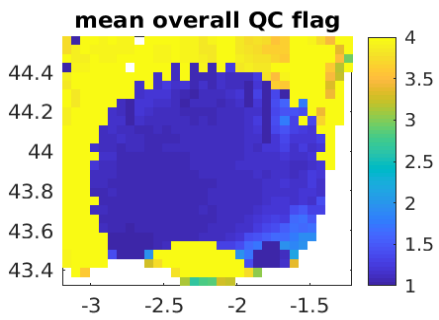
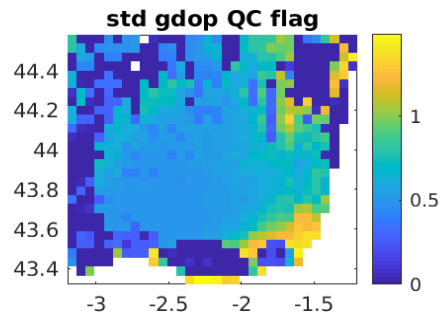
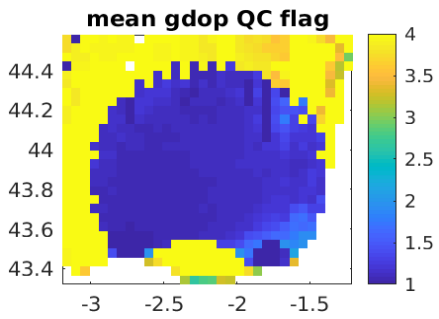
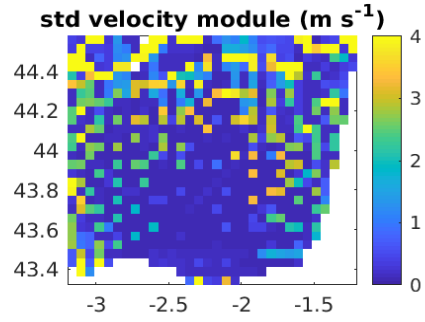
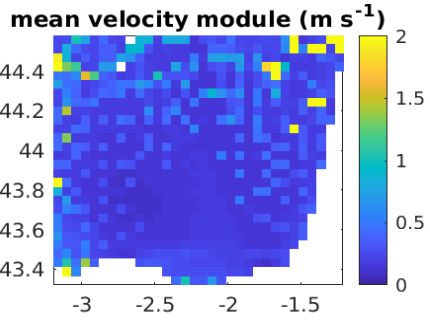
A



B

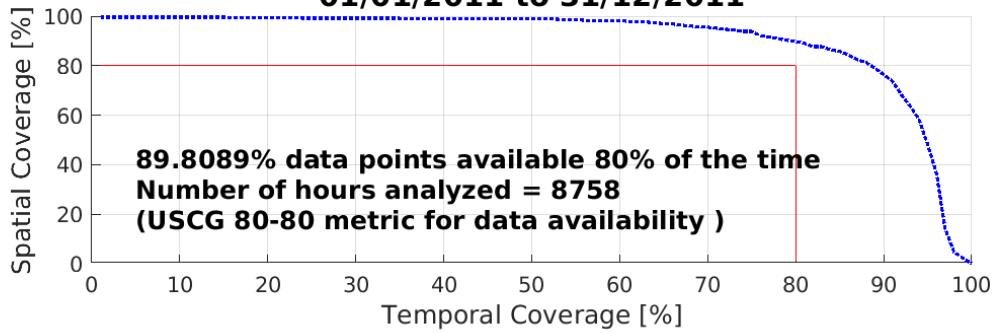


C



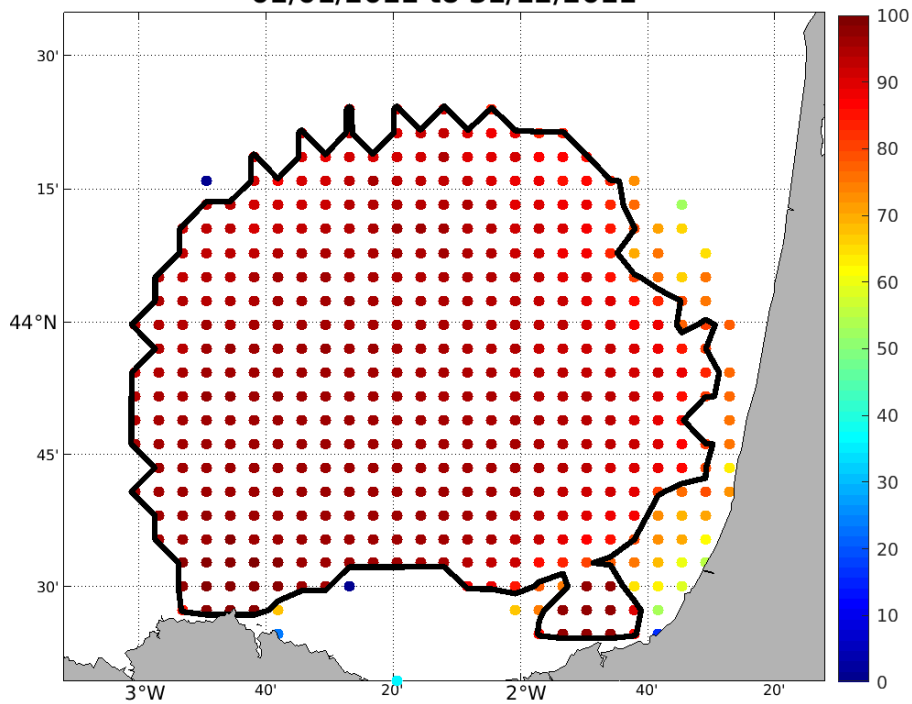
D

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



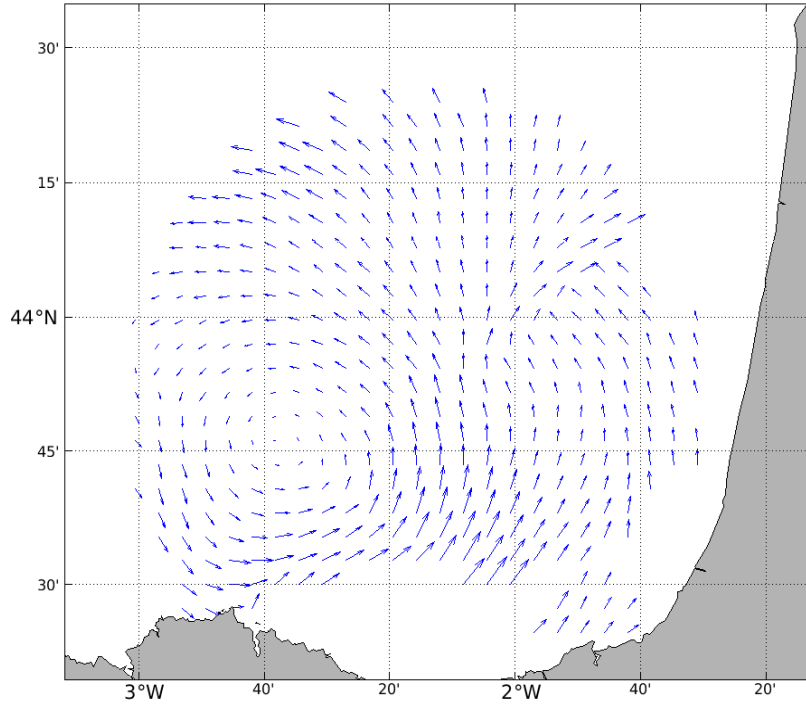
E

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



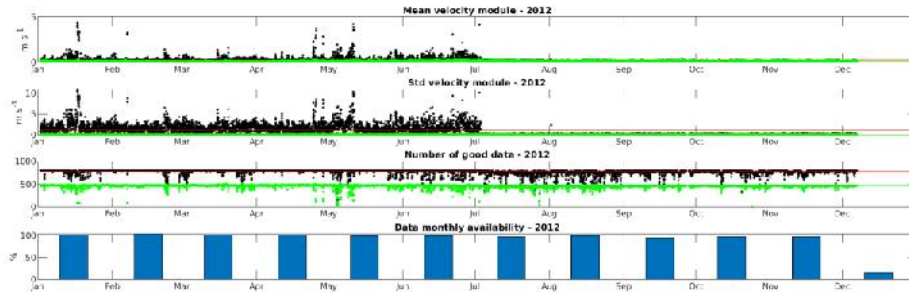
F

HFR-EUSKOOS: HFR Surface current average [m/s] 01/01/2011 to 31/12/2011

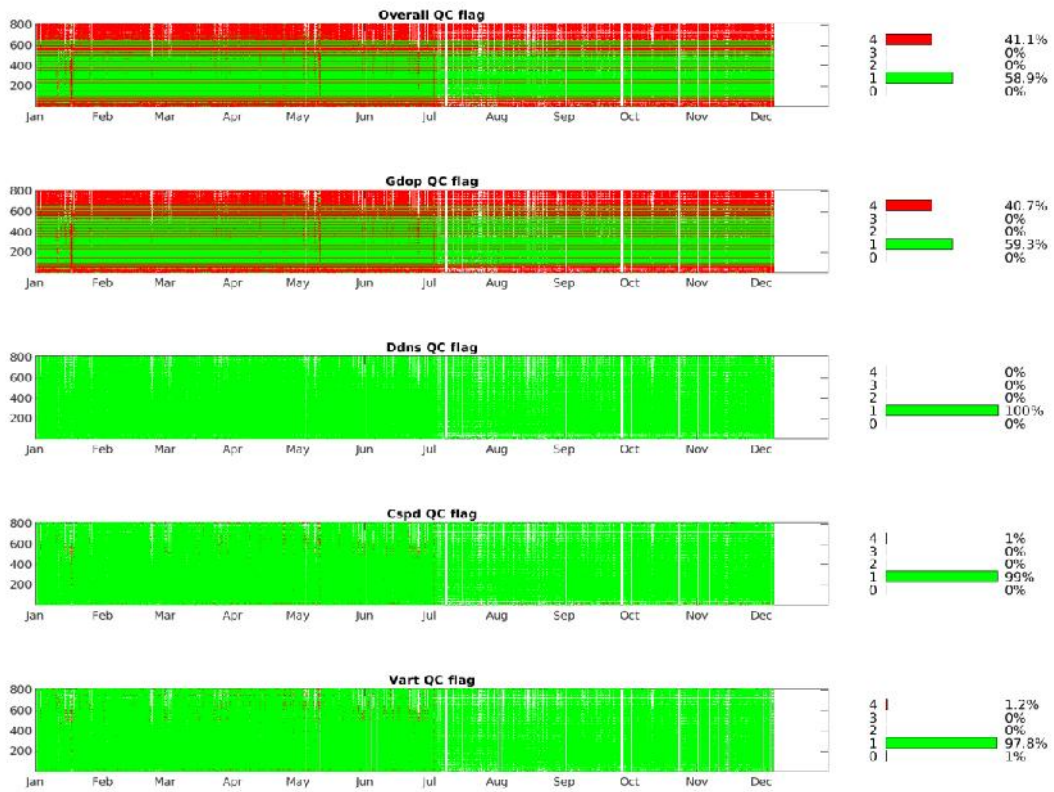


Period: 2012

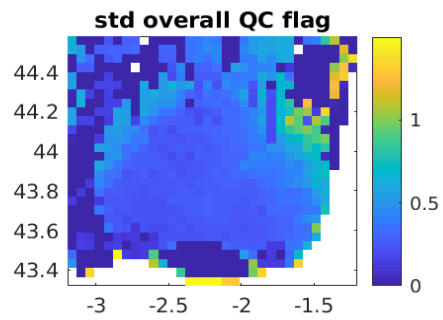
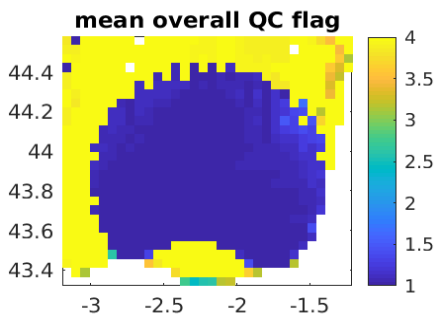
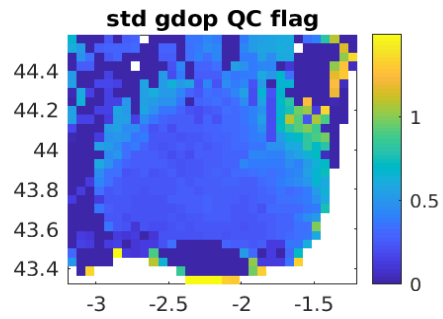
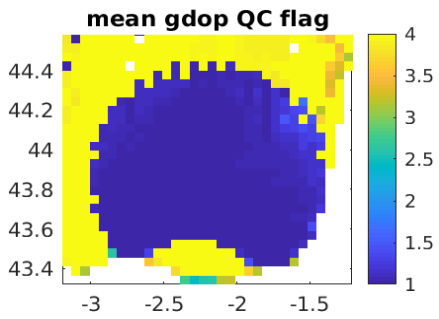
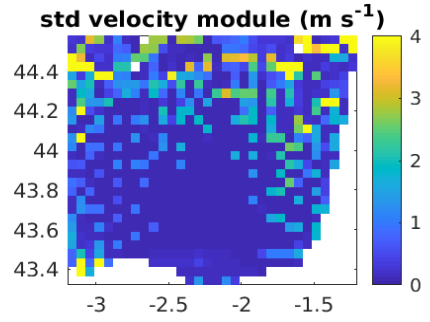
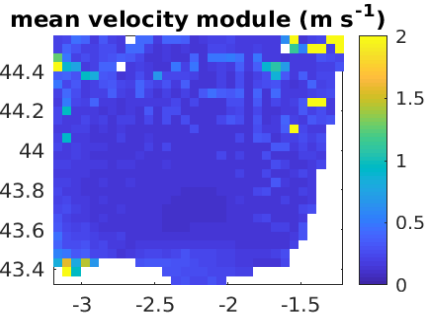
A



B

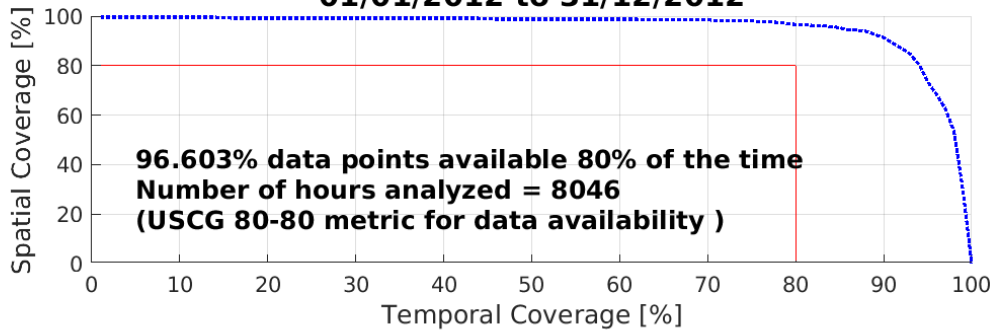


C



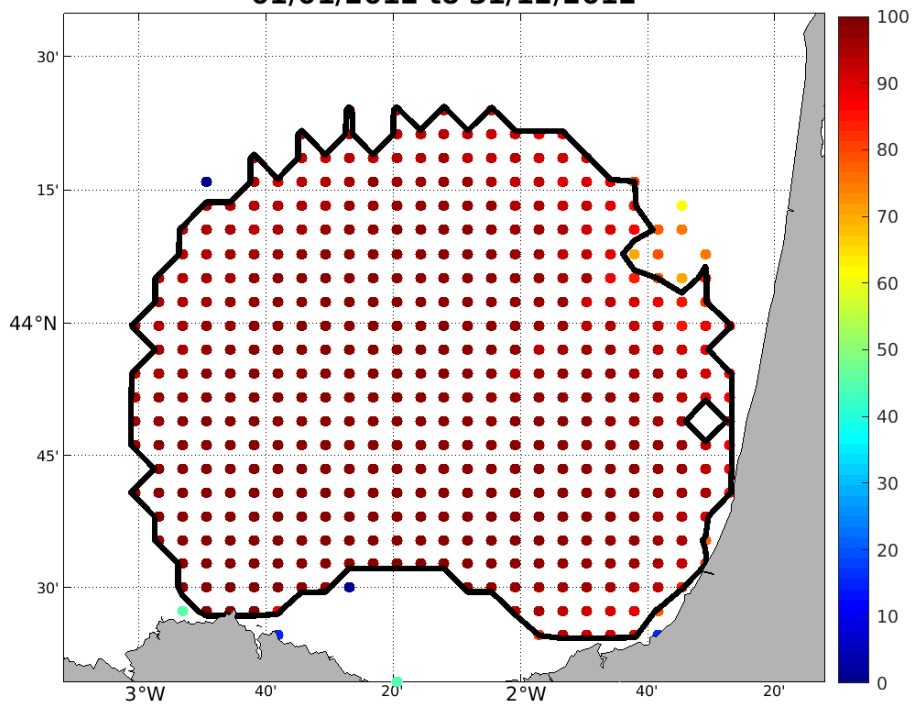
D

HFR-EUSKOOS: Spatial Coverage vs. Temporal Coverage 01/01/2012 to 31/12/2012



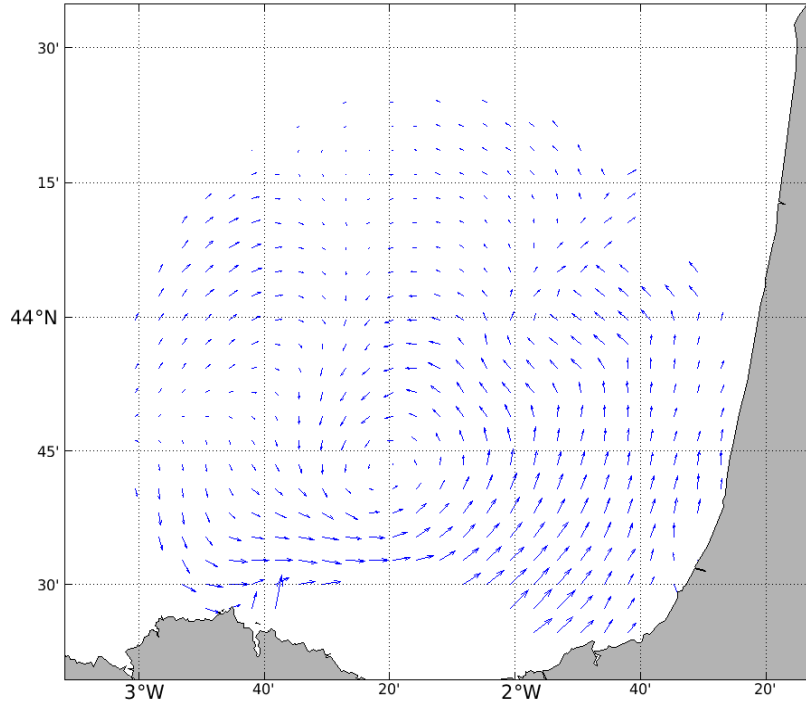
E

HFR-EUSKOOS: Percent Total Vector Coverage (contour showing >80%) 01/01/2012 to 31/12/2012



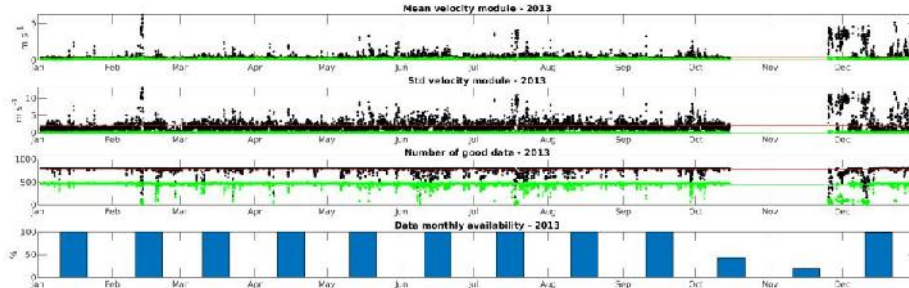
F

HFR-EUSKOOS: HFR Surface current average [m/s] 01/01/2012 to 31/12/2012

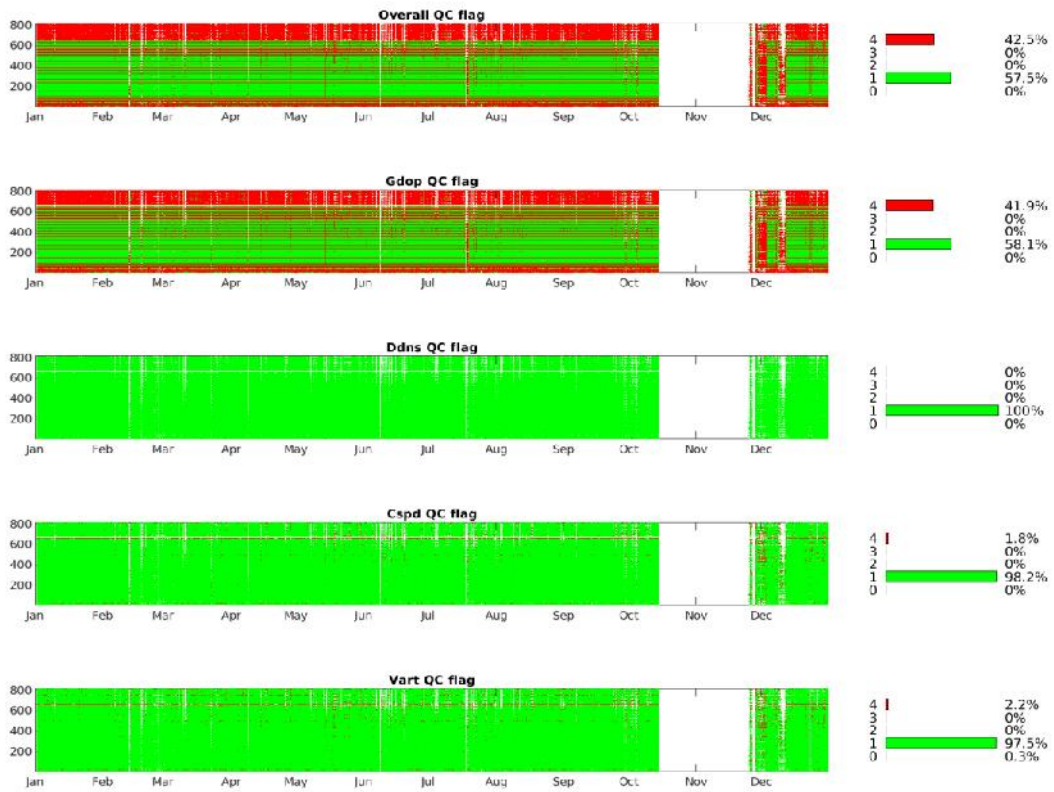


Period: 2013

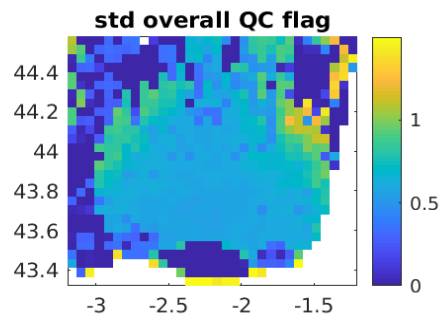
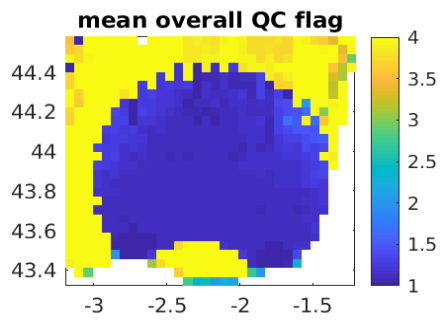
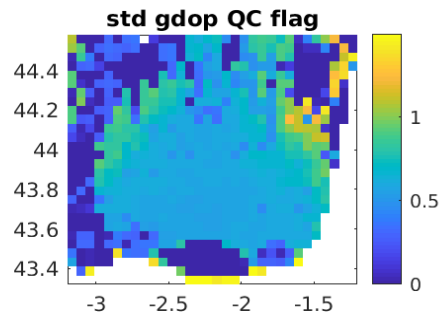
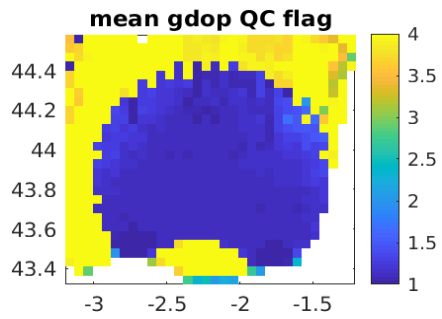
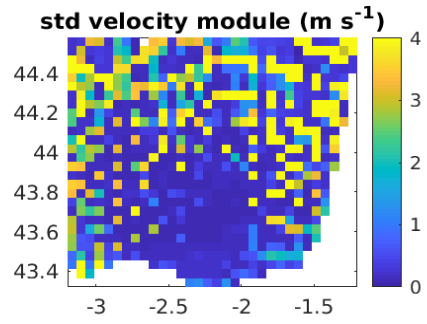
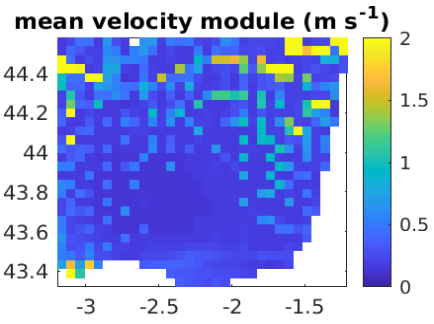
A



B

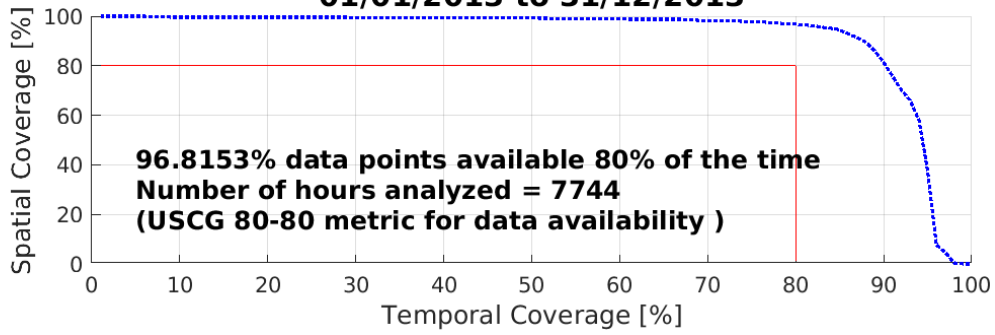


C



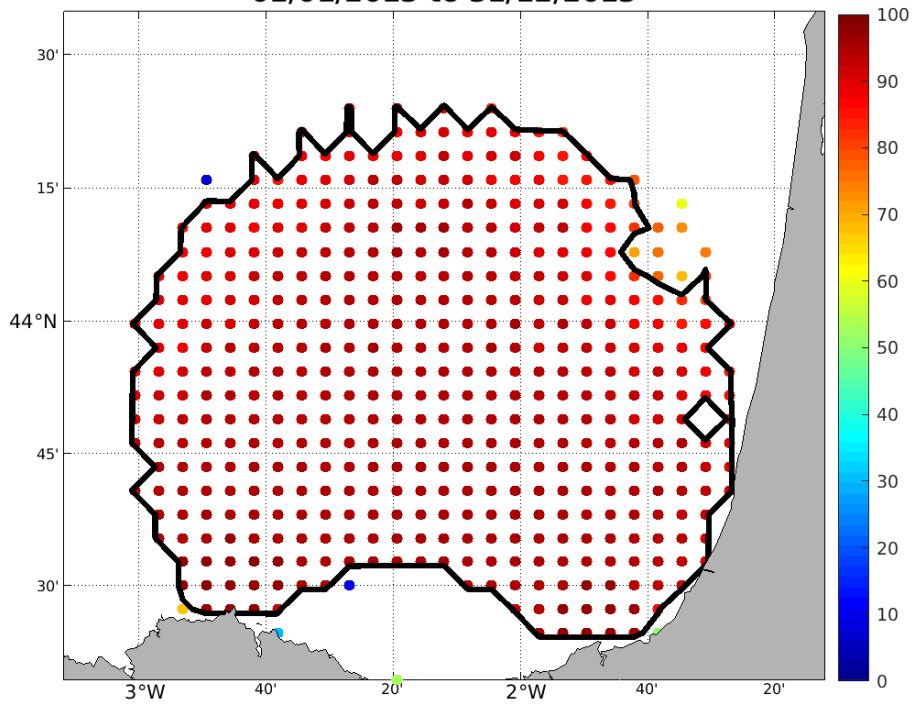
D

HFR-EUSKOOS: Spatial Coverage vs. Temporal Coverage 01/01/2013 to 31/12/2013



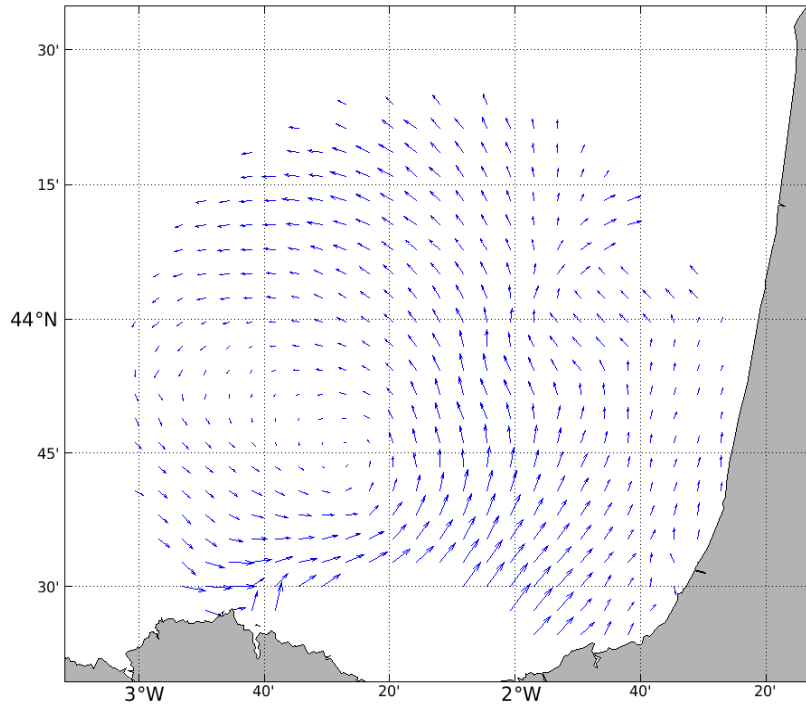
E

HFR-EUSKOOS: Percent Total Vector Coverage (contour showing >80%) 01/01/2013 to 31/12/2013



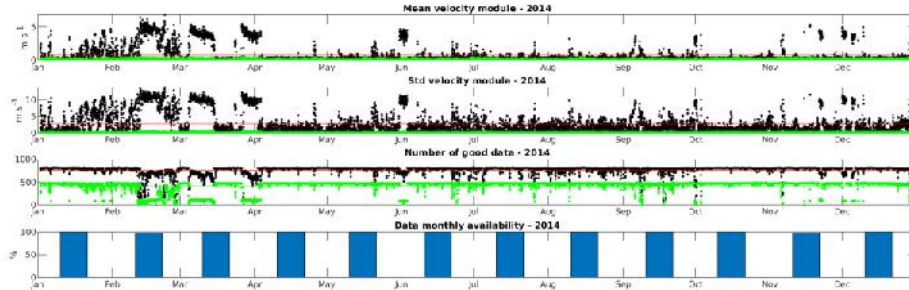
F

HFR-EUSKOOS: HFR Surface current average [m/s] 01/01/2013 to 31/12/2013

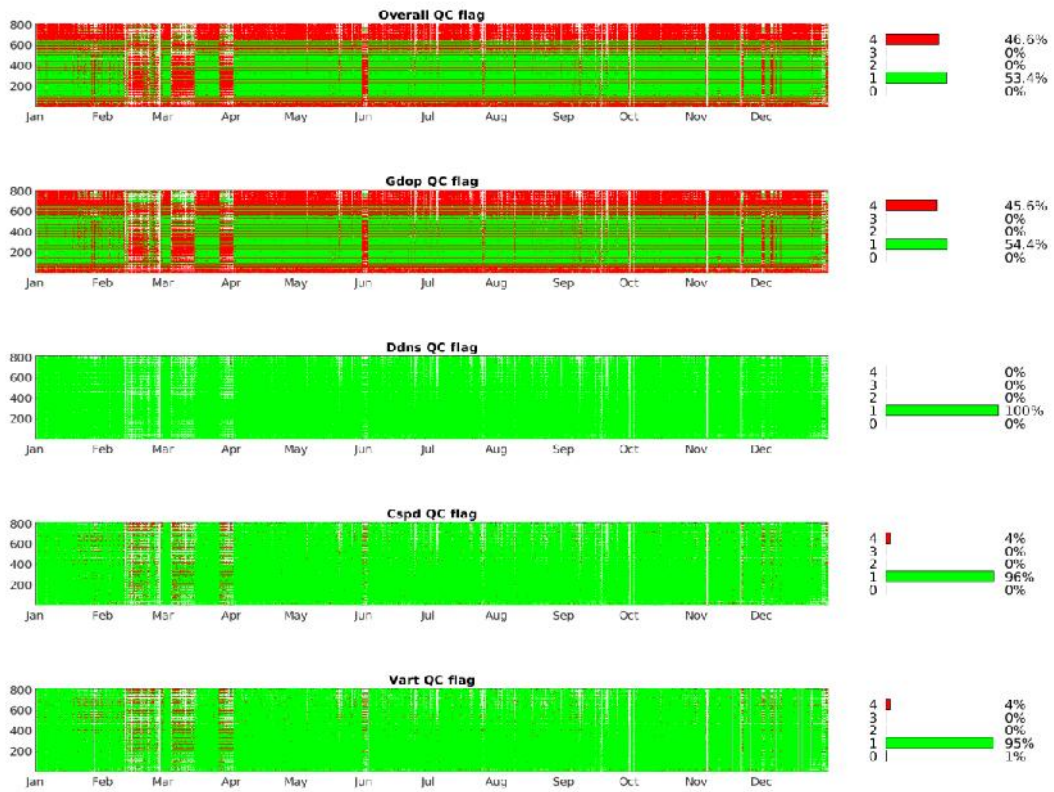


Period: 2014

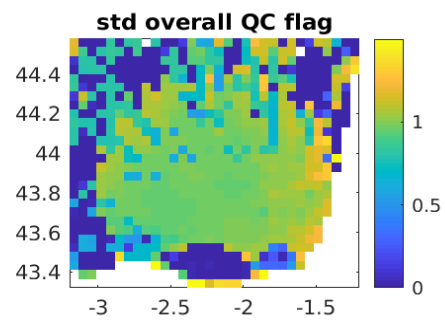
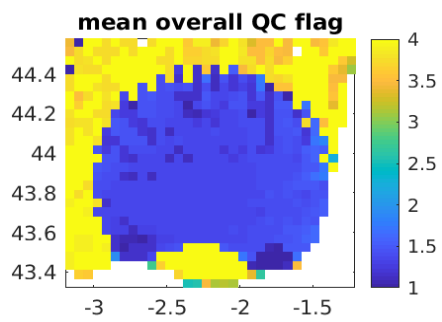
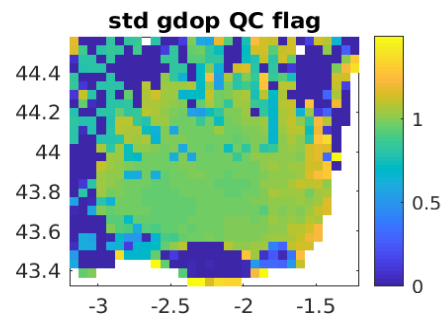
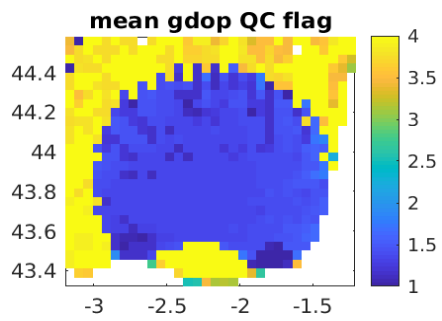
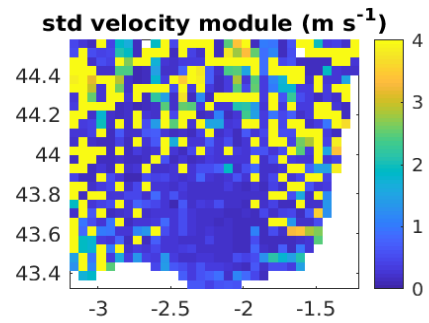
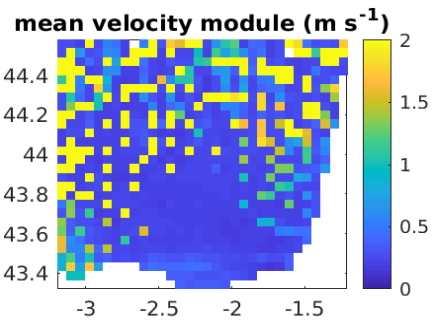
A



B

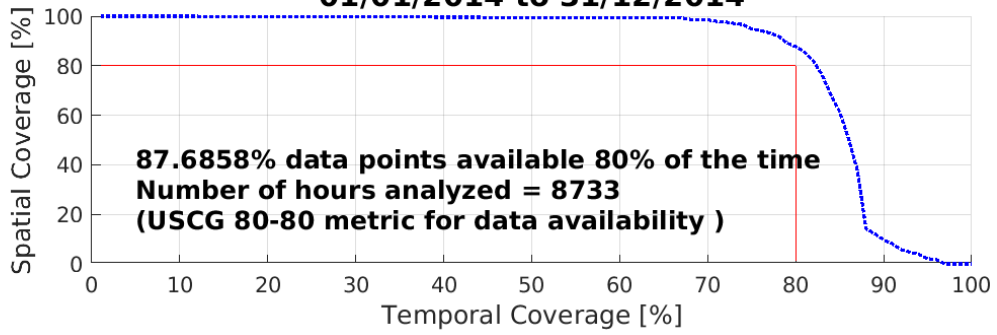


C



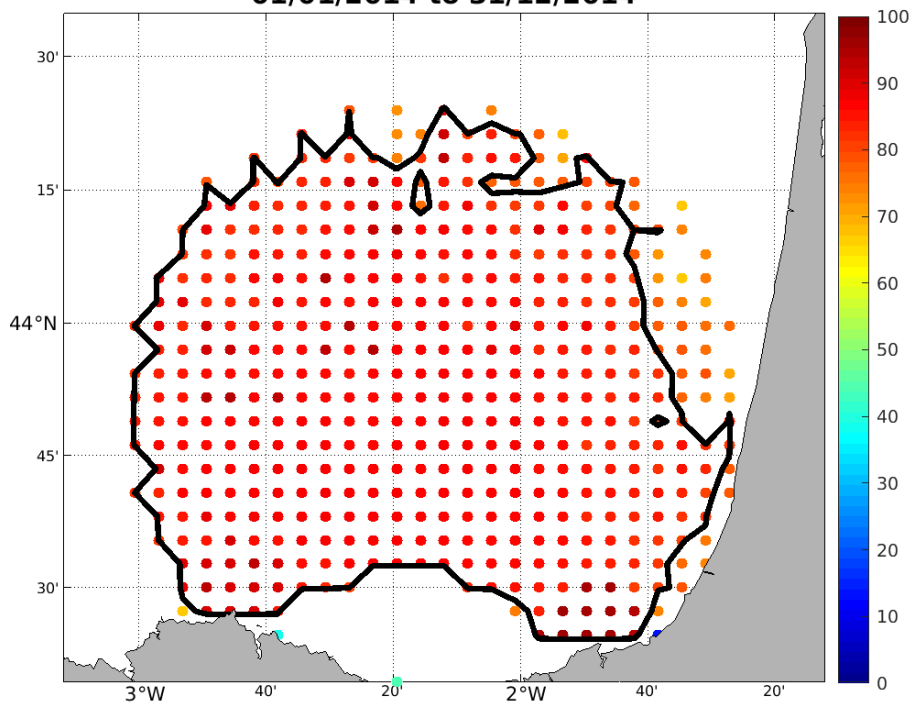
D

HFR-EUSKOOS: Spatial Coverage vs. Temporal Coverage 01/01/2014 to 31/12/2014



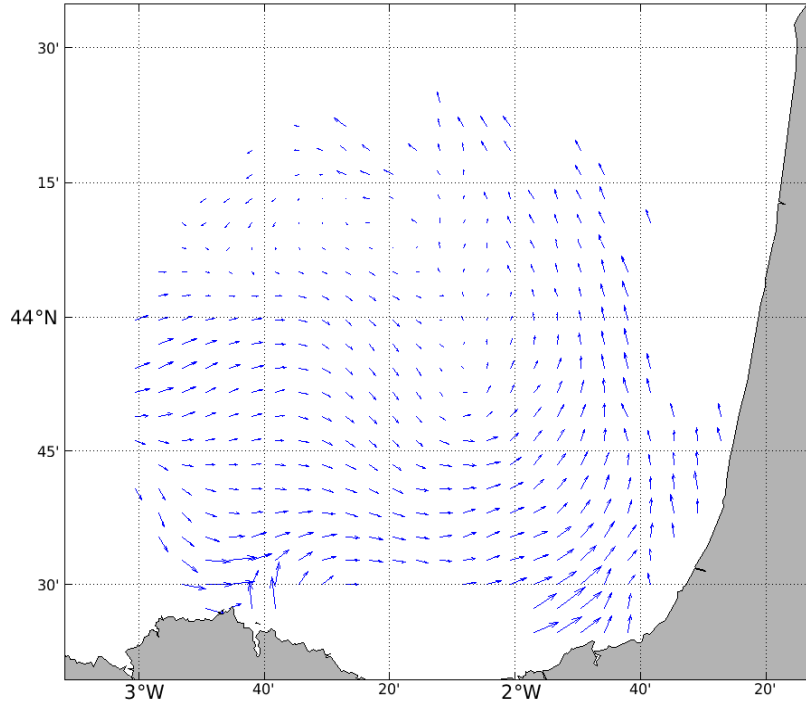
E

HFR-EUSKOOS: Percent Total Vector Coverage (contour showing >80%) 01/01/2014 to 31/12/2014



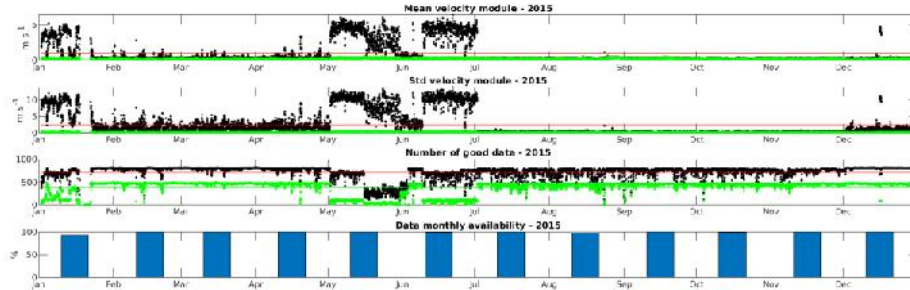
F

HFR-EUSKOOS: HFR Surface current average [m/s] 01/01/2014 to 31/12/2014

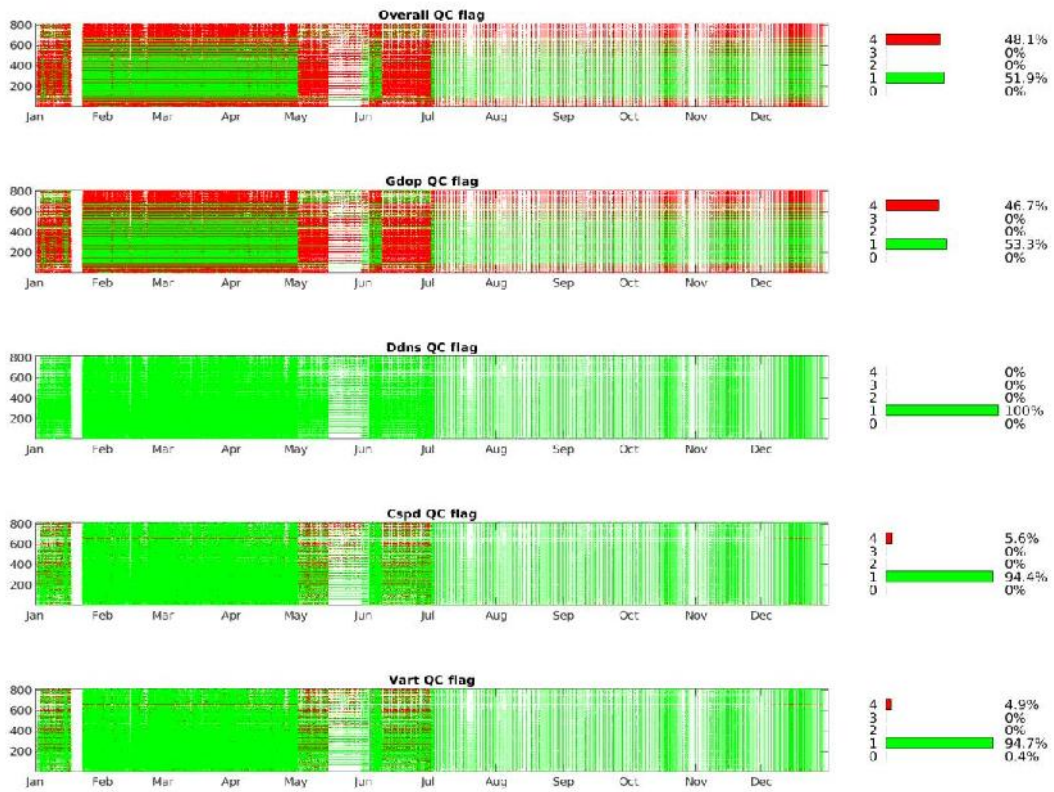


Period: 2015

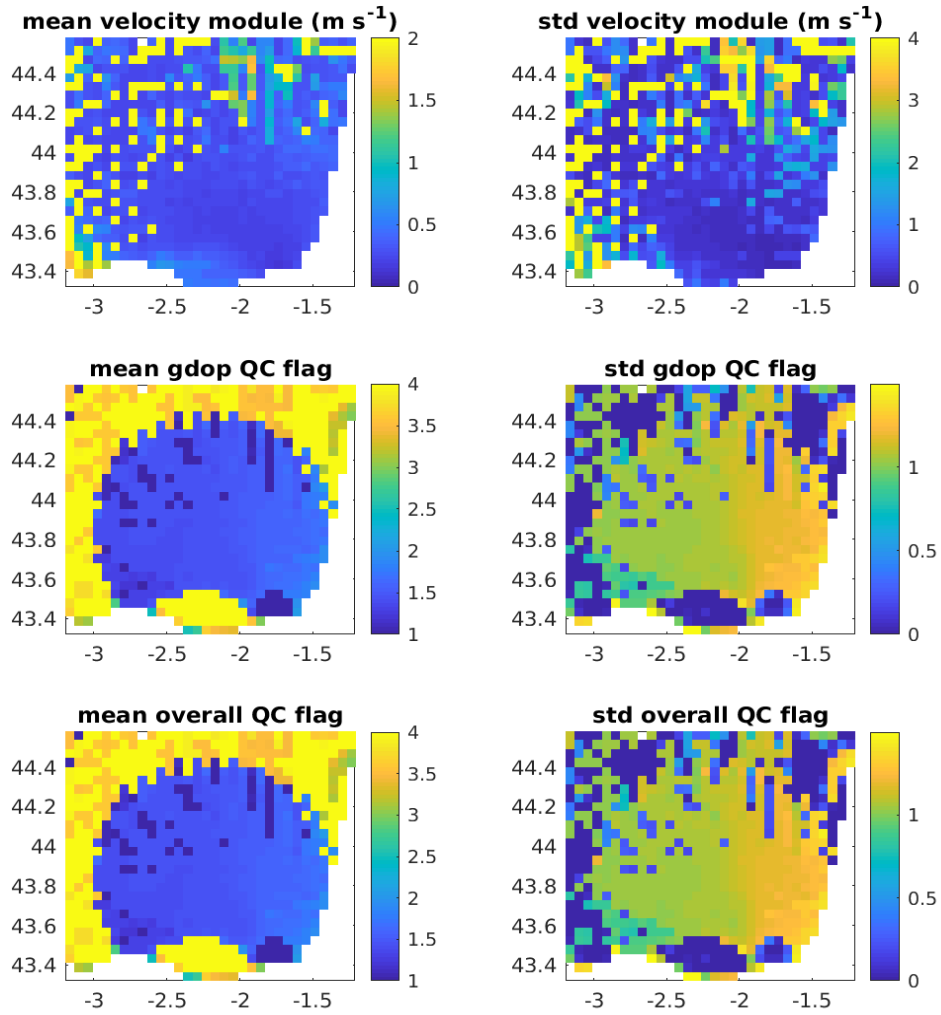
A



B

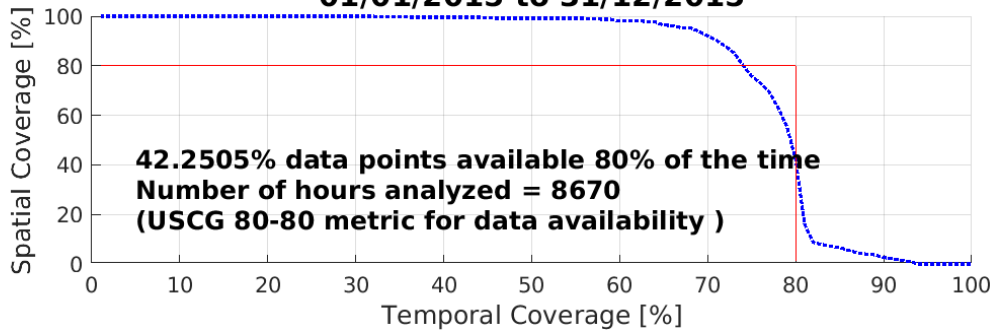


C



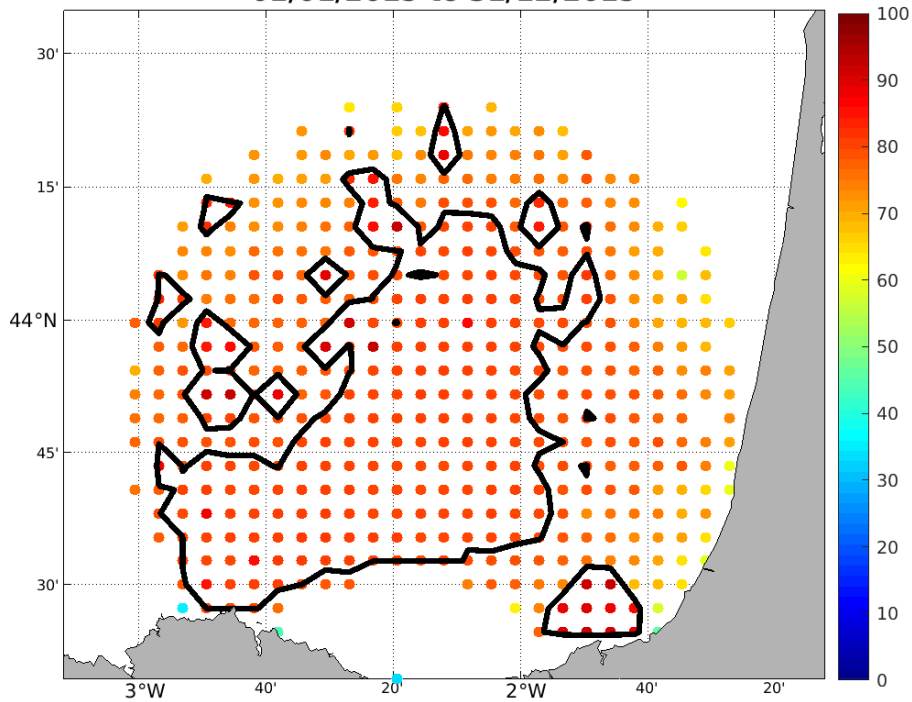
D

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



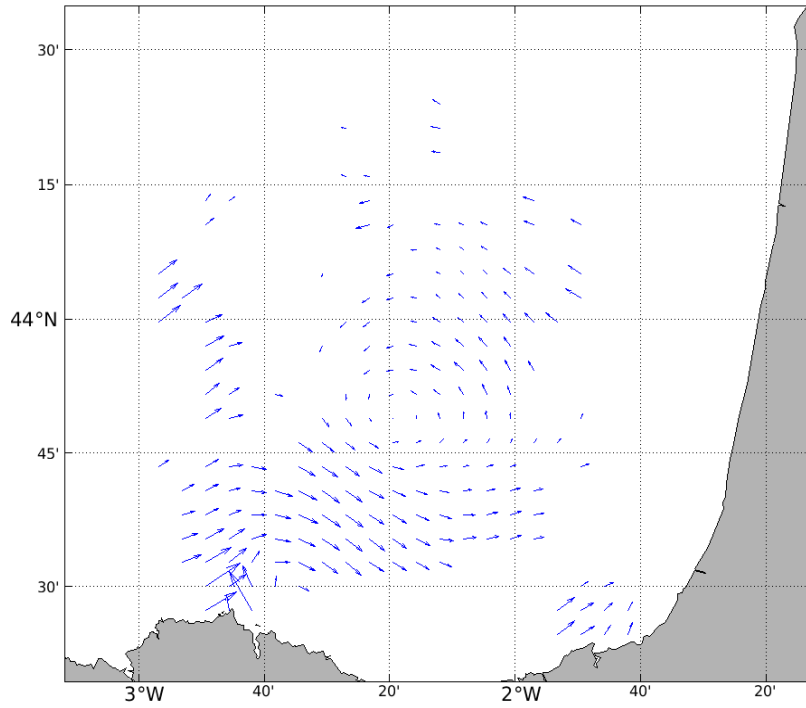
E

HFR-EUSKOOS: Percent Total Vector Coverage (contour showing >80%) 01/01/2015 to 31/12/2015



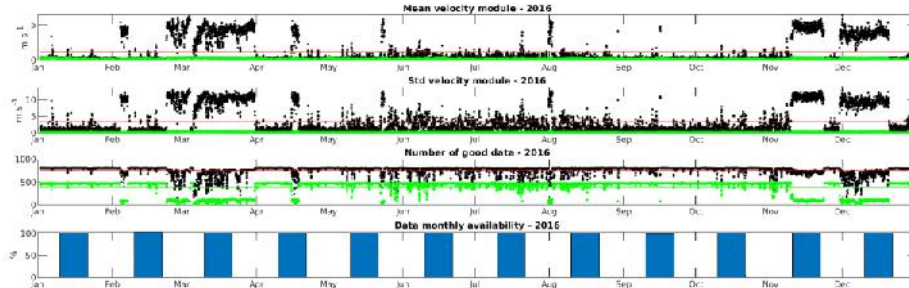
F

HFR-EUSKOOS: HFR Surface current average [m/s] 01/01/2015 to 31/12/2015

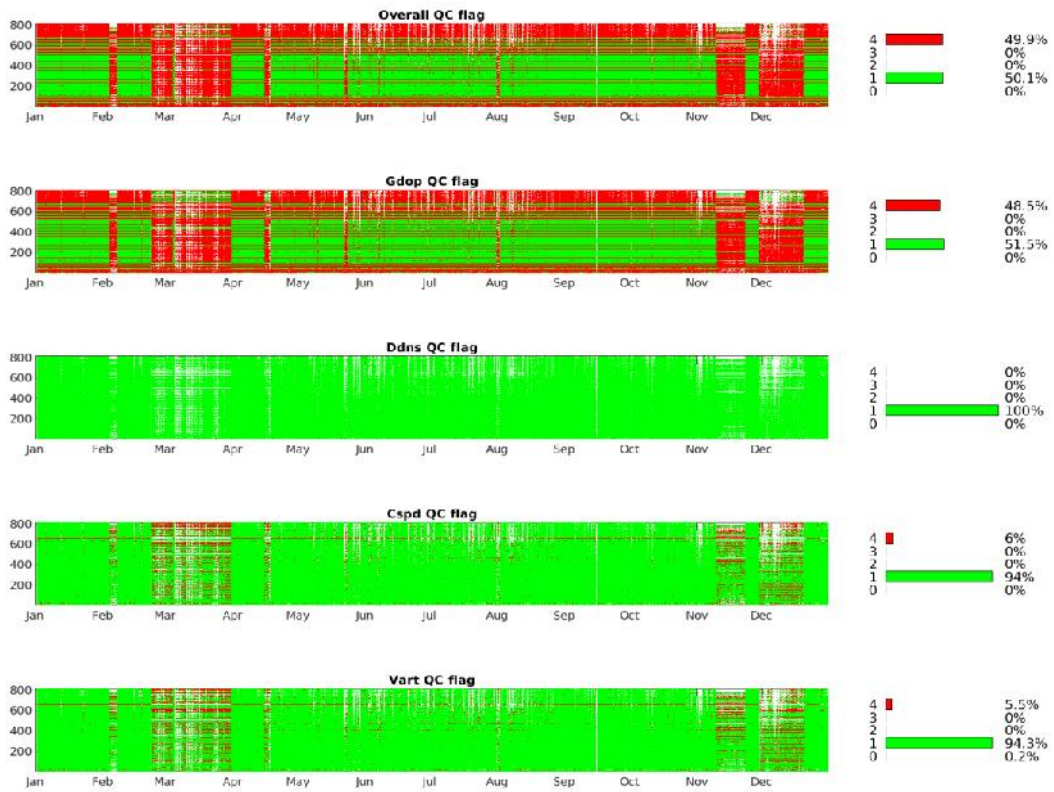


Period: 2016

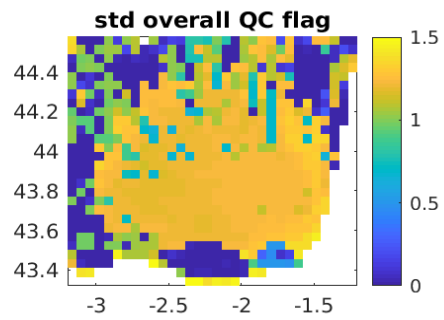
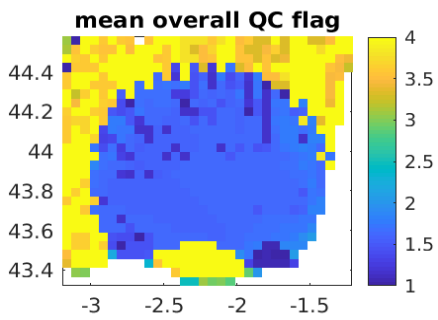
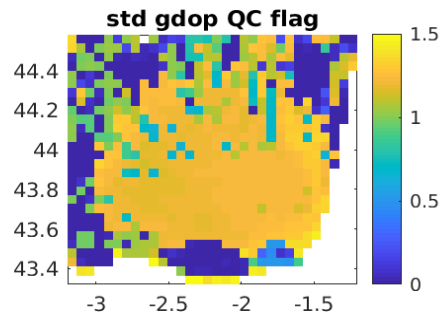
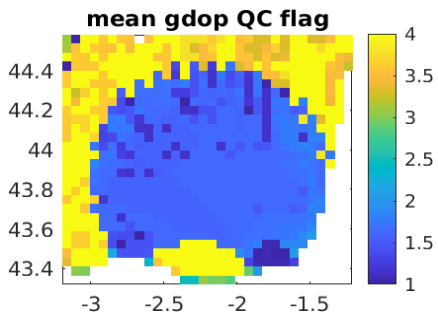
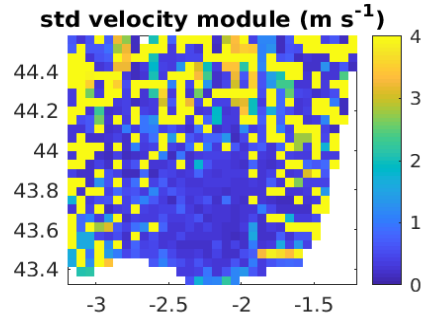
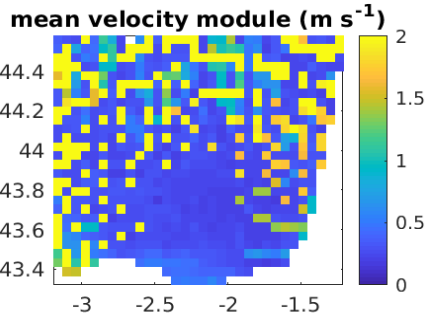
A



B

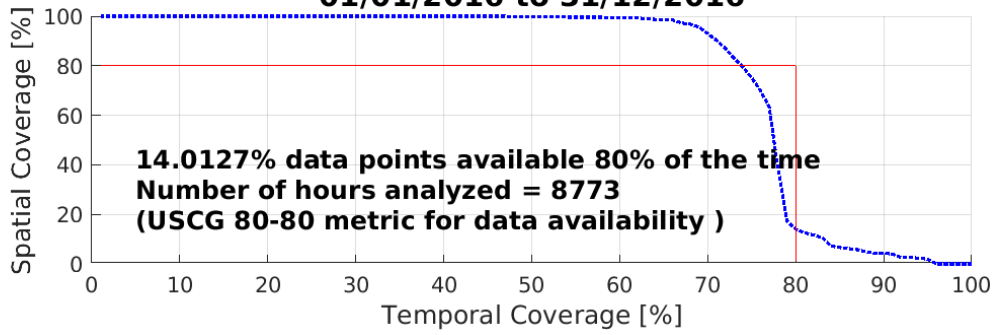


C



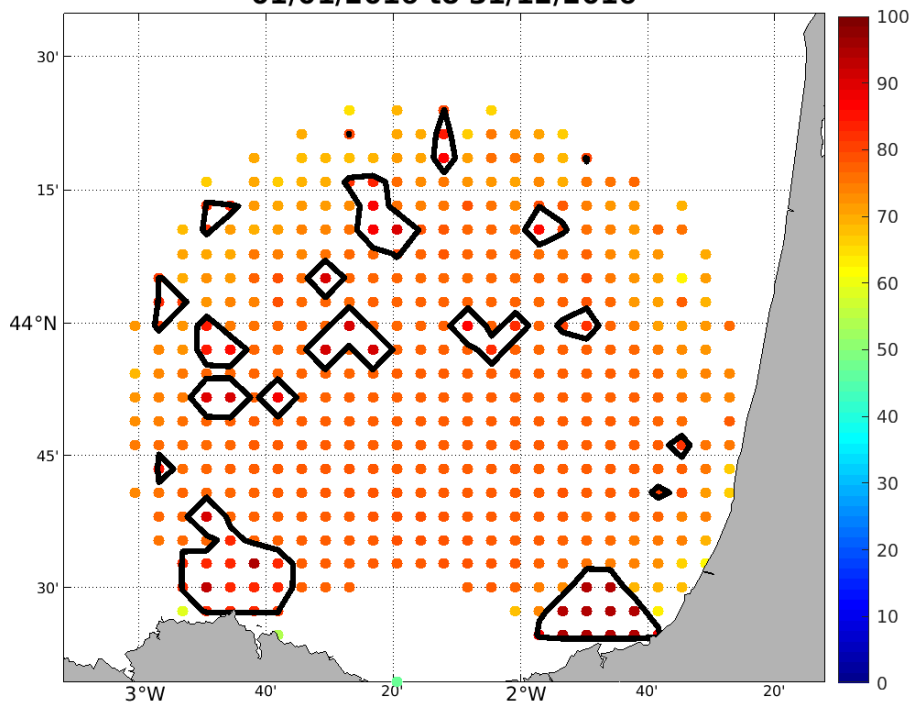
D

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



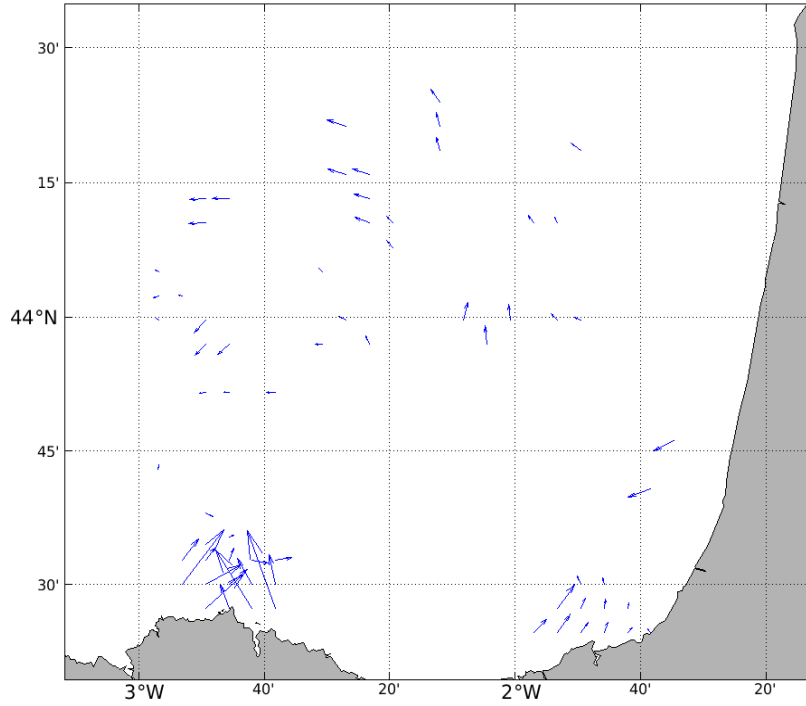
E

HFR-EUSKOOS: Percent Total Vector Coverage (contour showing >80%) 01/01/2016 to 31/12/2016



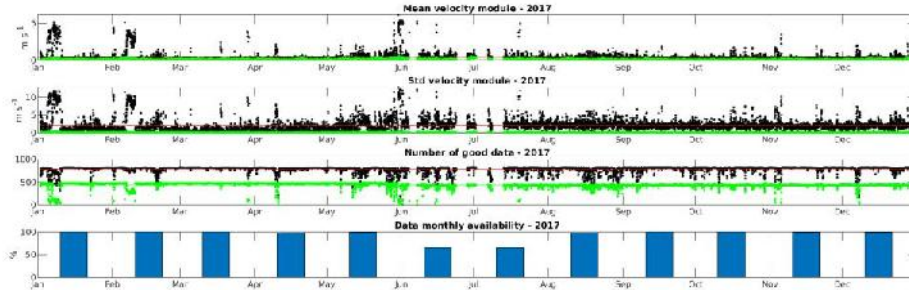
F

HFR-EUSKOOS: HFR Surface current average [m/s] 01/01/2016 to 31/12/2016

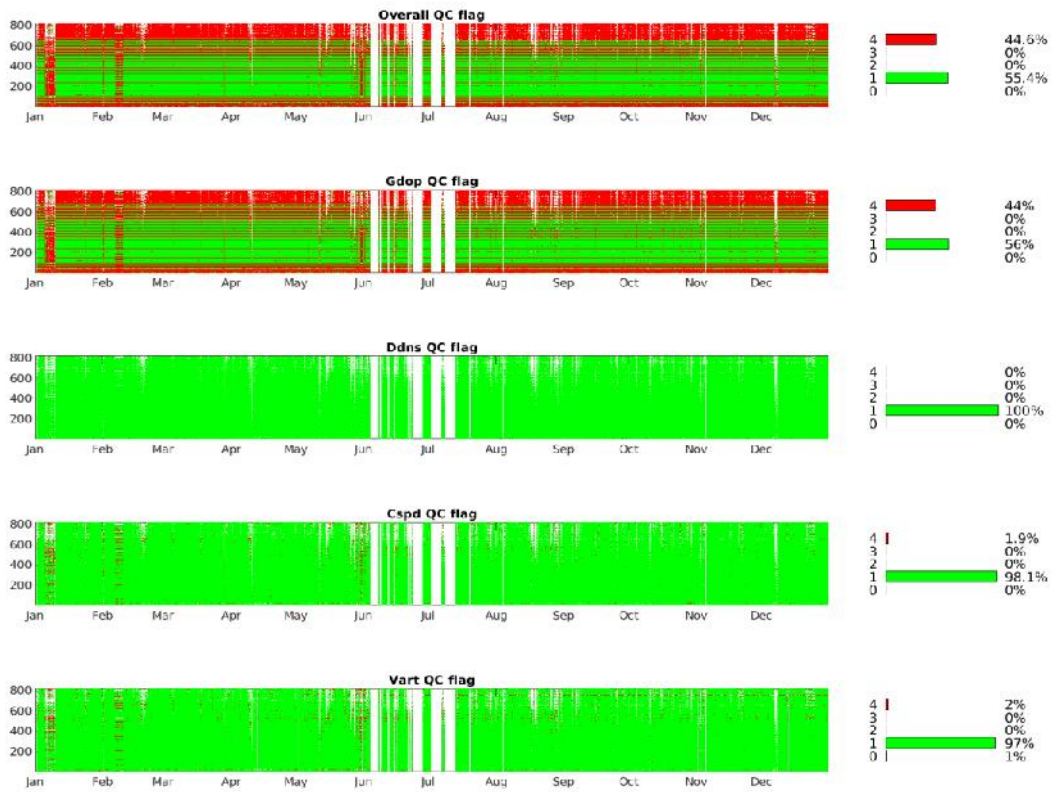


Period: 2017

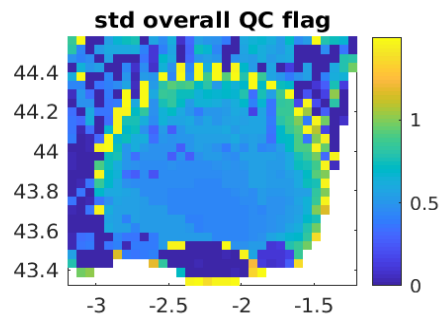
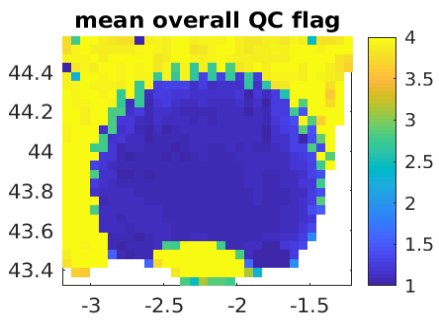
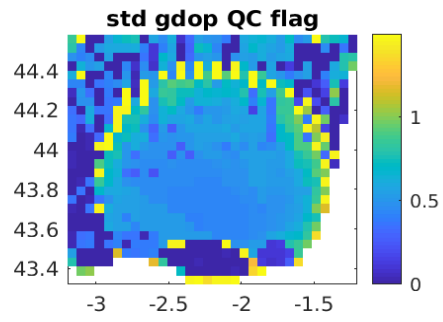
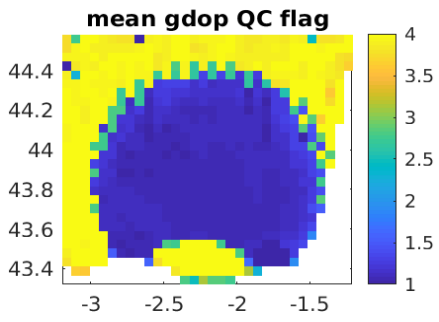
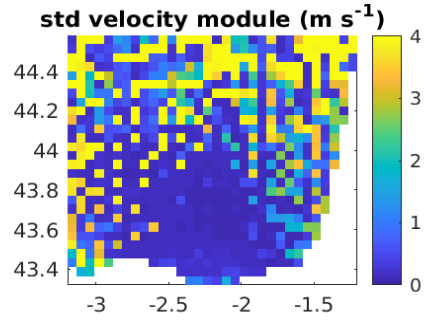
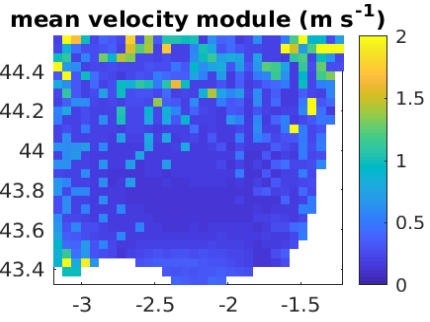
A



B

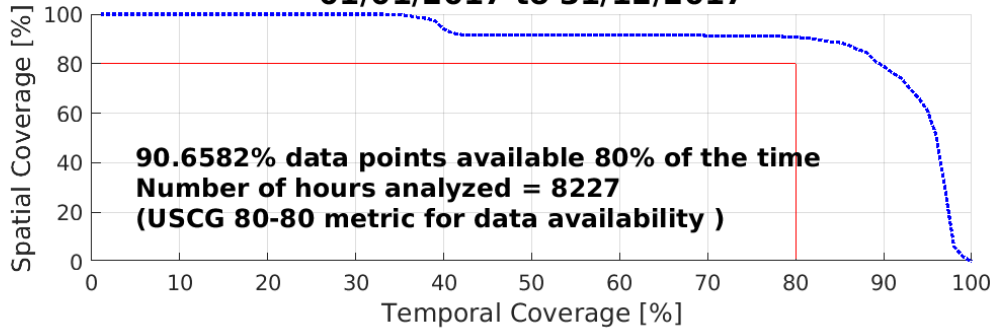


C



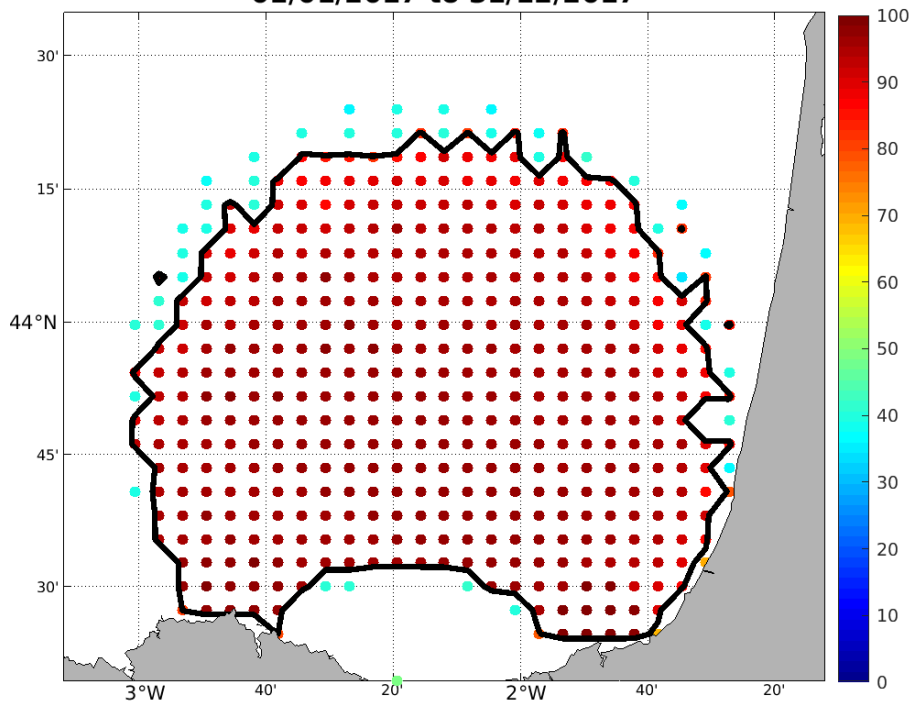
D

HFR-EUSKOOS: Spatial Coverage vs. Temporal Coverage 01/01/2017 to 31/12/2017



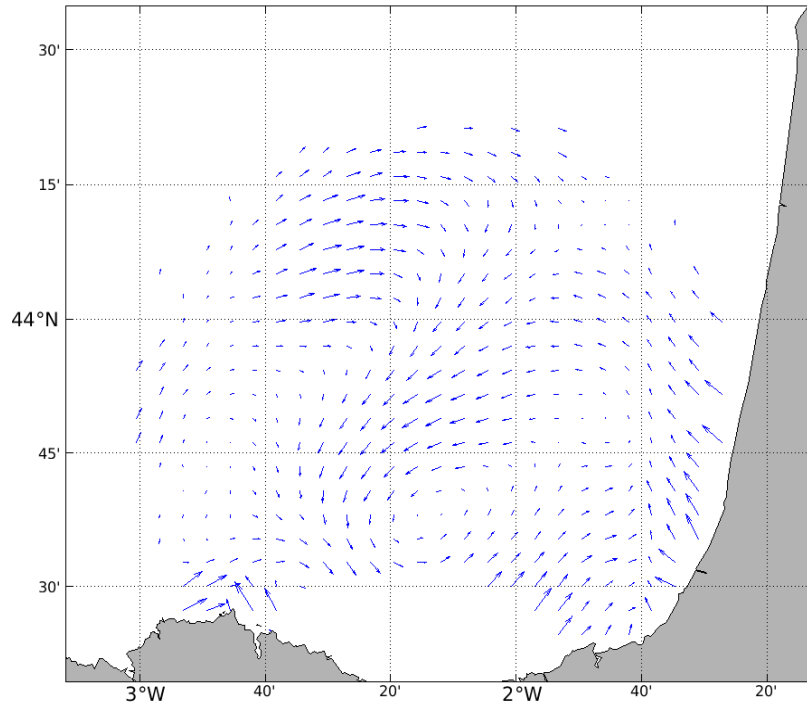
E

HFR-EUSKOOS: Percent Total Vector Coverage (contour showing >80%) 01/01/2017 to 31/12/2017



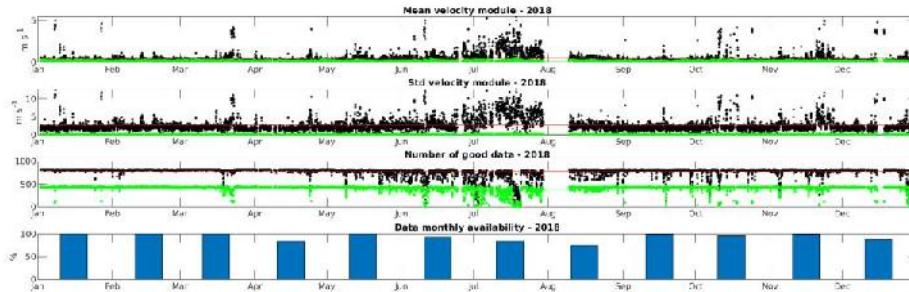
F

HFR-EUSKOOS: HFR Surface current average [m/s] 01/01/2017 to 31/12/2017

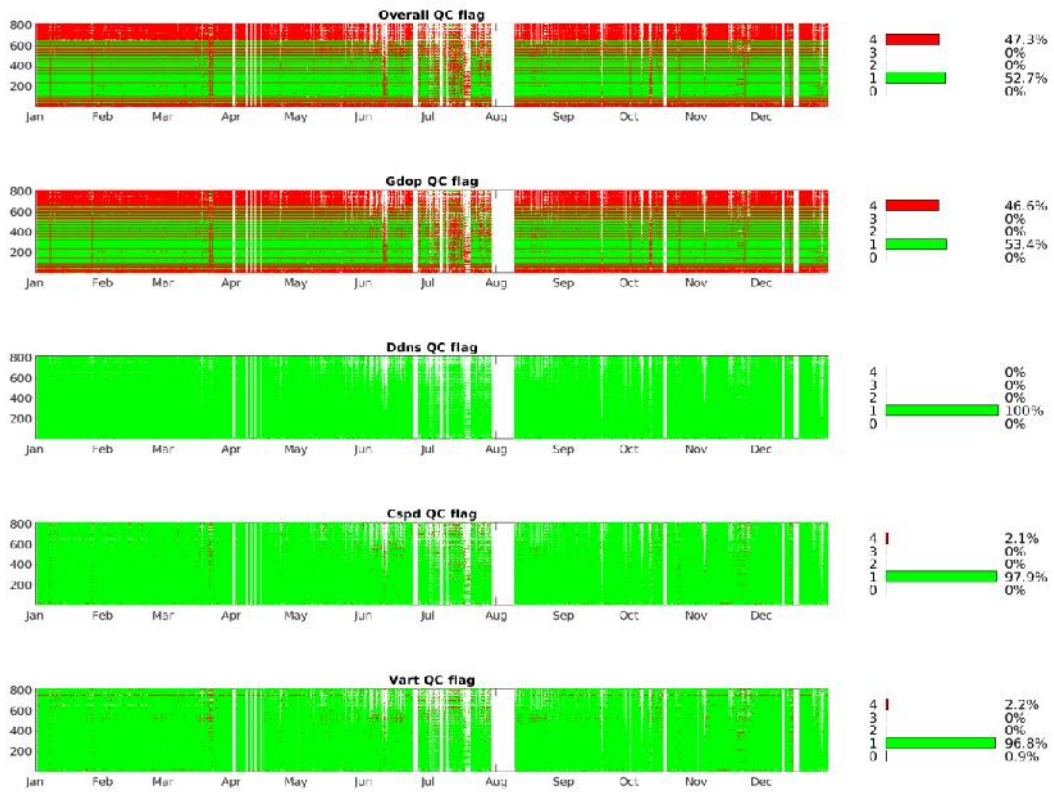


Period: 2018

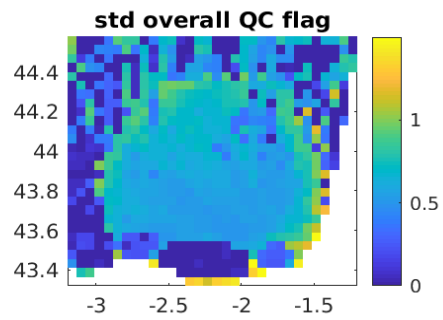
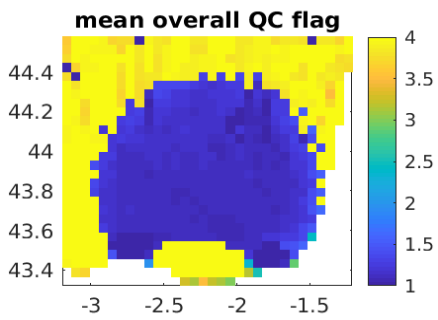
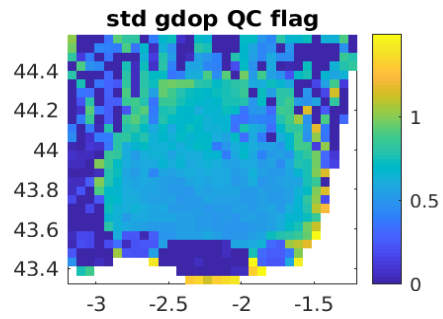
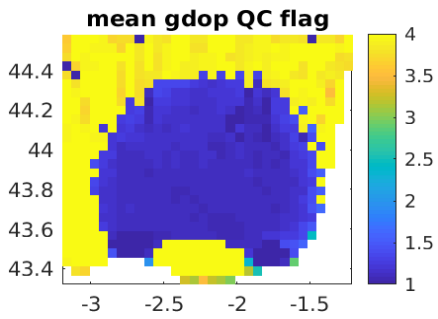
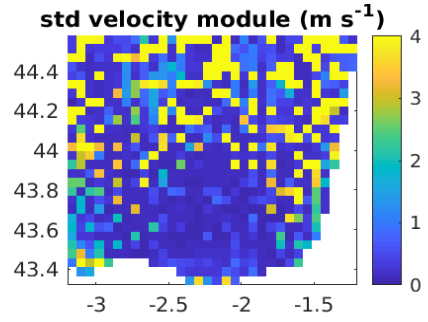
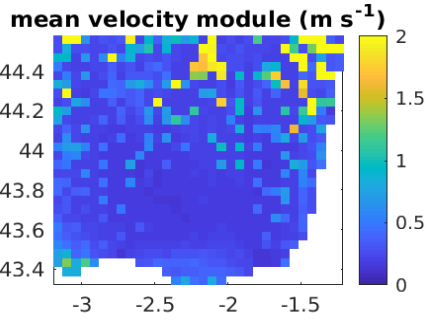
A



B

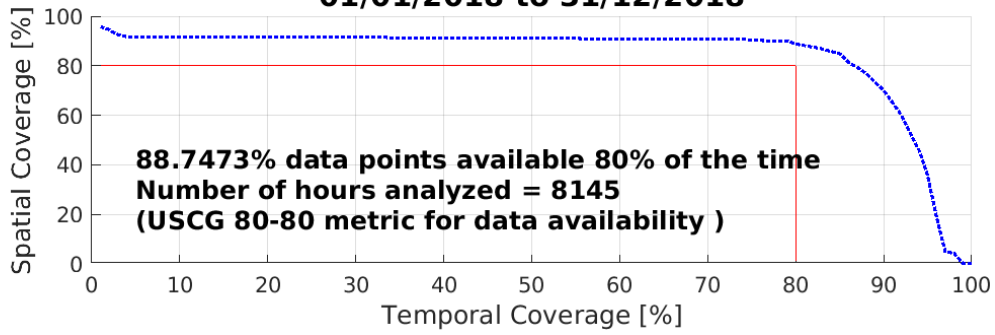


C



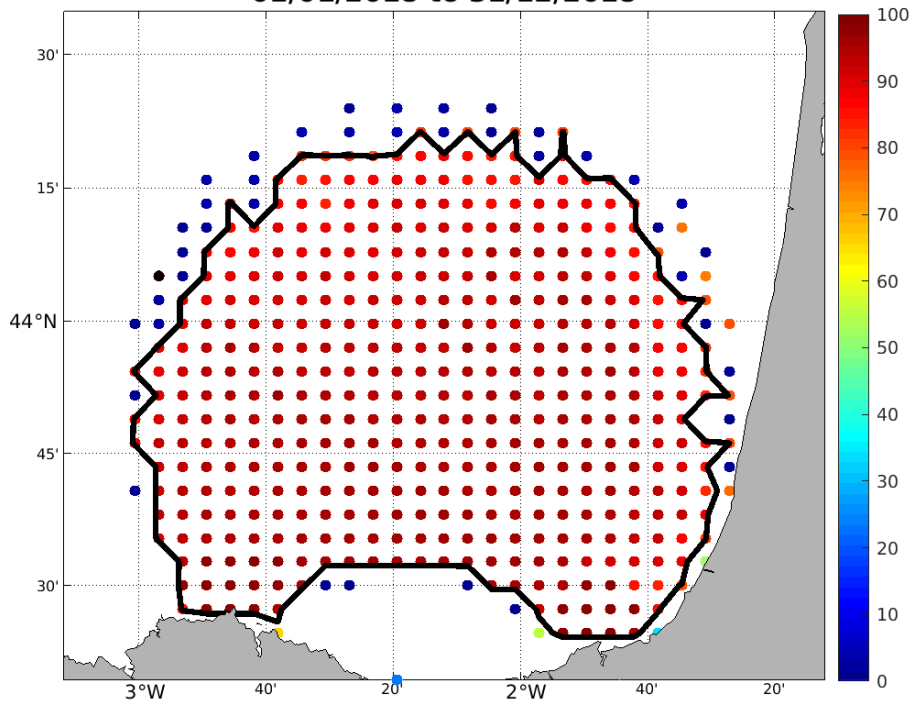
D

HFR-EUSKOOS: Spatial Coverage vs. Temporal Coverage 01/01/2018 to 31/12/2018



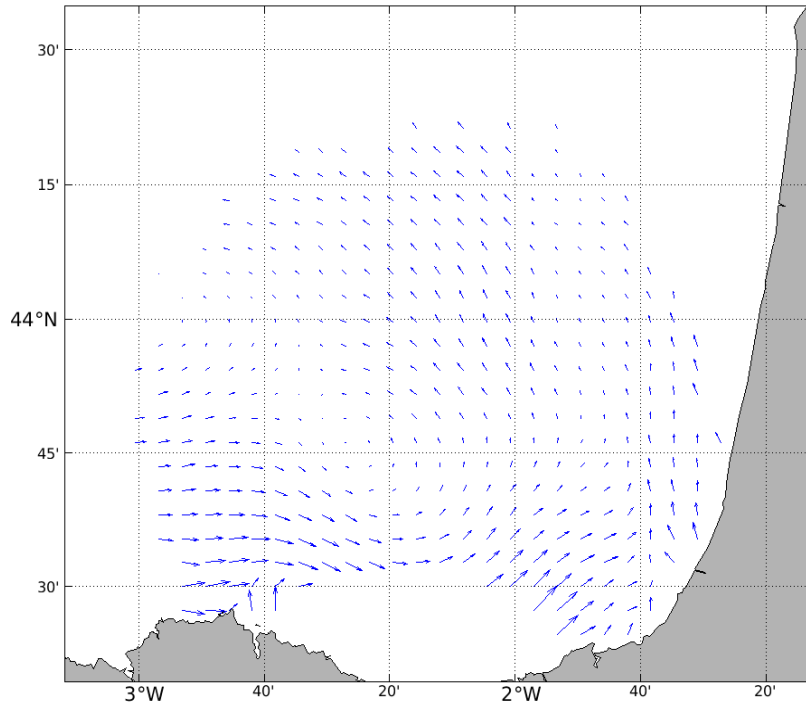
E

HFR-EUSKOOS: Percent Total Vector Coverage (contour showing >80%) 01/01/2018 to 31/12/2018



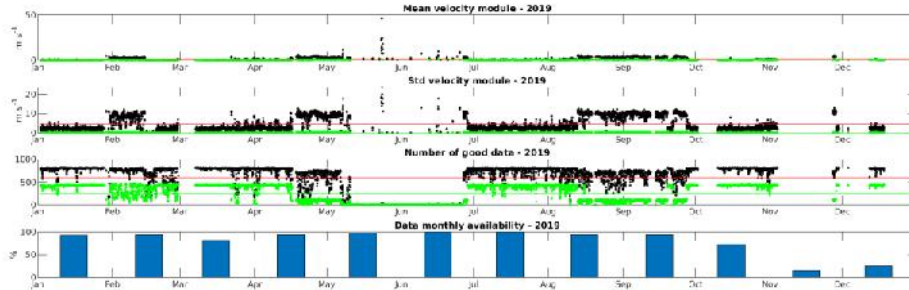
F

HFR-EUSKOOS: HFR Surface current average [m/s] 01/01/2018 to 31/12/2018

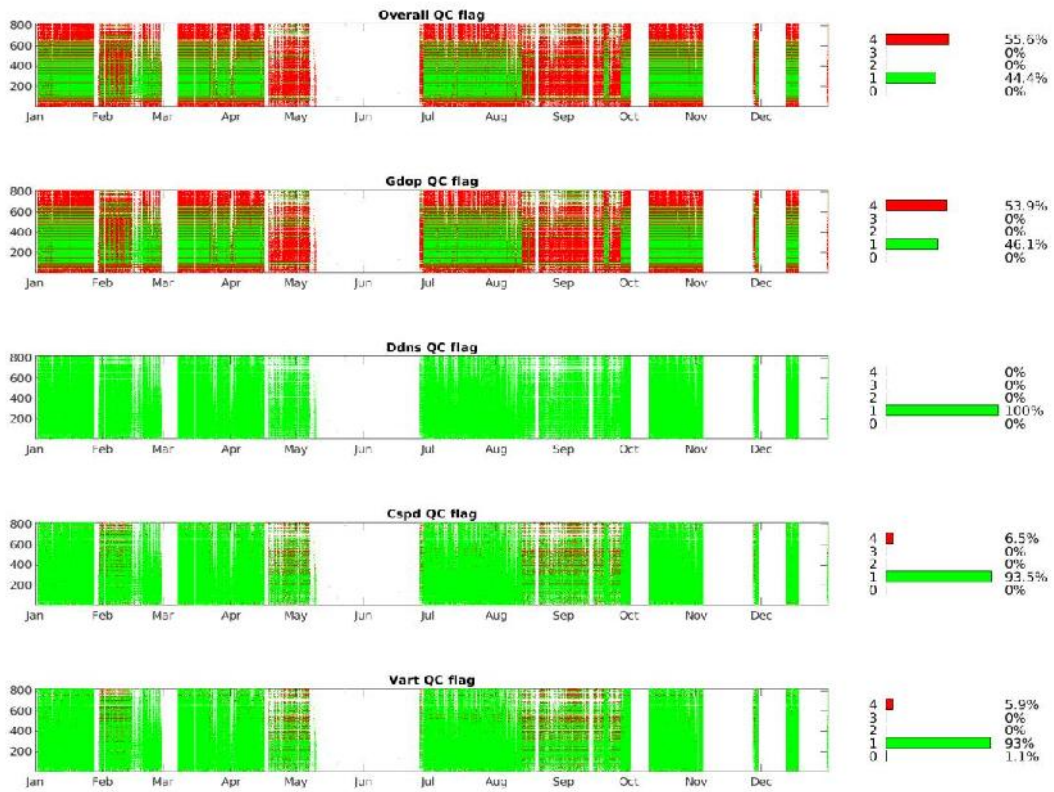


Period: 2019

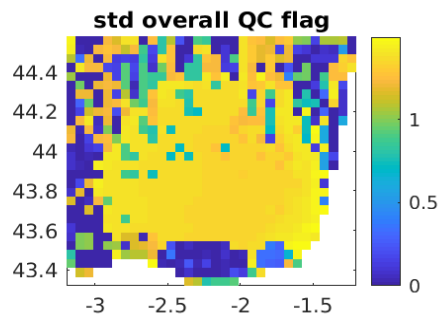
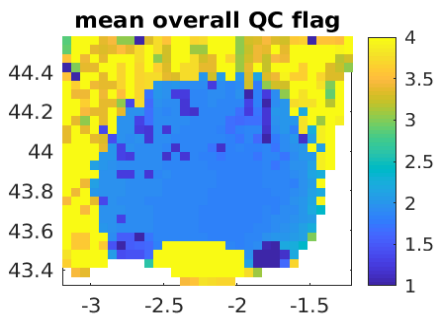
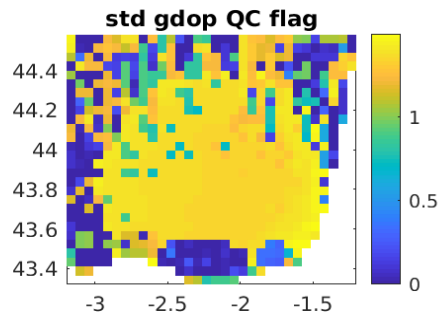
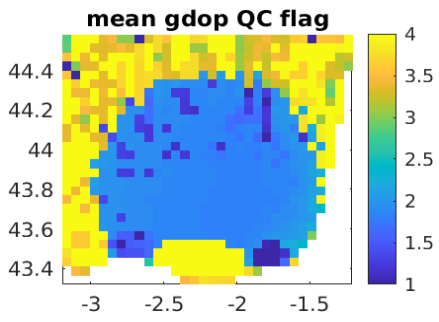
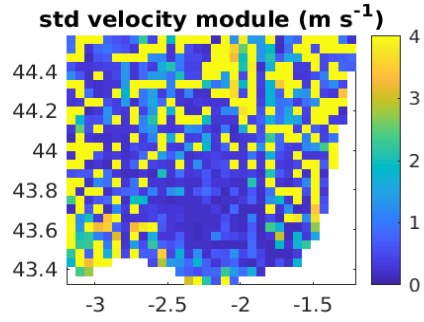
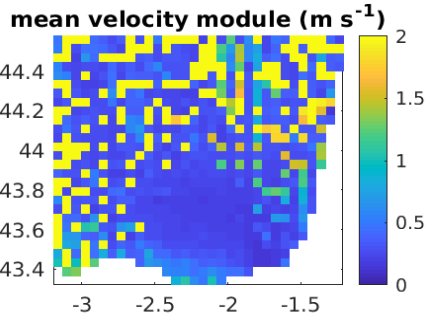
A



B

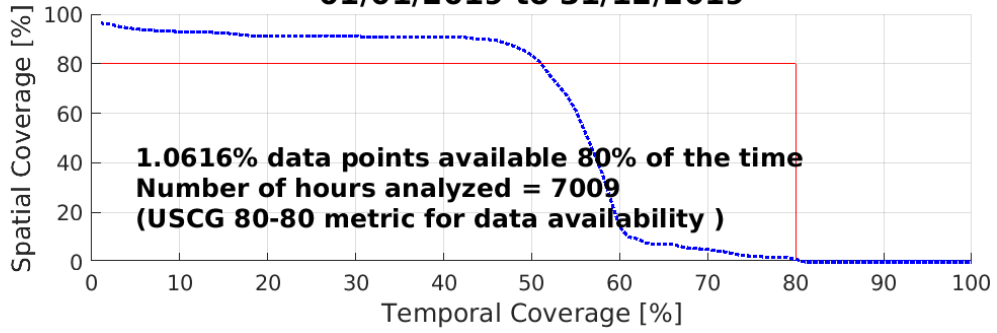


C



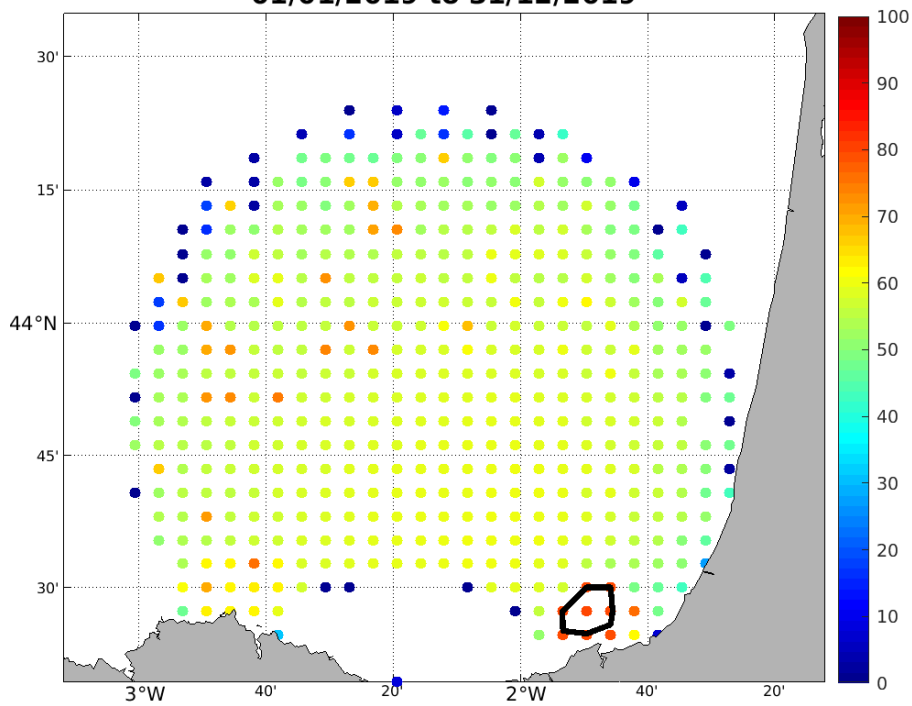
D

HFR-EUSKOOS: Spatial Coverage vs. Temporal Coverage 01/01/2019 to 31/12/2019



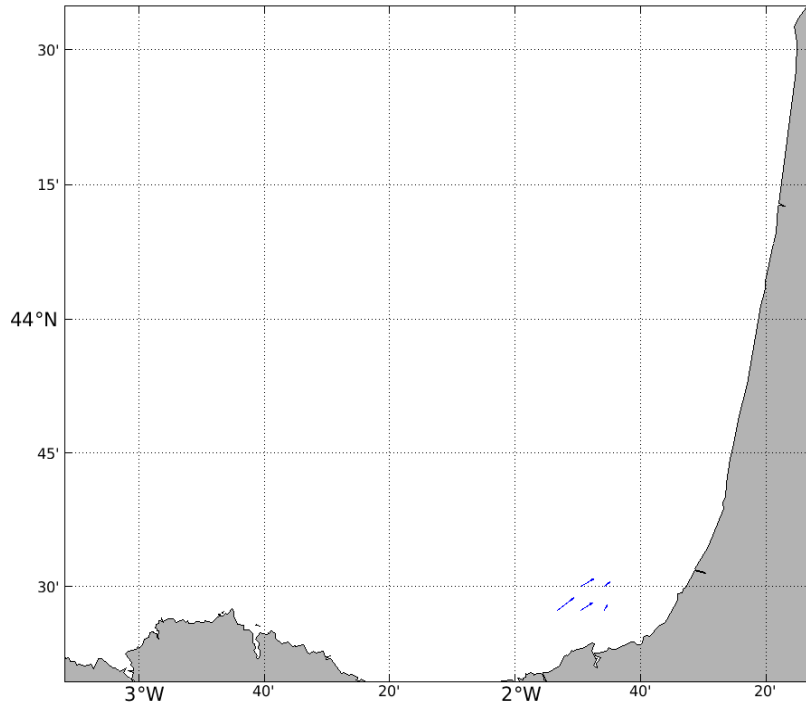
E

HFR-EUSKOOS: Percent Total Vector Coverage (contour showing >80%) 01/01/2019 to 31/12/2019



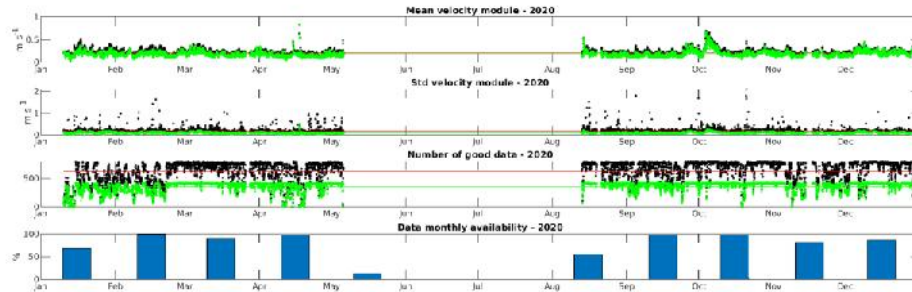
F

HFR-EUSKOOS: HFR Surface current average [m/s] 01/01/2019 to 31/12/2019

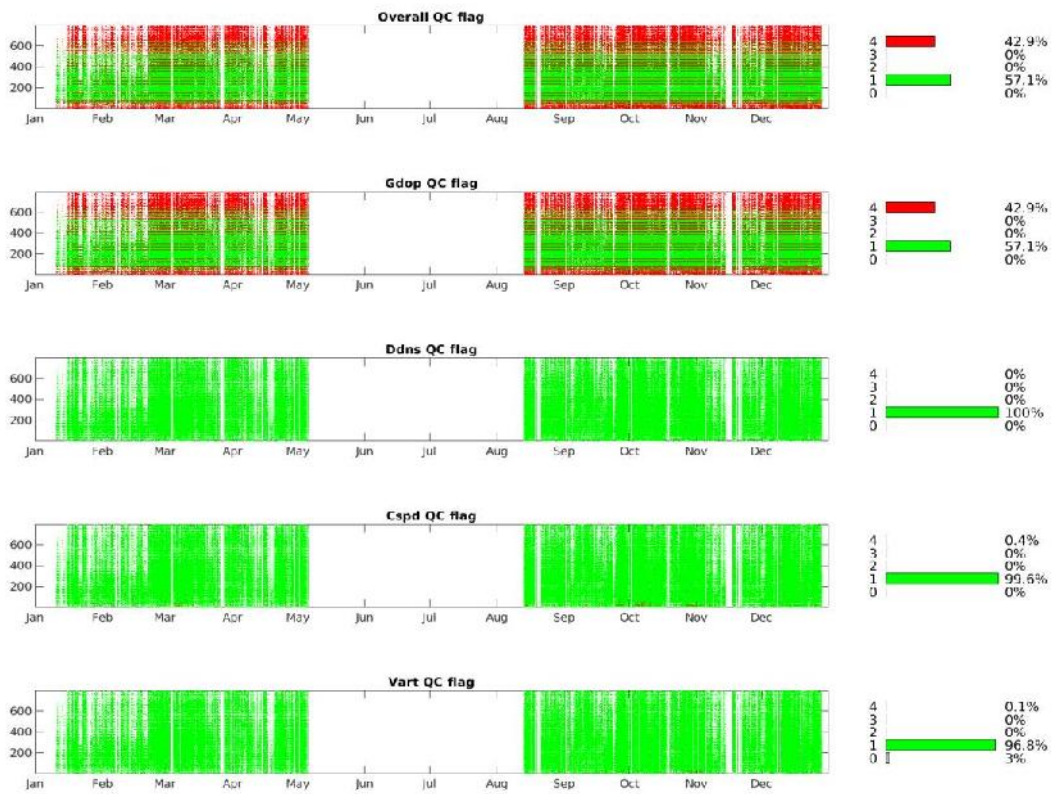


Period: 2020

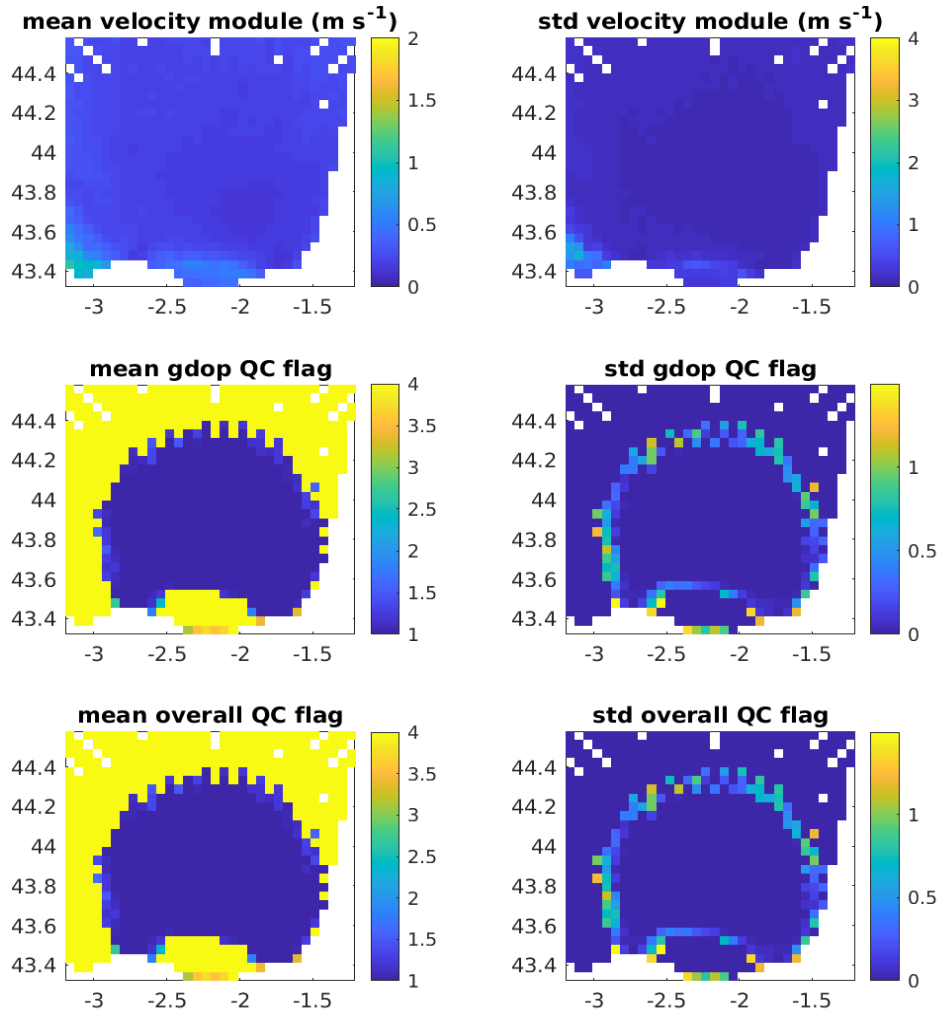
A



B

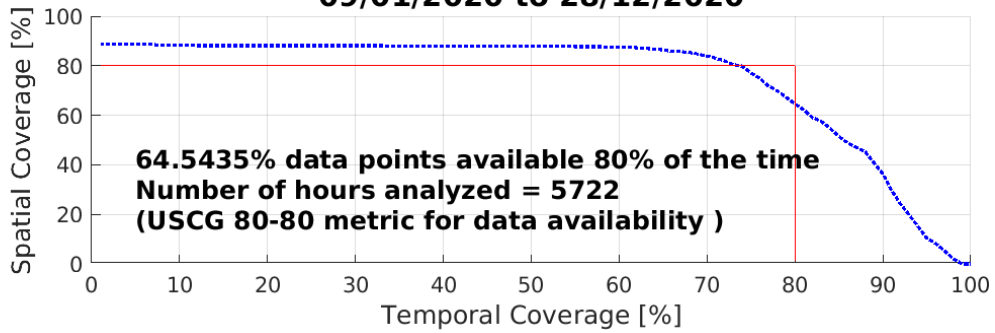


C



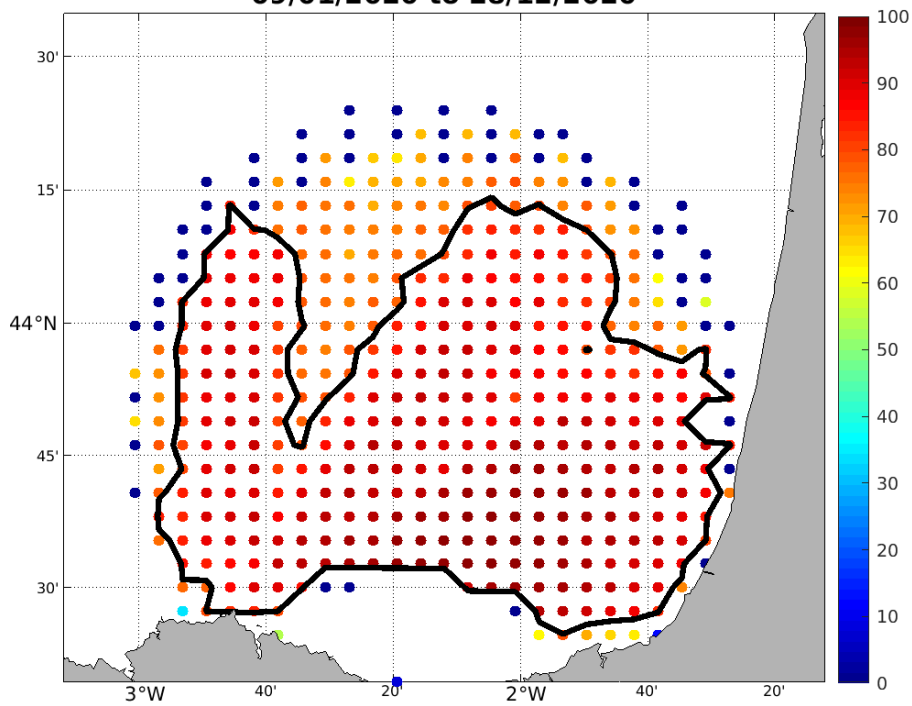
D

HFR-EUSKOOS: Spatial Coverage vs. Temporal Coverage 09/01/2020 to 28/12/2020



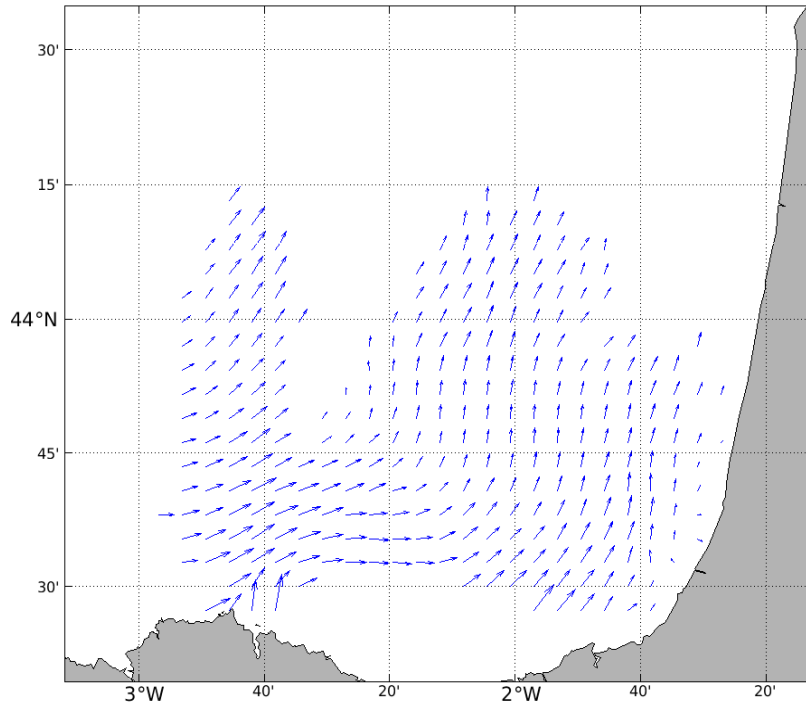
E

HFR-EUSKOOS: Percent Total Vector Coverage (contour showing >80%) 09/01/2020 to 28/12/2020



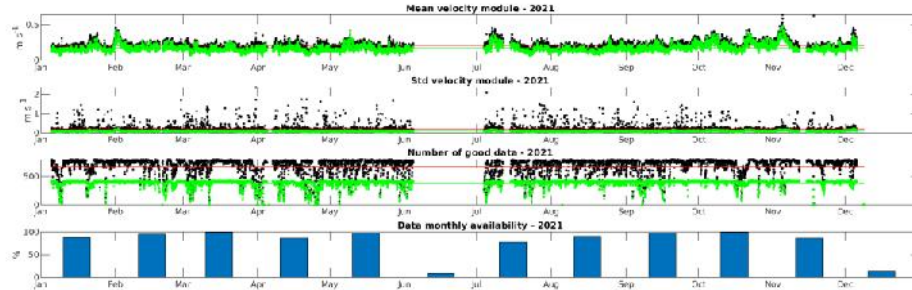
F

HFR-EUSKOOS: HFR Surface current average [m/s] 09/01/2020 to 28/12/2020

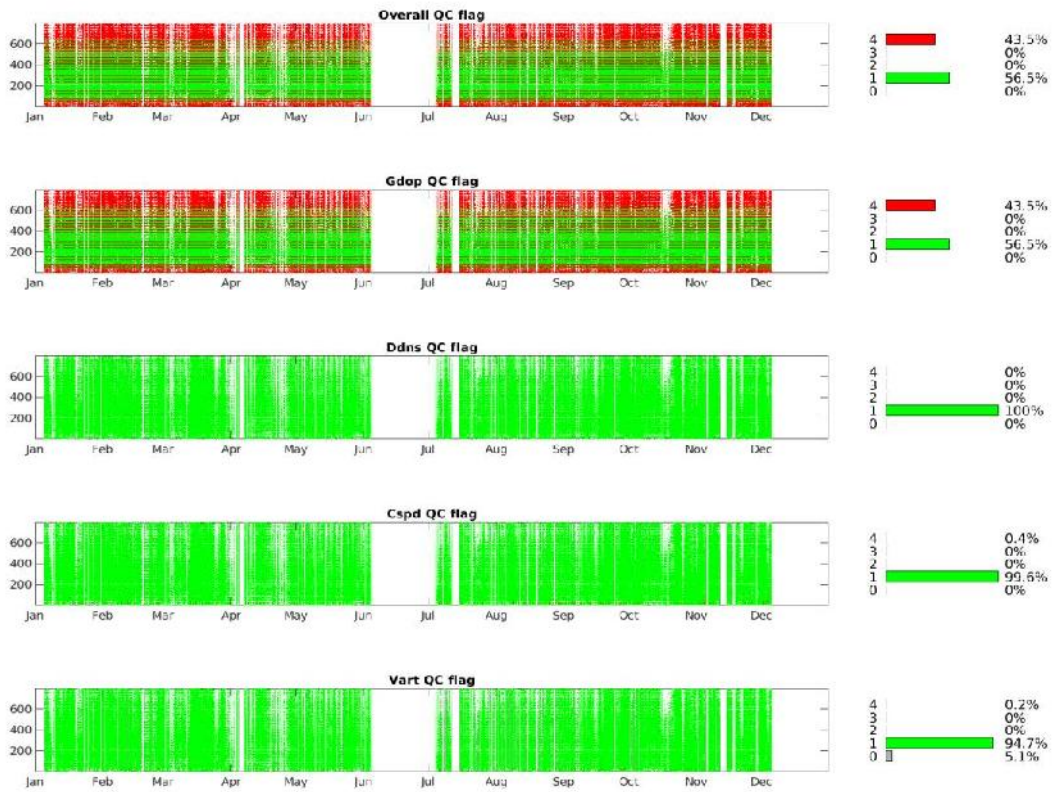


Period: 2021

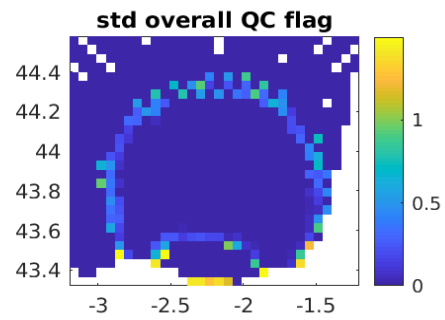
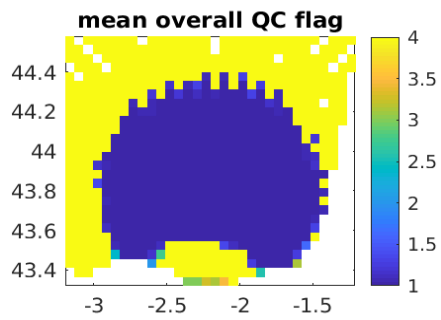
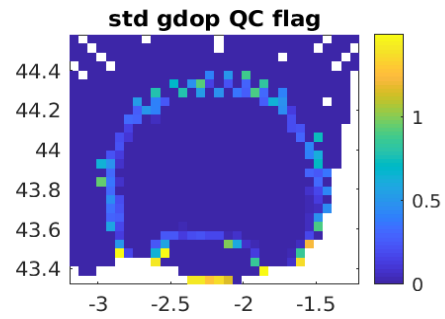
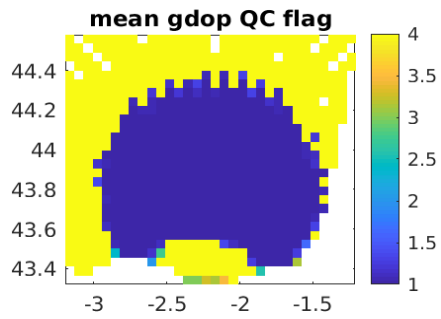
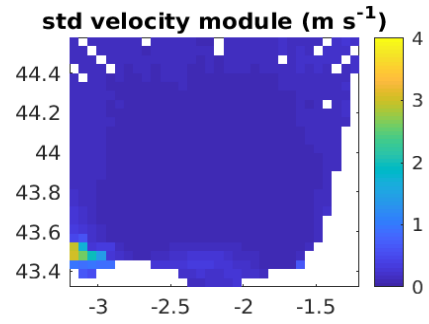
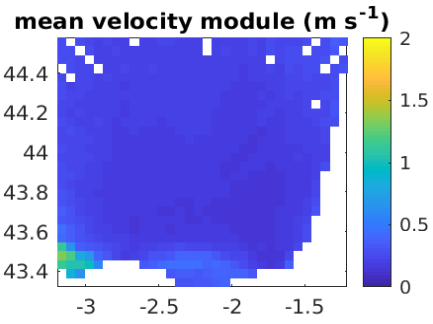
A



B

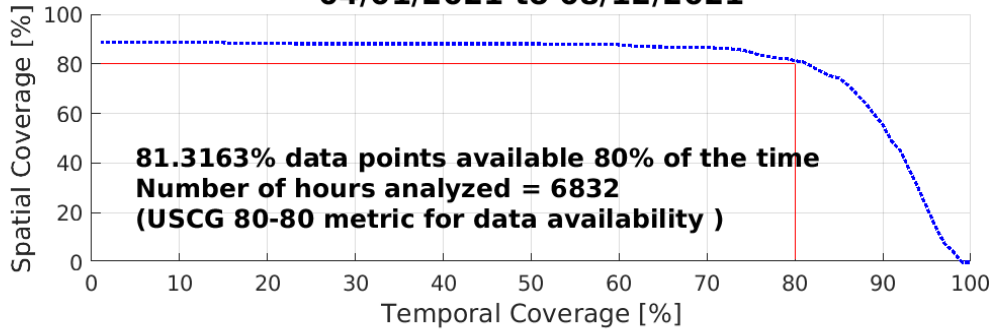


C



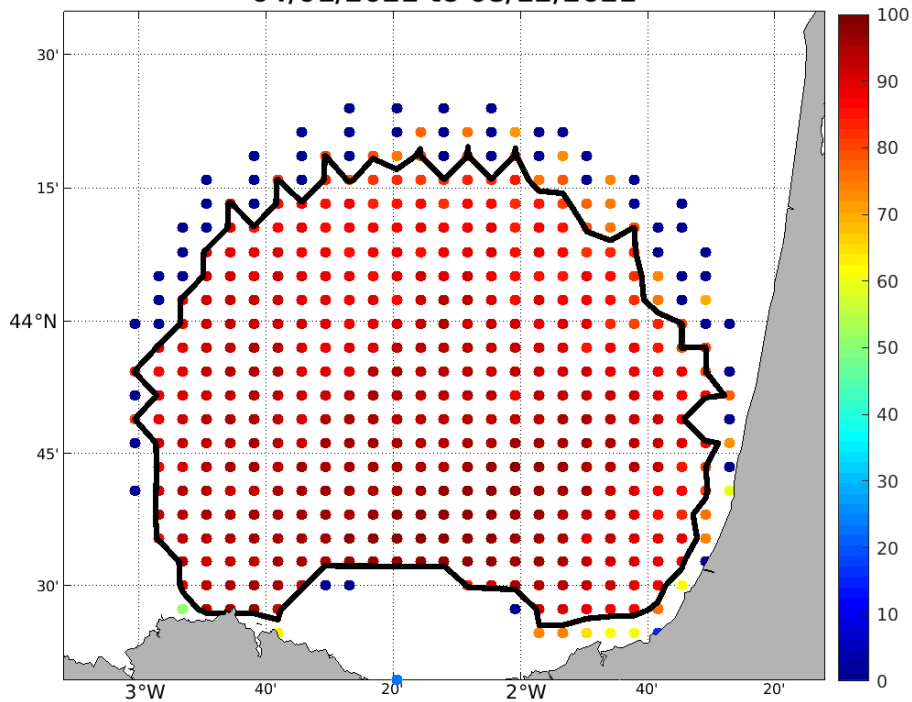
D

HFR-EUSKOOS: Spatial Coverage vs. Temporal Coverage 04/01/2021 to 08/12/2021



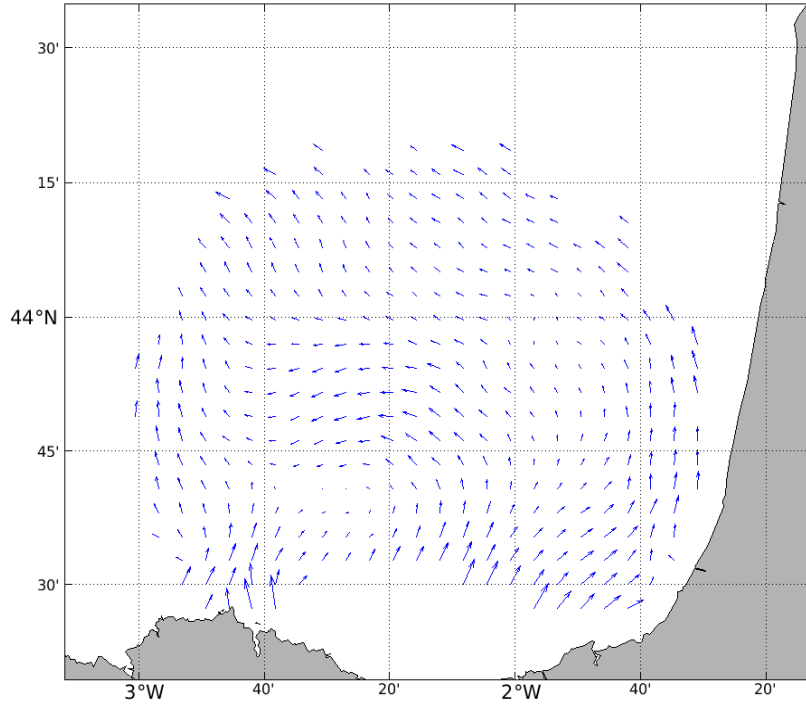
E

HFR-EUSKOOS: Percent Total Vector Coverage (contour showing >80%) 04/01/2021 to 08/12/2021



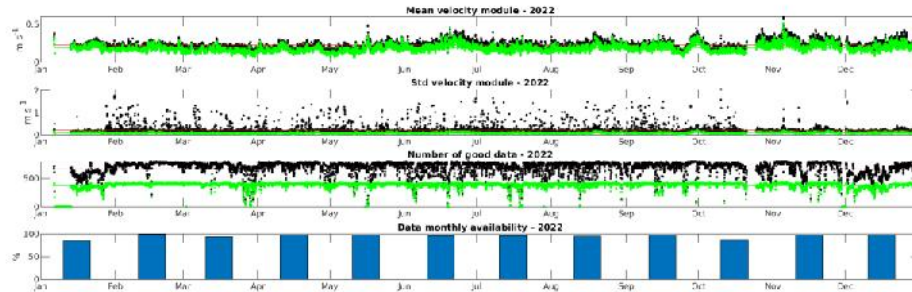
F

HFR-EUSKOOS: HFR Surface current average [m/s] 04/01/2021 to 08/12/2021

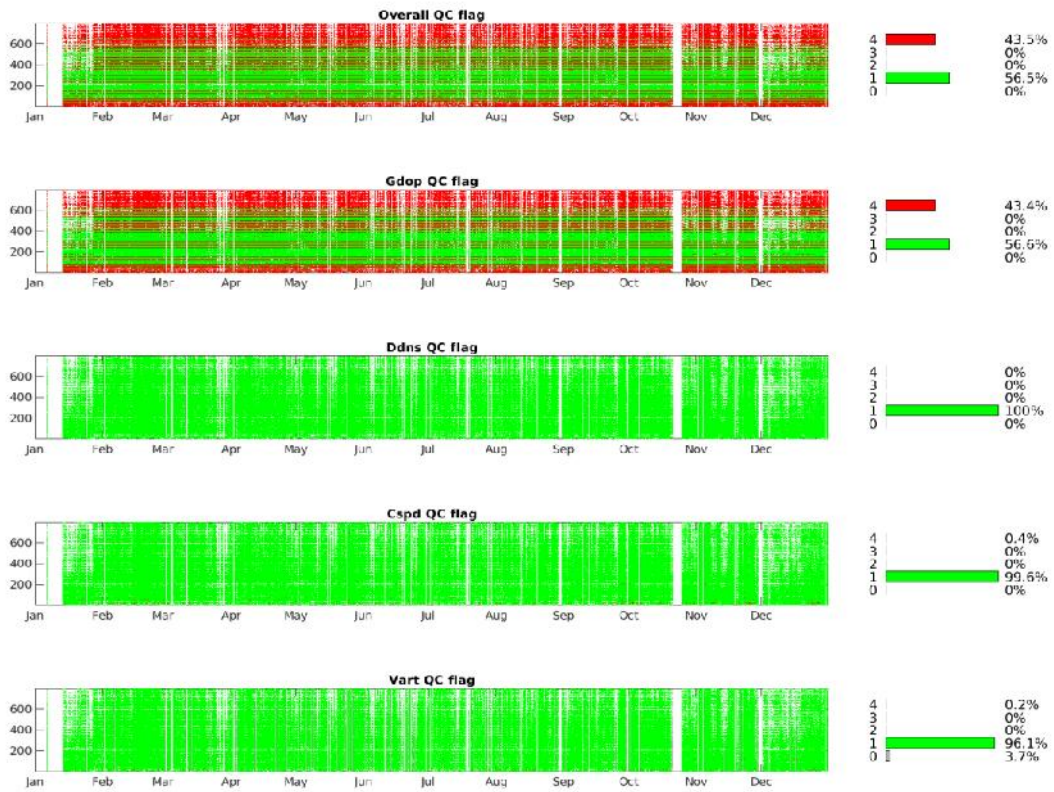


Period: 2022

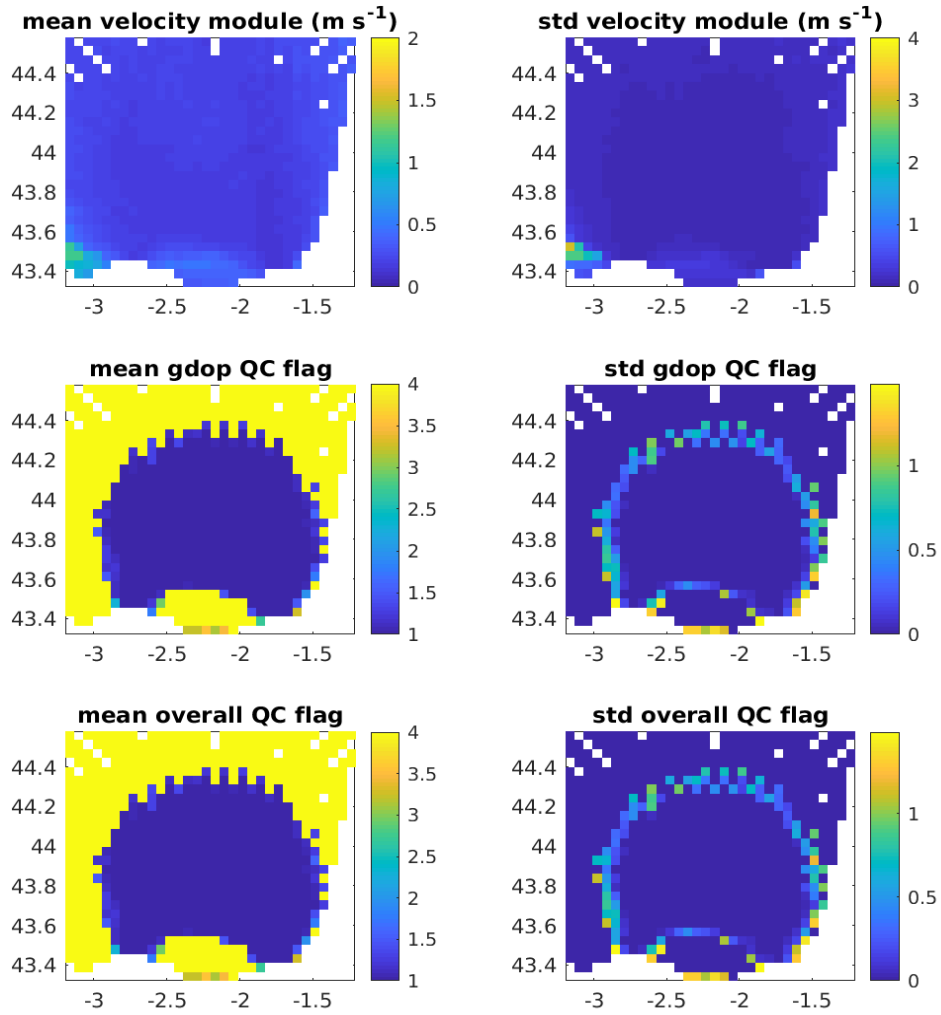
A



B

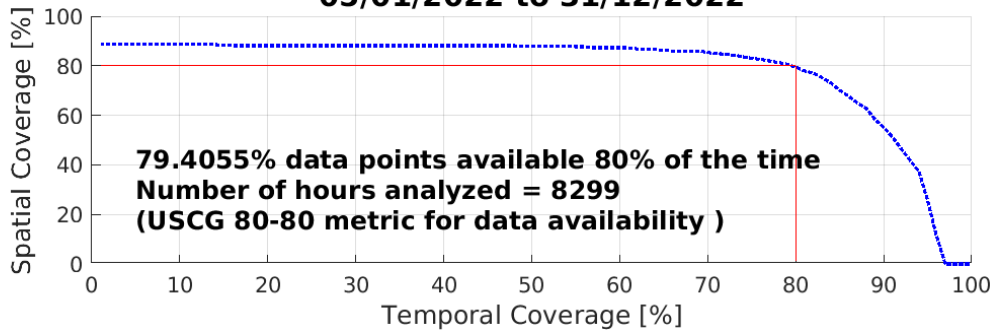


C



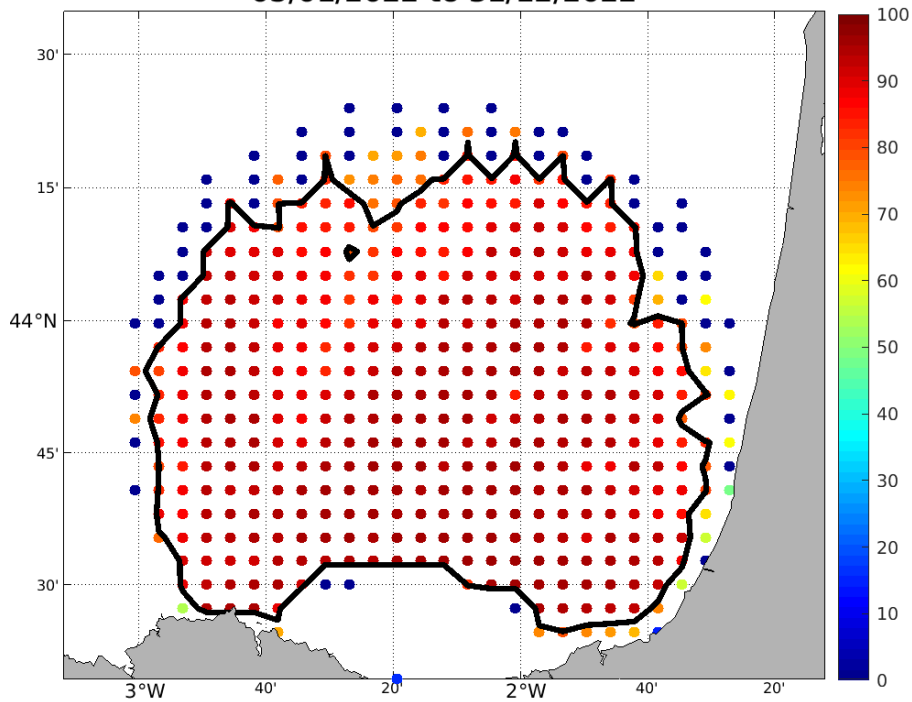
D

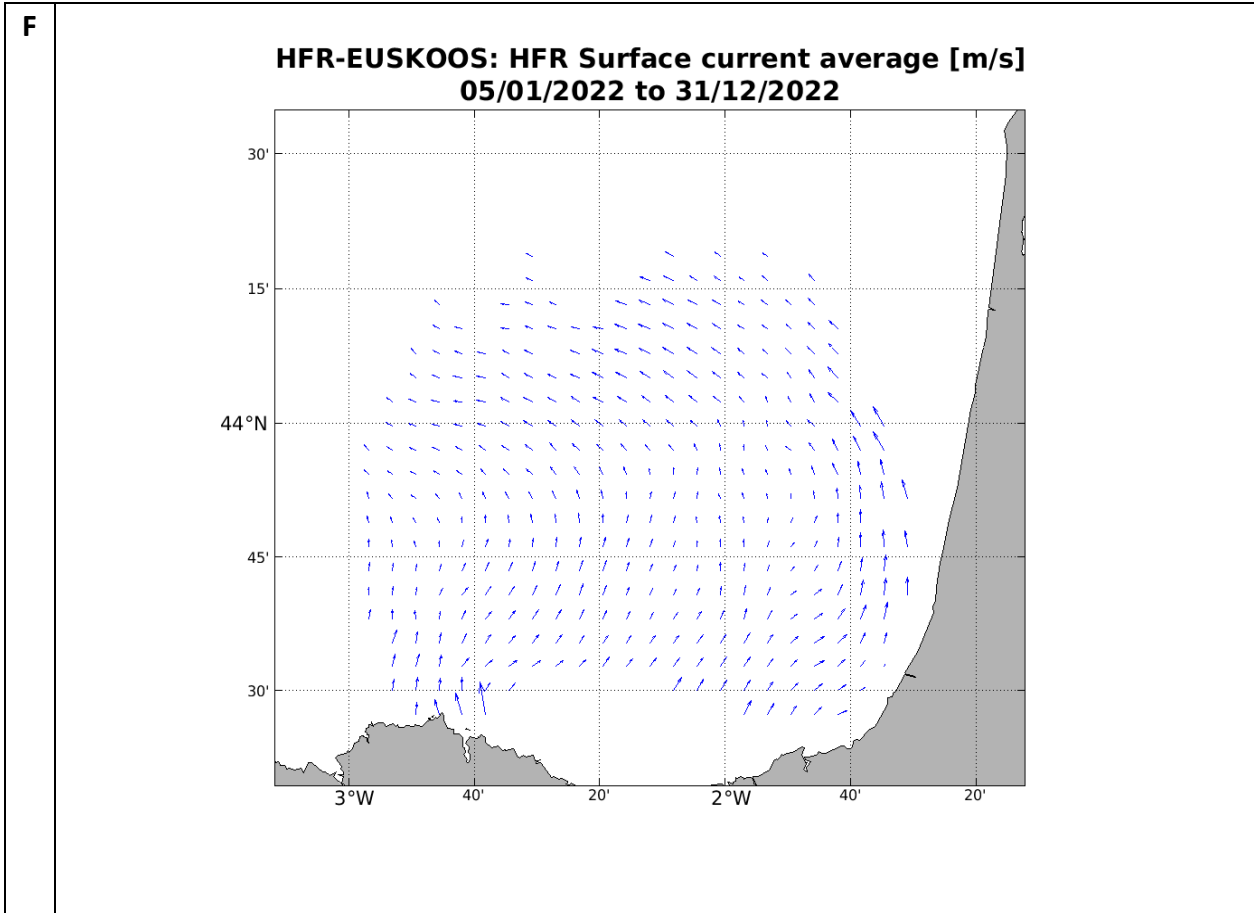
HFR-EUSKOOS: Spatial Coverage vs. Temporal Coverage 05/01/2022 to 31/12/2022



E

HFR-EUSKOOS: Percent Total Vector Coverage (contour showing >80%) 05/01/2022 to 31/12/2022





Version of the report	Changes made by	Nature of changes
V2	M. Chifflet & A. Rubio	Spatial coverage details
V3	A. Rubio & M. Chifflet	+ figures
V4	A. Rubio & M. Chifflet	New version after reflagging
VR2020_12	L. Solabarrieta & A. Rubio	Update 2020
VR2022_05	L. Solabarrieta & I. Manso	Update 2021
VR2023_11	L. Solabarrieta & I. Manso	Update 2022

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