

Report on HFR - Gibraltar Historical data files QA/QC

Data provider information:

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- acknowledgements: The network has been designed, implemented and managed through the efforts of Puertos del Estado.

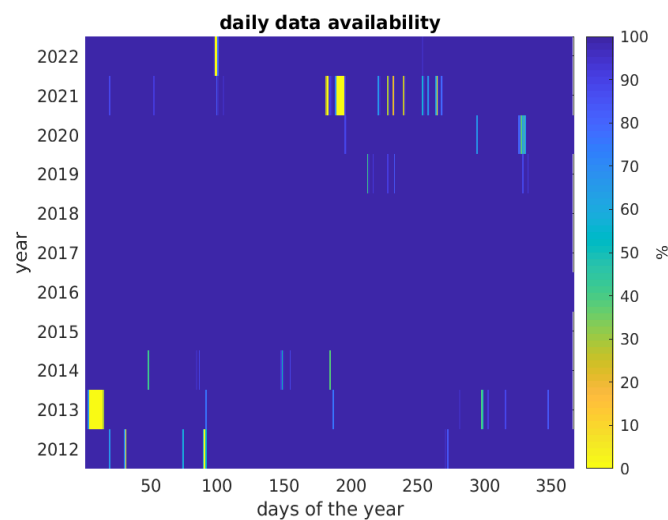
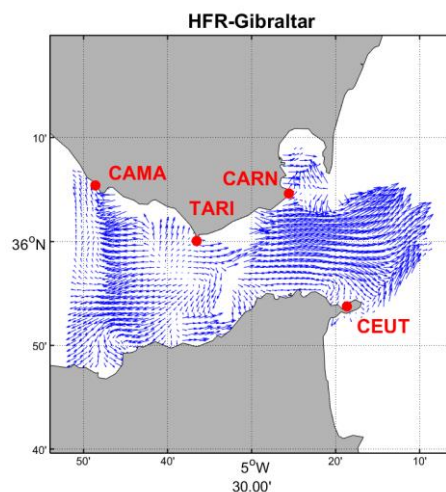
System: **Gibraltar**

Sites: **CAMA, CARN, CEUT, TARI**

Data set: **Totals**

Data source: Totals from the radials combination in de EU Node

Period: **2012-Jan-01 - 2022-Dec-31**



Daily data % available during the whole time period

INFO ON QA/QC Settings and Calibration

%%% QC info for all the period 1-Jan-2012 – 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 the period 1-Jan-2012 – 31-Dec-2022

CAMA: 2022-04-18T00:00:00Z; CARN: 2021-12-13T00:00:00Z; CEUT: 2022-01-21T00:00:00Z; TARI: 2021-12-13T00:00:00Z

RESULTS OF HIST DATA INSPECTION

General comments:

The “number of good data” is high in general. However, there are also periods where it decreases. The main QC flags correspond to GDOP and the velocity threshold. These are the mentioned periods:

- Mar-Jul 2013
- May-August 2014
- April 2015
- April 2016
- Few weeks in 2017
- Feb 2019
- Jan 2020 and Sep-Dec
- Jan-May and July 2021

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

Data availability is unstable in 2013, 2014 and 2021. In general, the spatio-temporal coverage does never fit the 80%-80% objective for the complete study area but depending on the number of functioning antennas, there are two areas inside the whole footprint, where the coverage is good and stable. These areas are located around 5°40'W - 35°55'N and 5°15'W - 36°05' N where the 80%-80% objective is reached except for 2013, 2014 and 2021.

The mean circulation pattern presents a strong eastward current through the Gibraltar Strait, for the available periods.

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

Period	General comments	Nb. analysed hours	80%-80% obj.
2012	31.9842% spatial availability 80% of the time.	8684	n
2013	3.998% spatial availability 80% of the time.	8445	n
2014	9.1807% spatial availability 80% of the time.	8709	n
2015	22.31% spatial availability 80% of the time.	8760	n

2016	33.0207% spatial availability 80% of the time.	8784	n
2017	38.0059% spatial availability 80% of the time.	8760	n
2018	38.7957% spatial availability 80% of the time.	8760	n
2019	36.6732% spatial availability 80% of the time.	8732	n
2020	30.7502% spatial availability 80% of the time.	8718	n
2021	0.049358% spatial availability 80% of the time.	8424	n
2022	65.696% spatial availability 80% of the time.	8705	n

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.

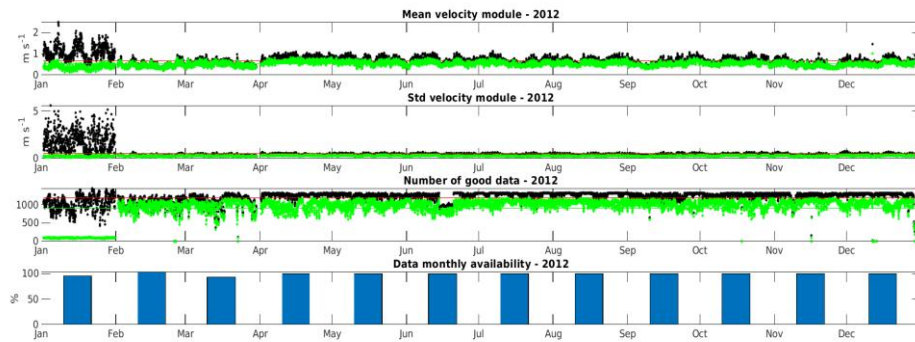
Fig D - Spatial (x-axis) vs. temporal (y-axis) coverage 80/80 annual metric. Allows to check if the system has reached the goal of providing surface currents over the 80% of the area during 80% of the time. The grid points taken in account for the % are the ones inside the GDOP limits defined by the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

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

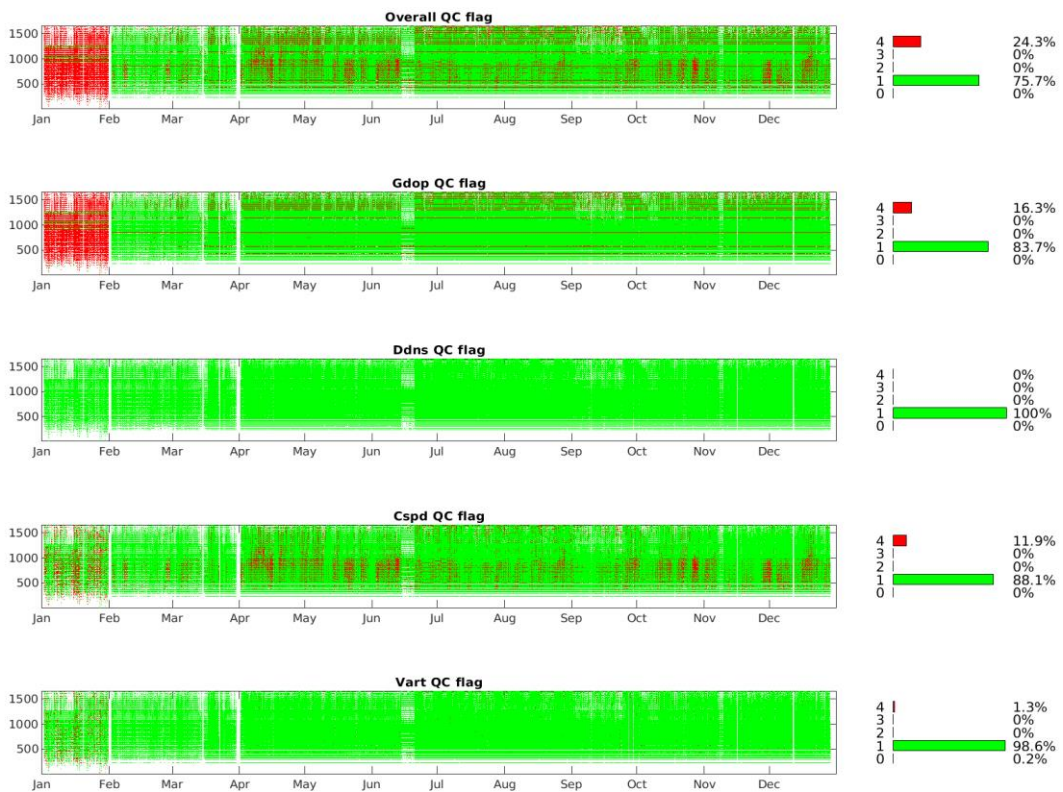
Fig F- Mean surface current maps for the indicated systems and periods. The means are computed in the area of 80% temporal coverage for the target year.

Period: 2012

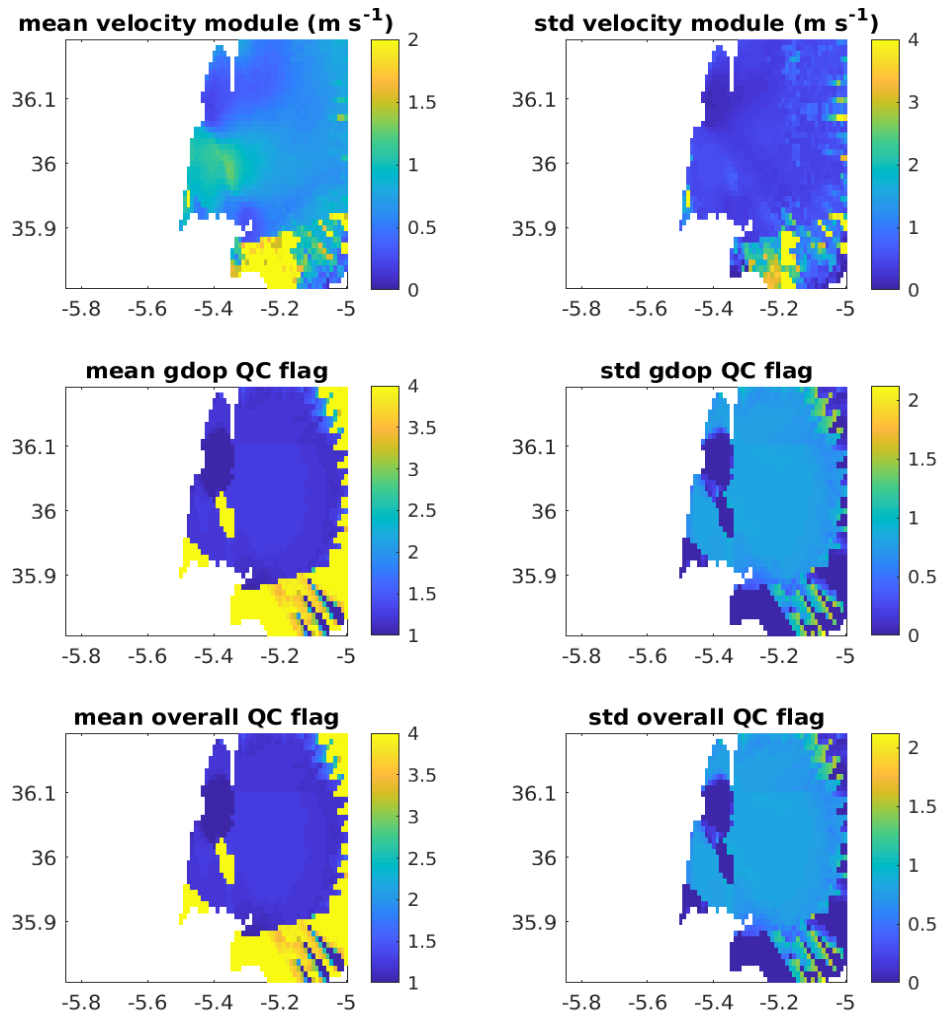
A



B

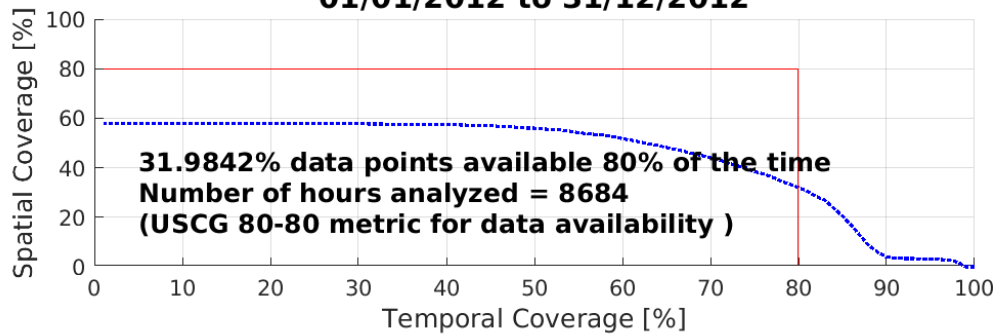


C



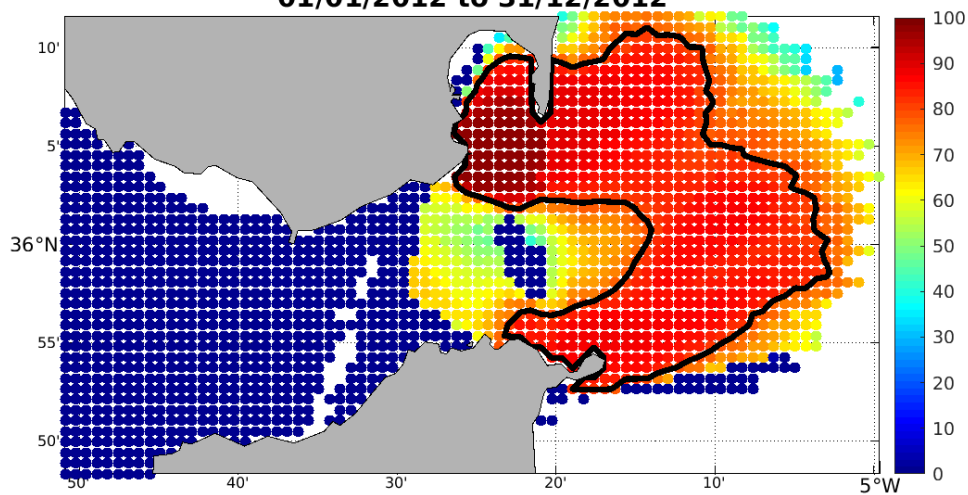
D

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



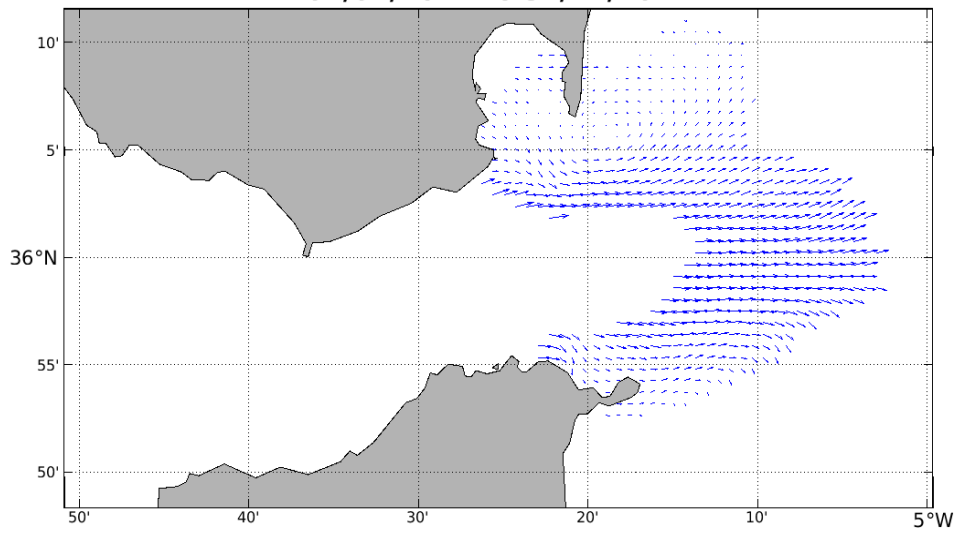
E

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



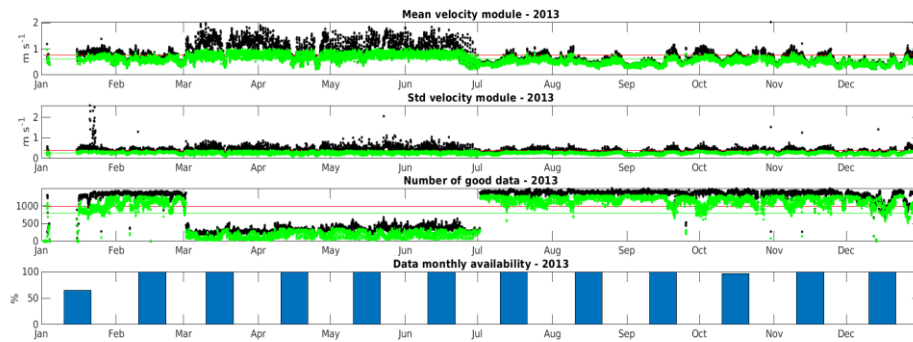
F

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

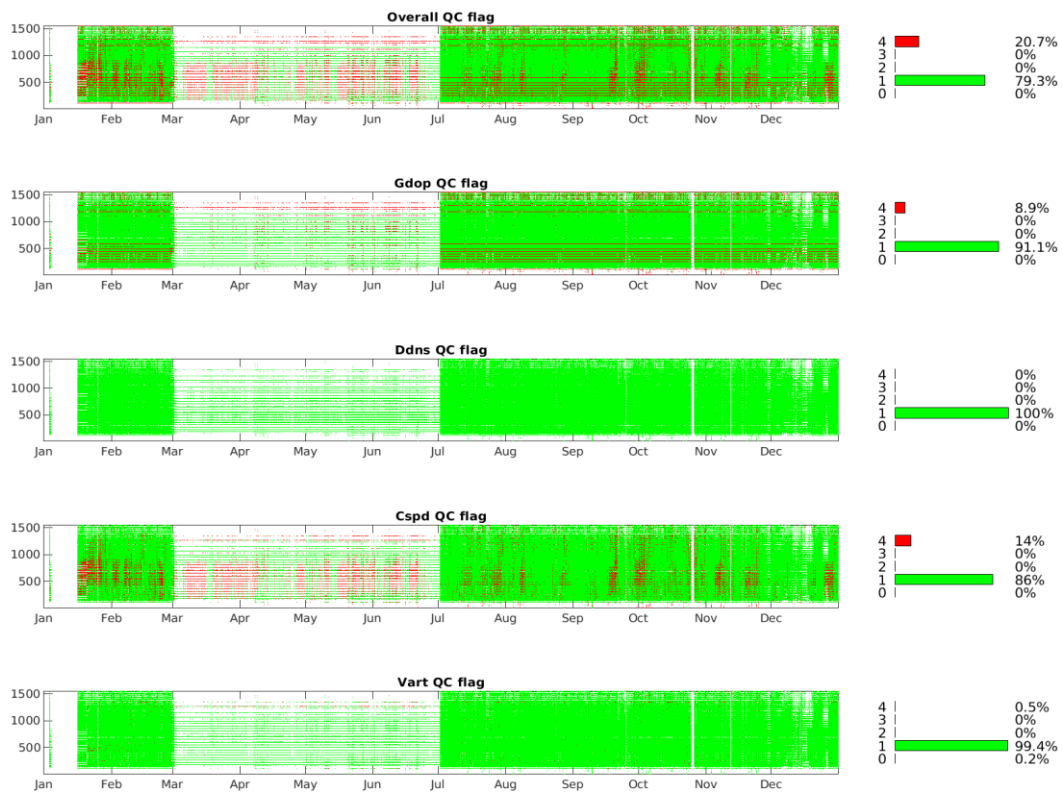


Period: 2013

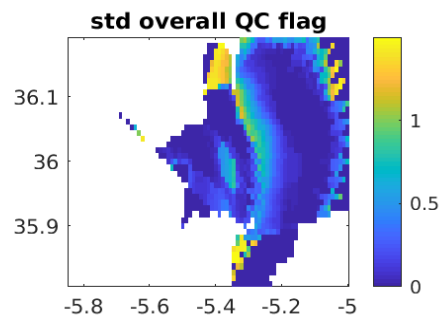
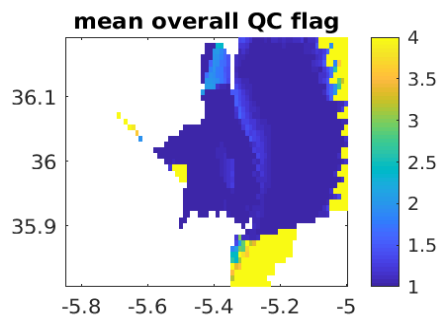
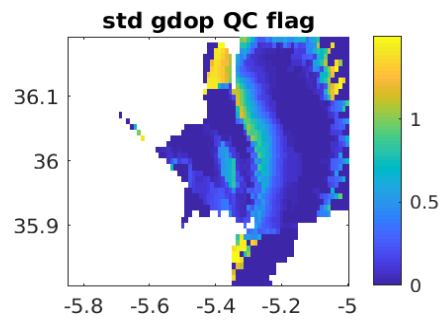
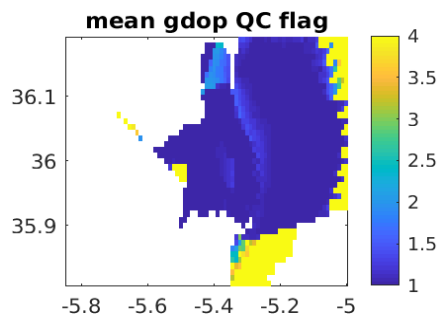
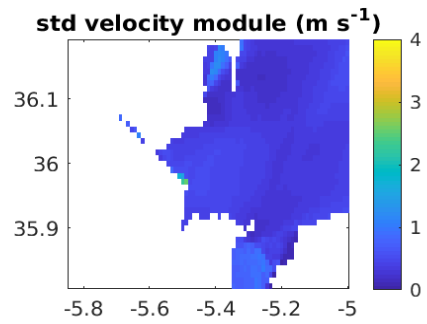
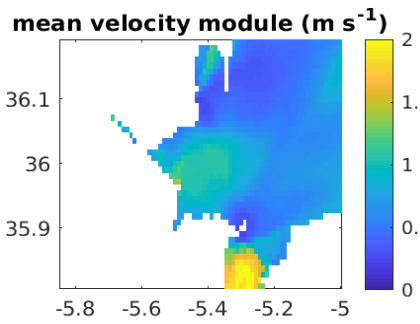
A



B

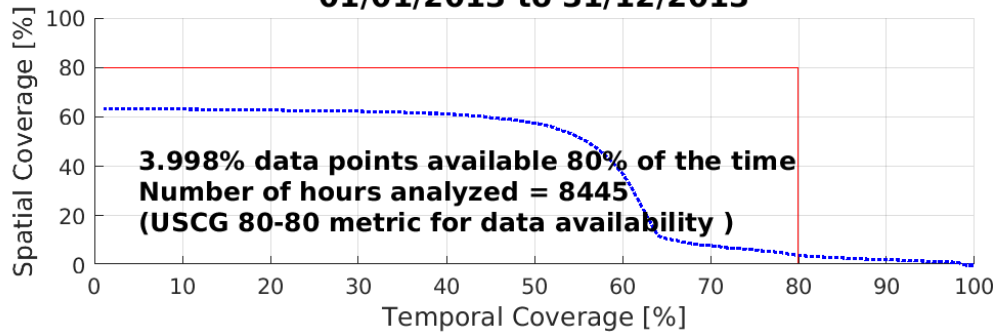


C



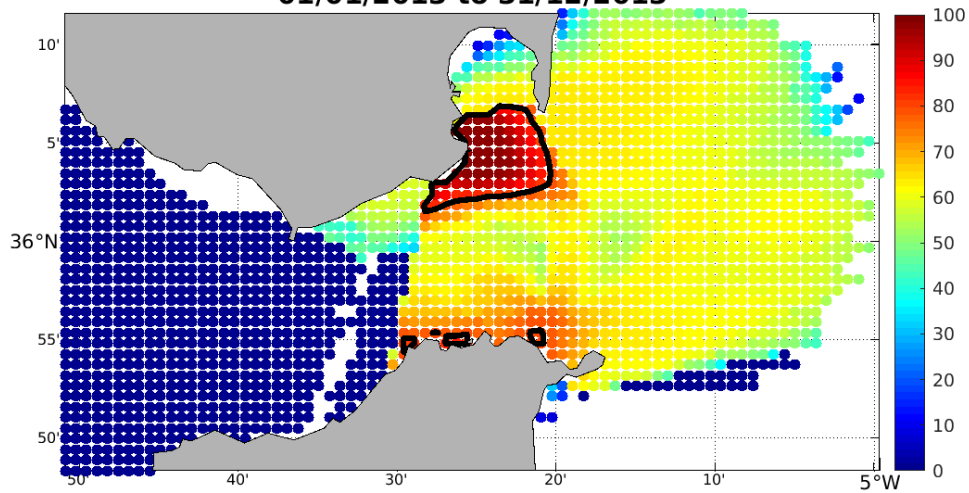
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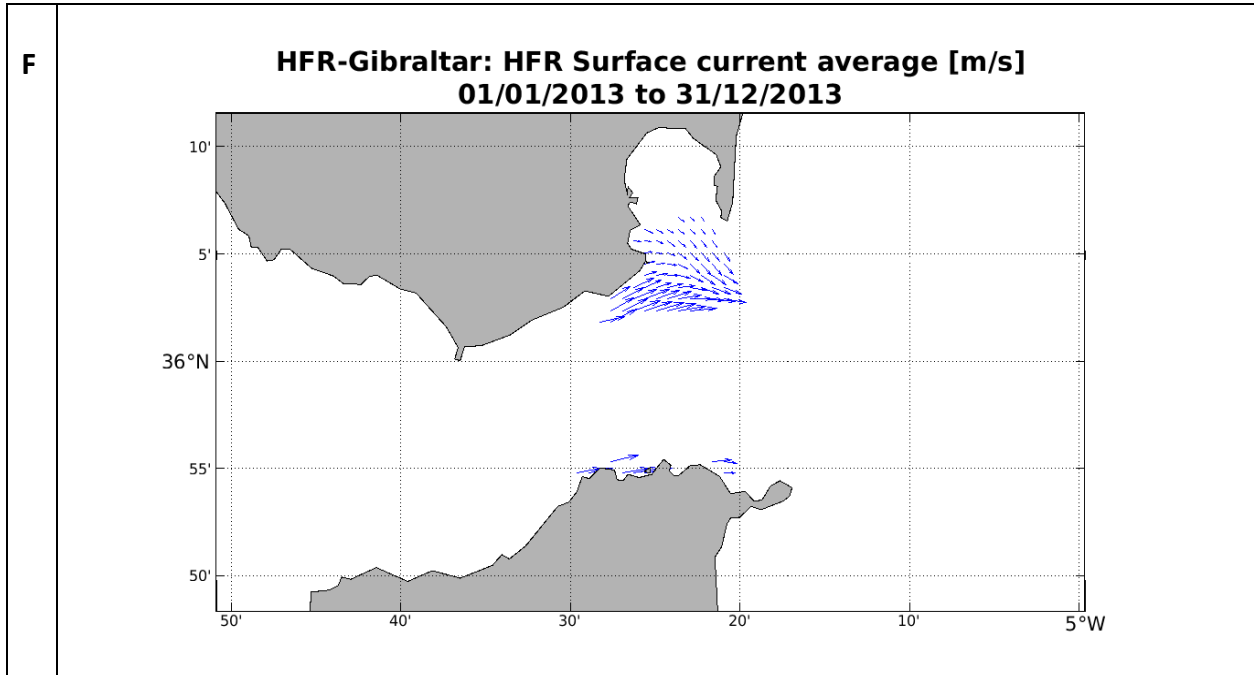
HFR-Gibraltar: Spatial Coverage vs. Temporal Coverage 01/01/2013 to 31/12/2013



E

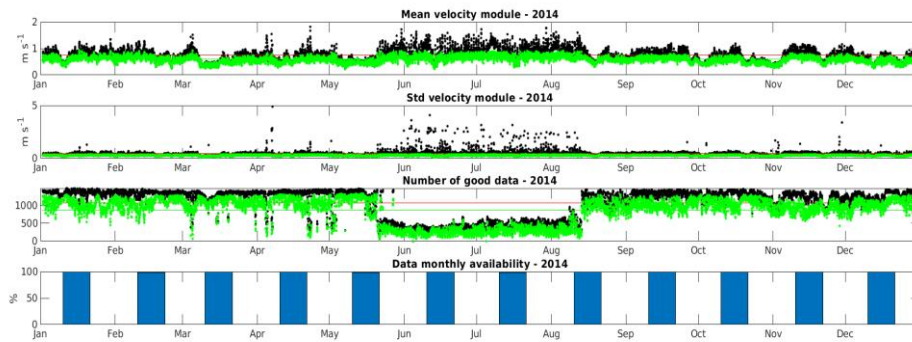
HFR-Gibraltar: Percent Total Vector Coverage (contour showing >80%) 01/01/2013 to 31/12/2013



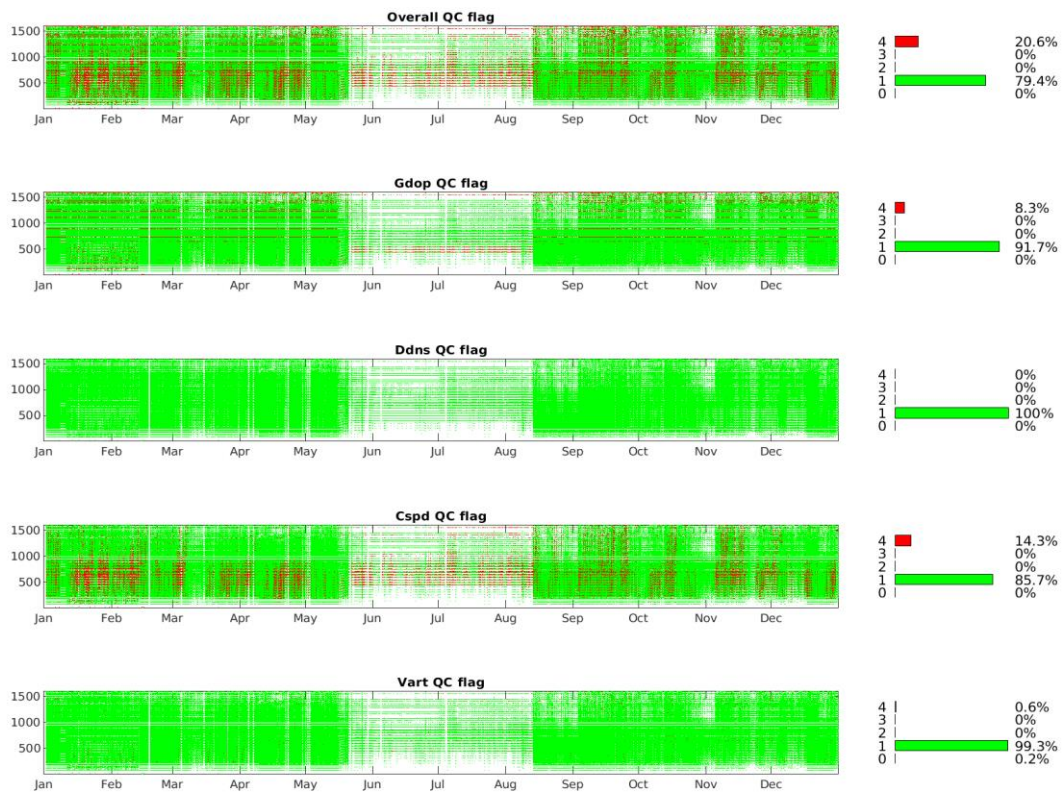


Period: 2014

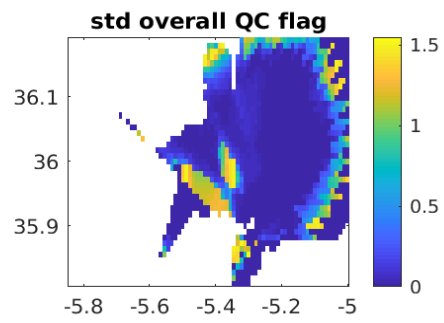
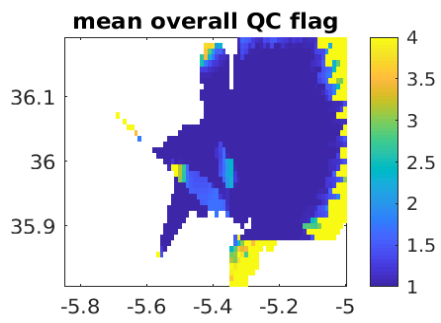
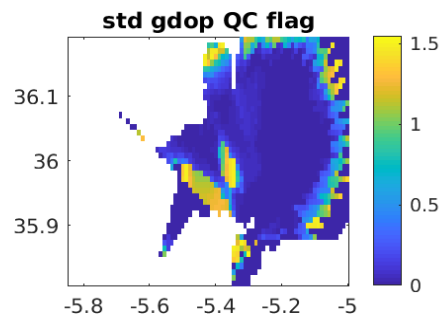
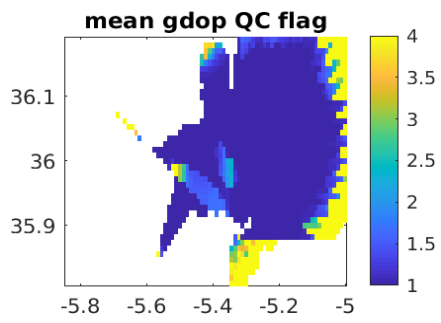
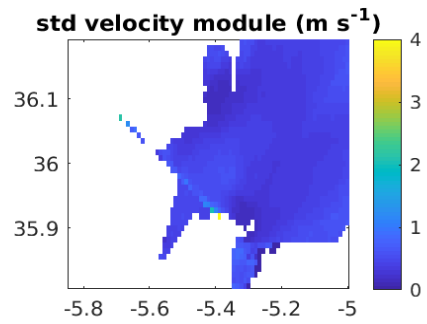
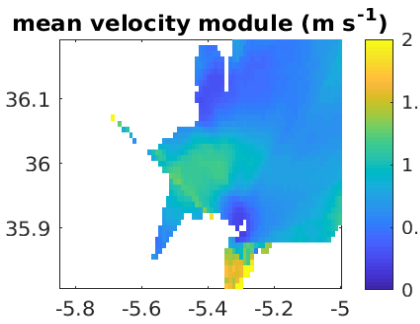
A



B

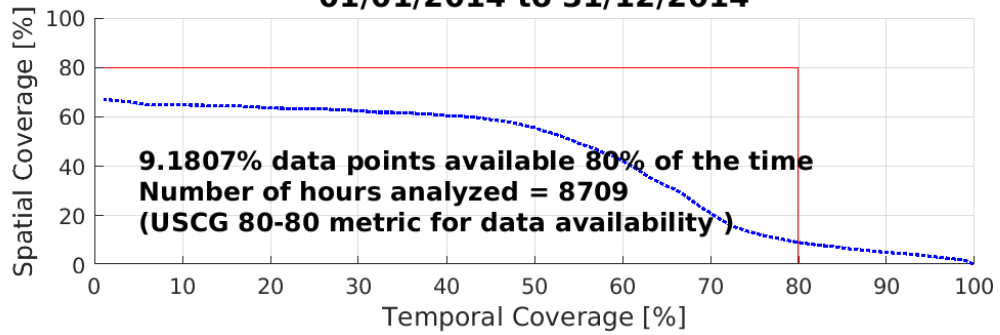


C



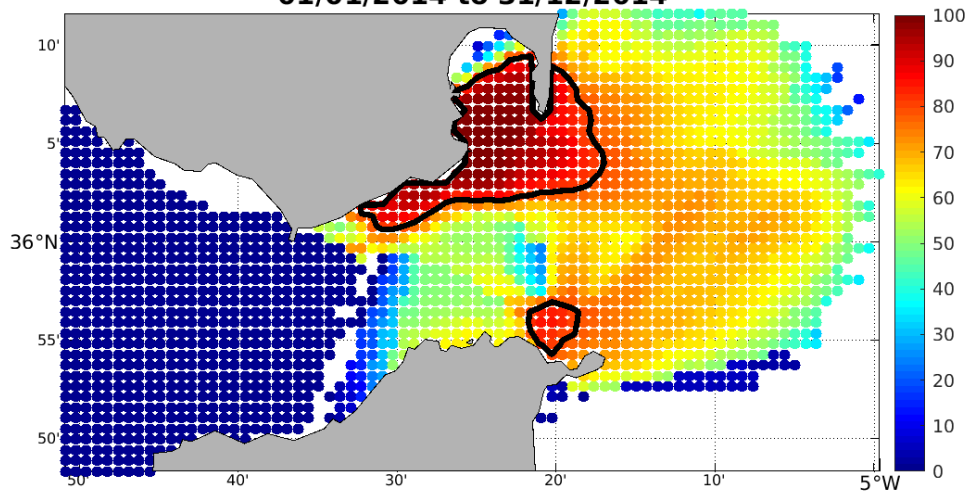
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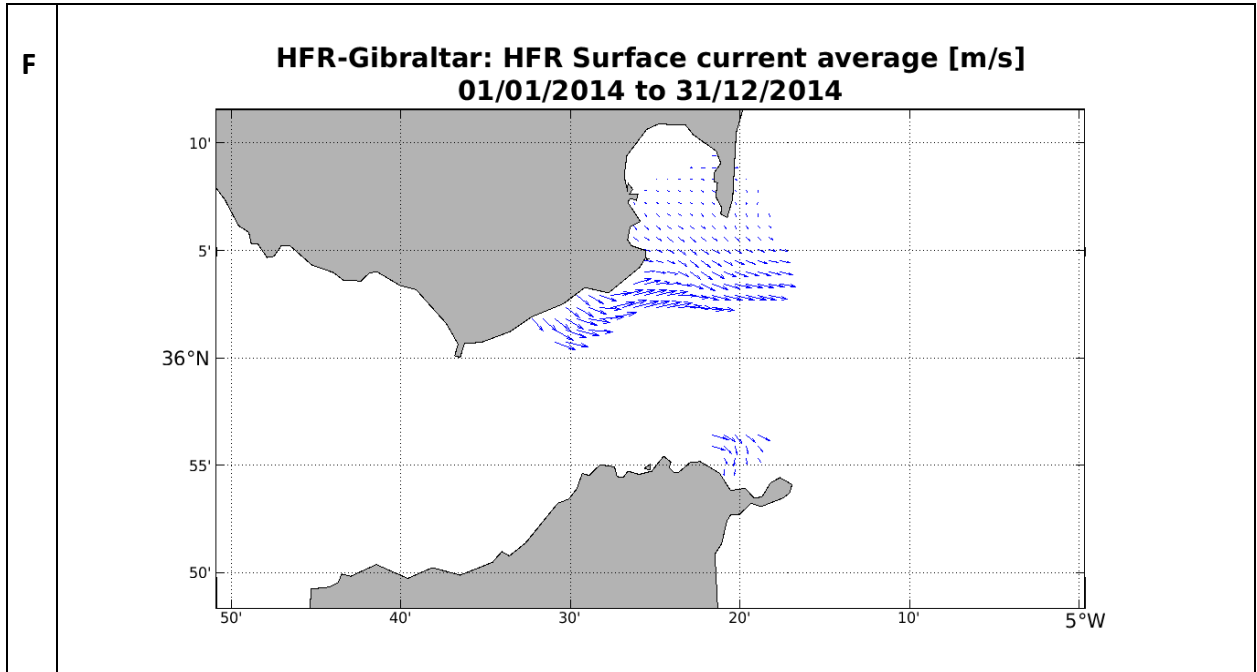
HFR-Gibraltar: Spatial Coverage vs. Temporal Coverage 01/01/2014 to 31/12/2014



E

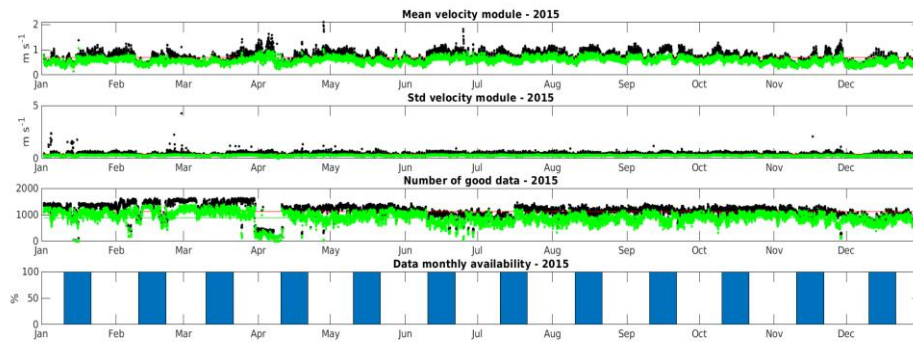
HFR-Gibraltar: Percent Total Vector Coverage (contour showing >80%) 01/01/2014 to 31/12/2014



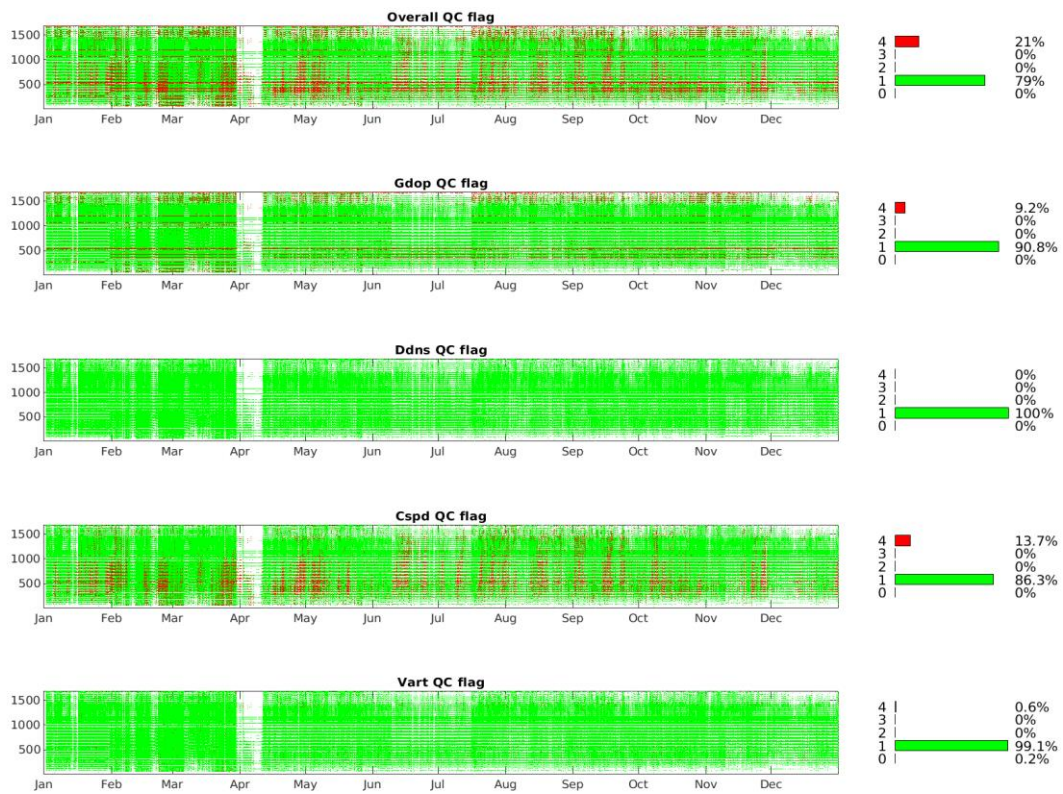


Period: 2015

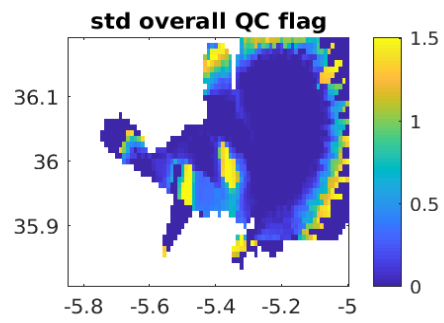
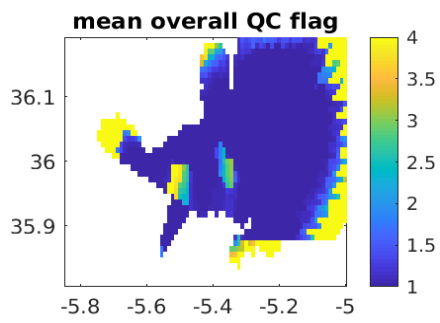
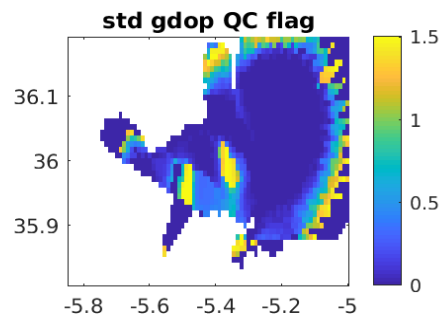
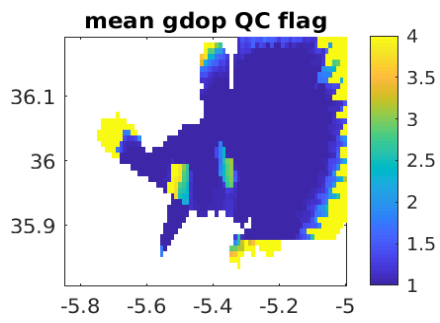
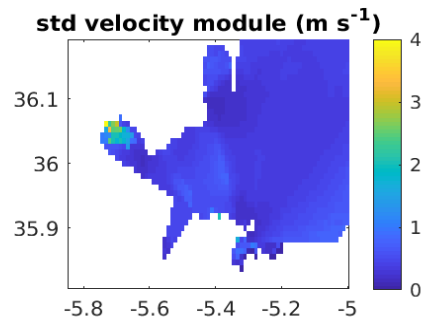
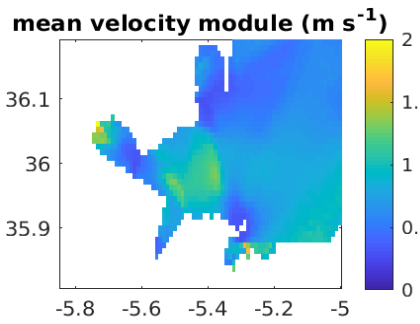
A



B

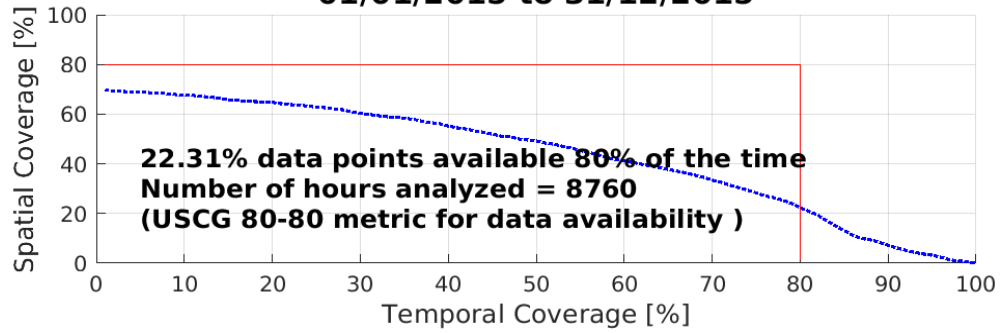


C



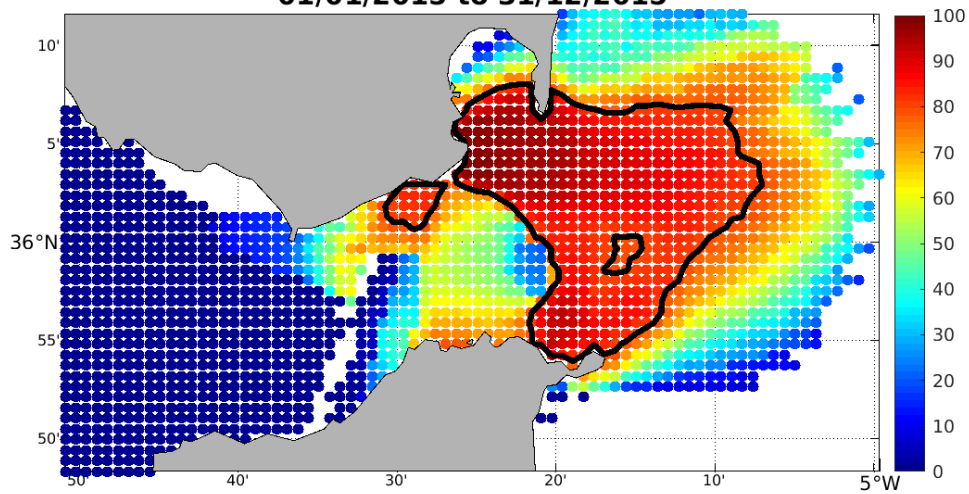
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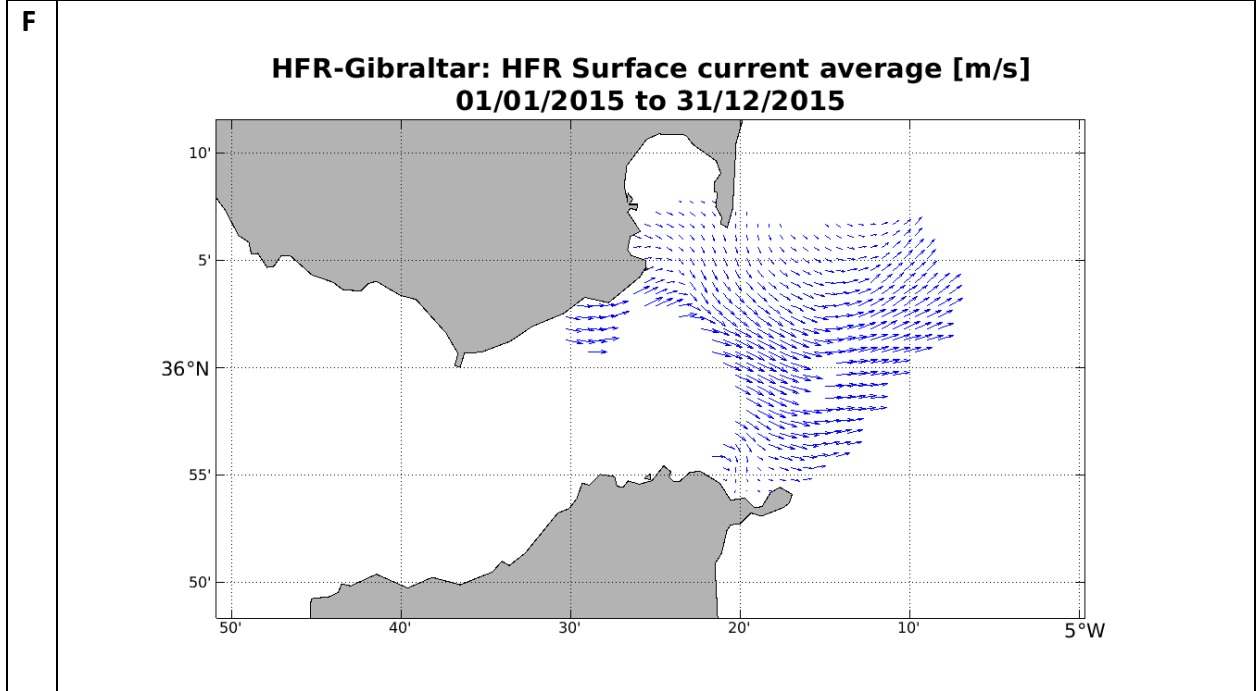
HFR-Gibraltar: Spatial Coverage vs. Temporal Coverage 01/01/2015 to 31/12/2015



E

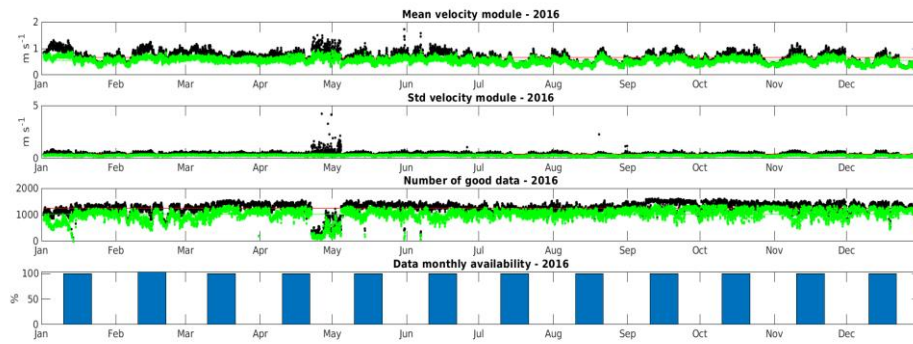
HFR-Gibraltar: Percent Total Vector Coverage (contour showing >80%) 01/01/2015 to 31/12/2015



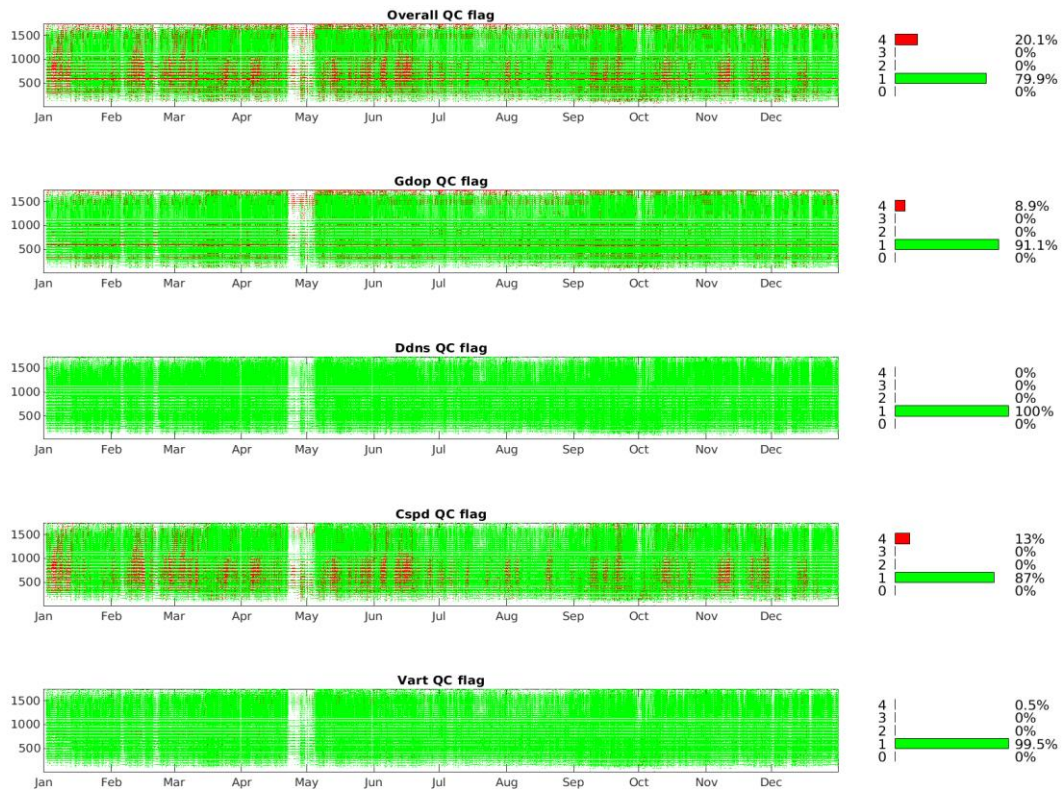


Period: 2016

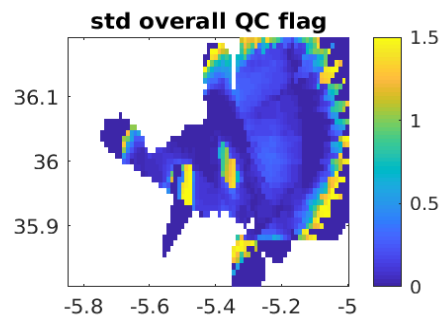
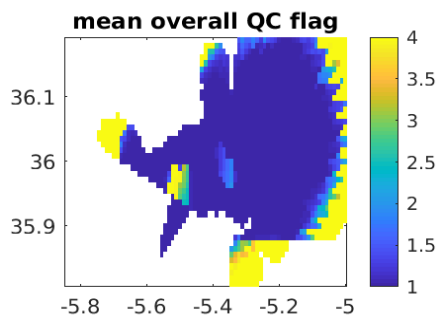
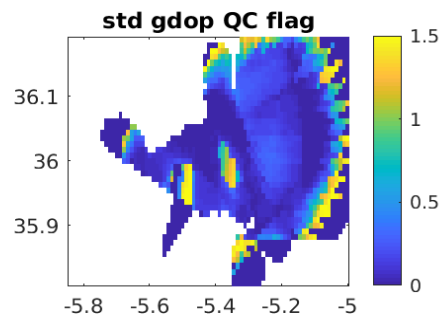
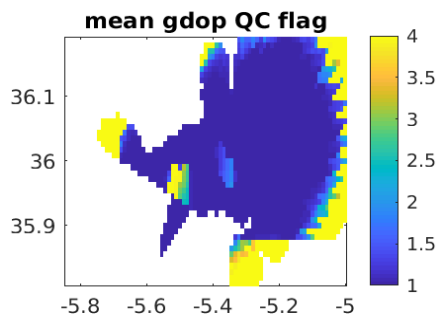
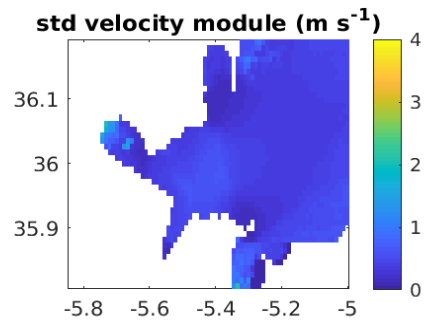
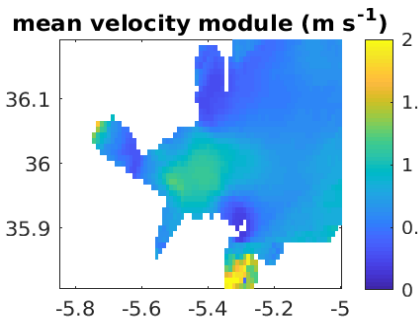
A



B

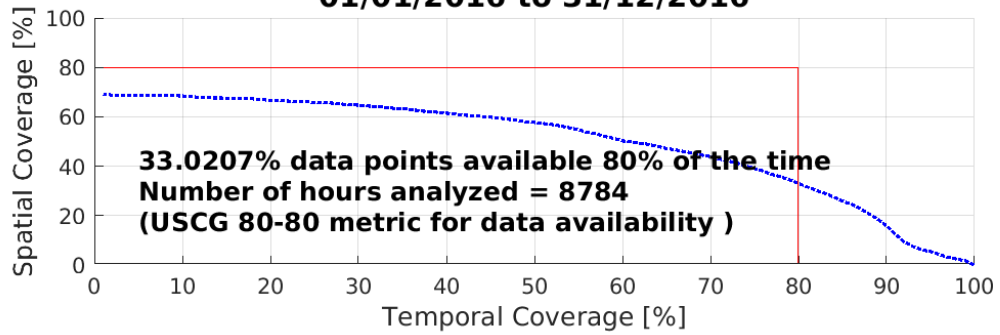


C



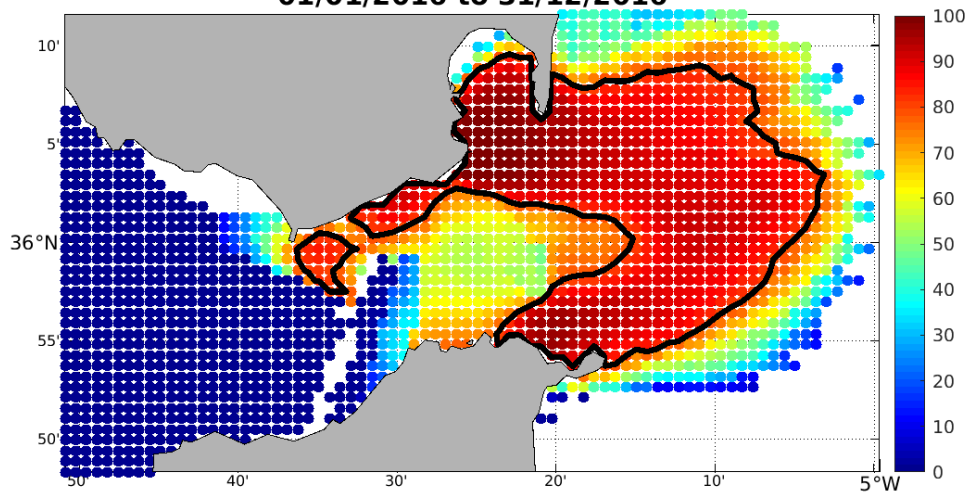
D

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



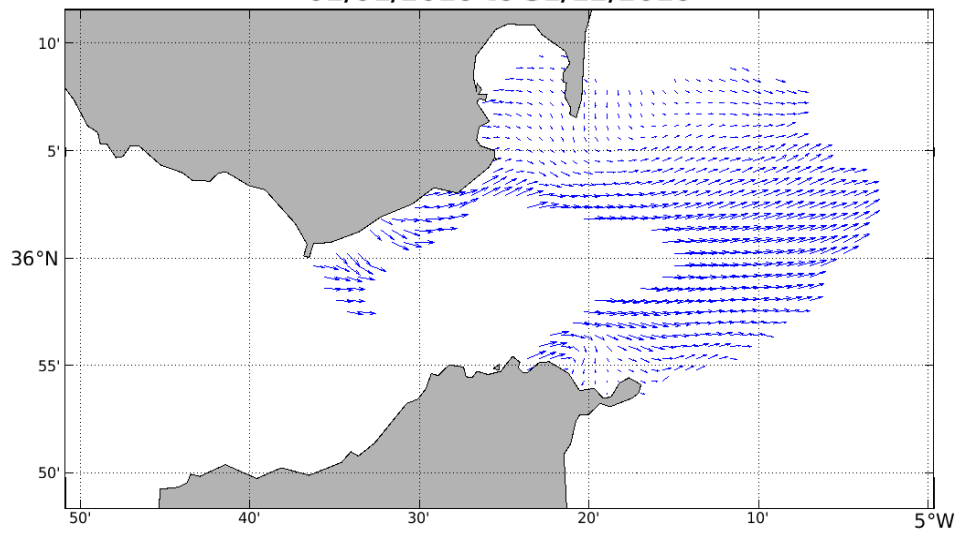
E

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



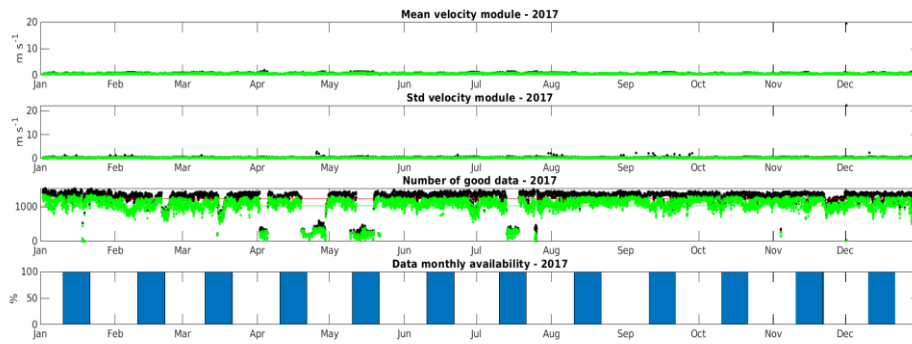
F

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

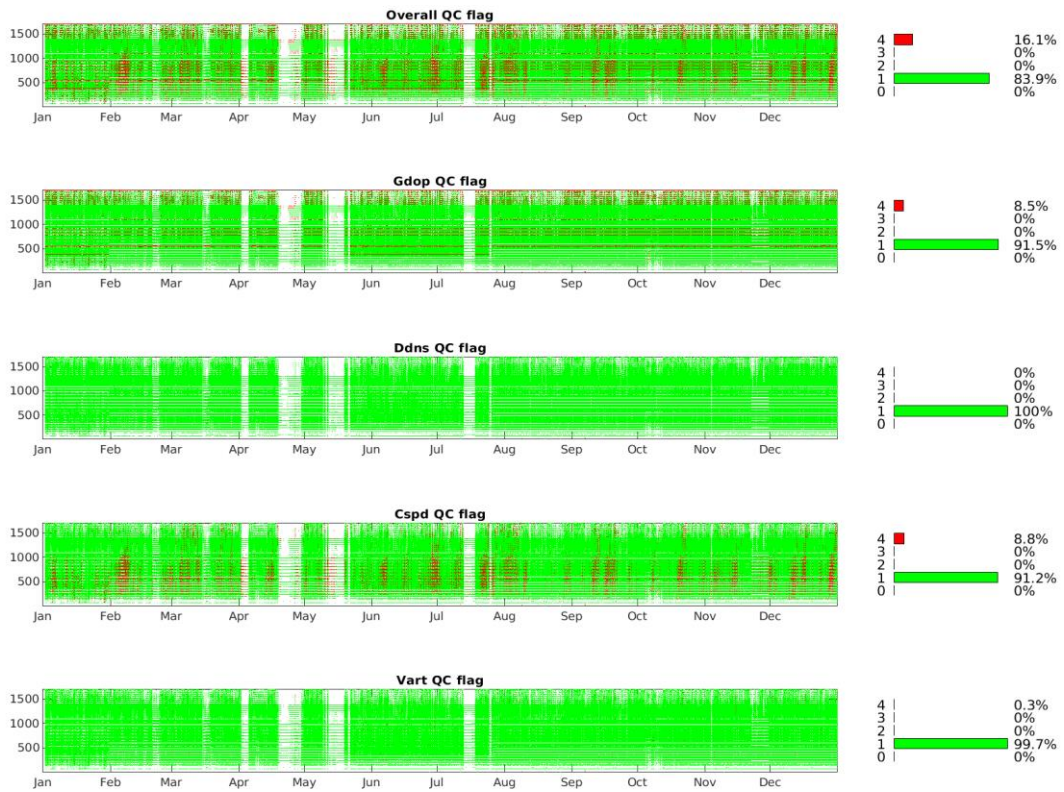


Period: 2017

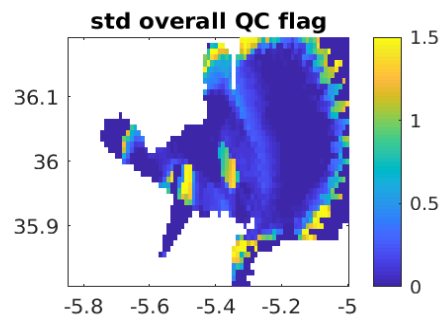
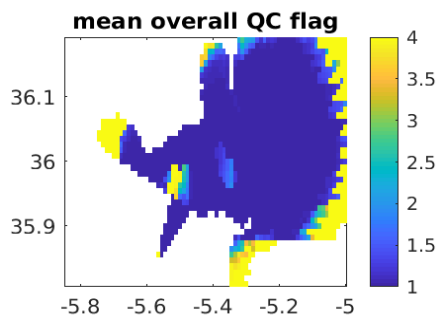
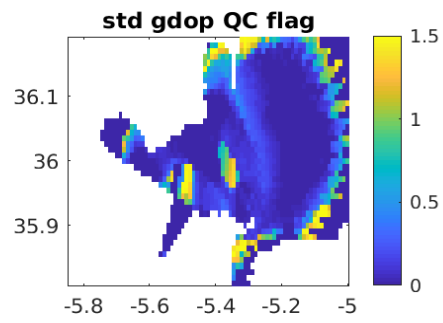
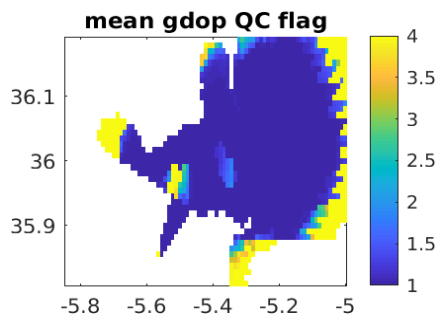
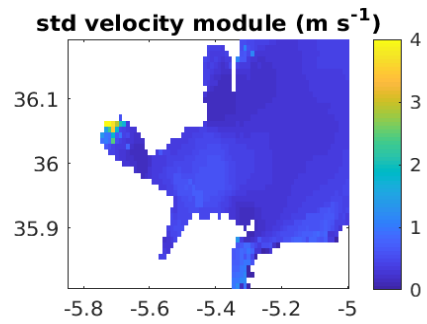
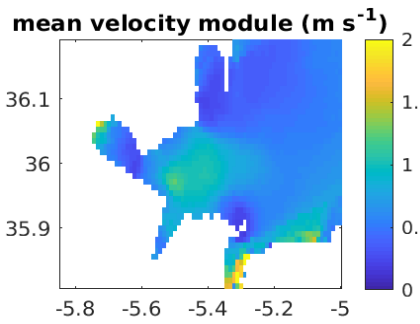
A



B

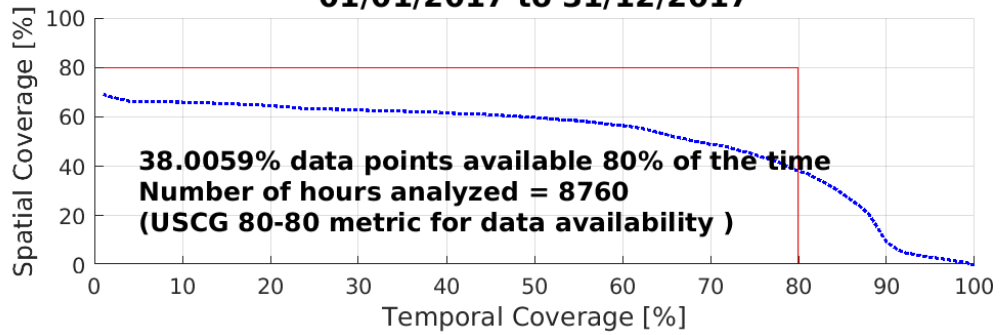


C



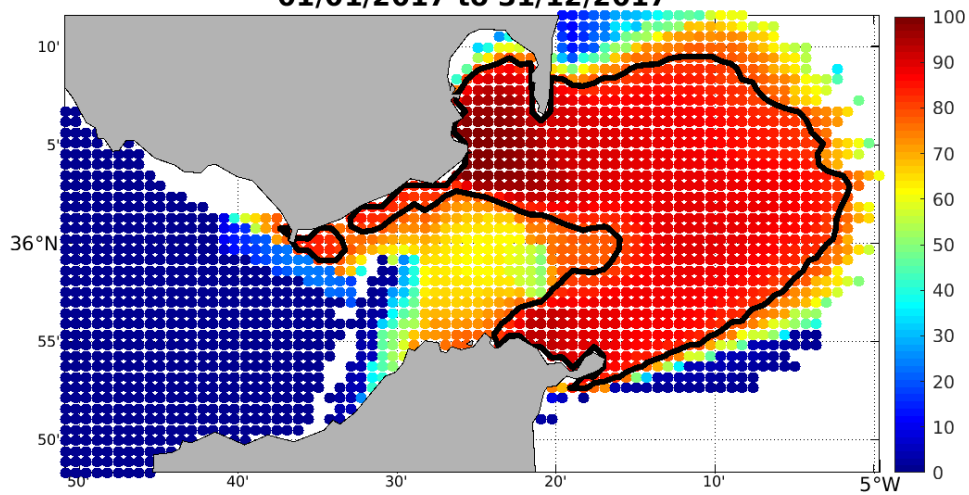
D

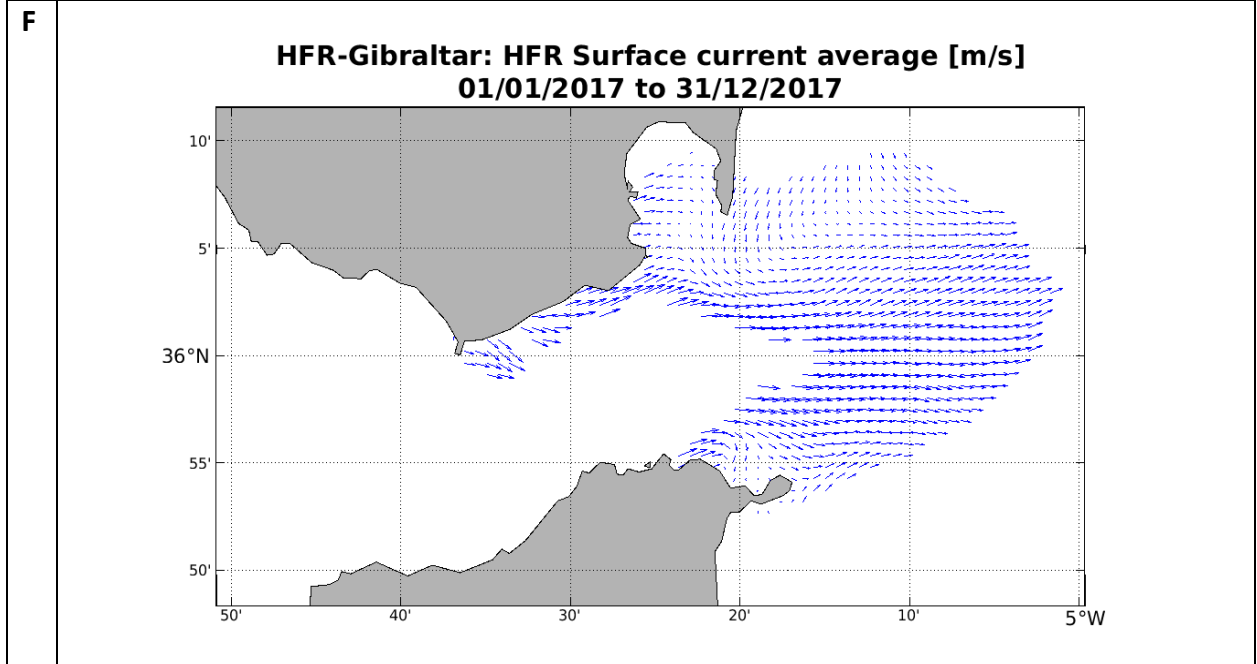
HFR-Gibraltar: Spatial Coverage vs. Temporal Coverage 01/01/2017 to 31/12/2017



E

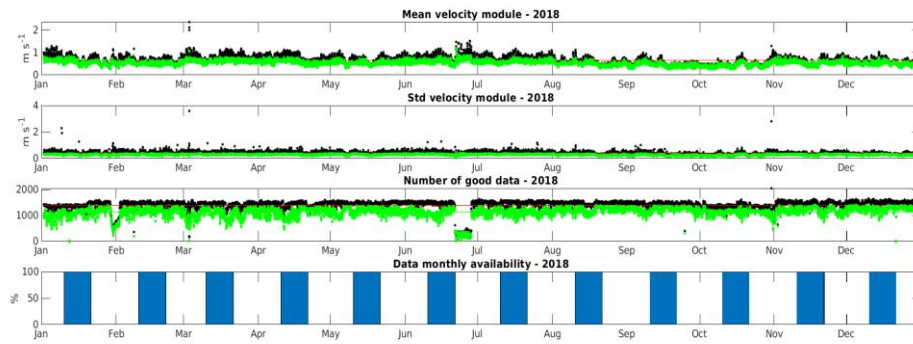
HFR-Gibraltar: Percent Total Vector Coverage (contour showing >80%) 01/01/2017 to 31/12/2017



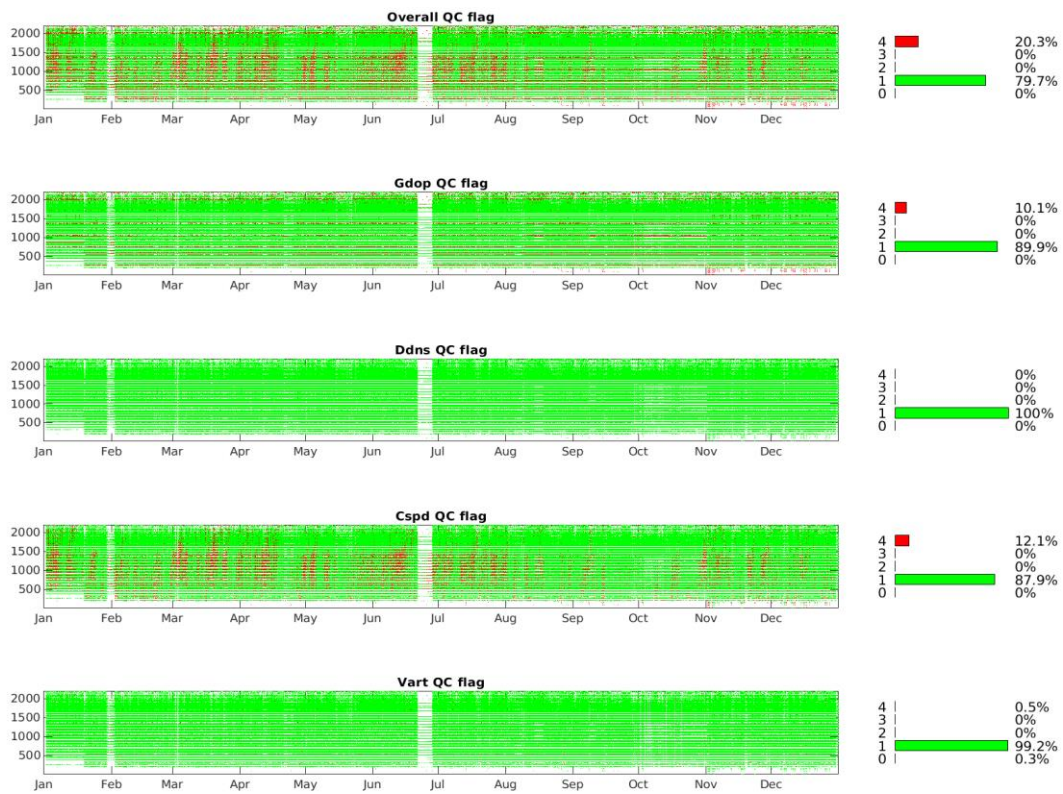


Period: 2018

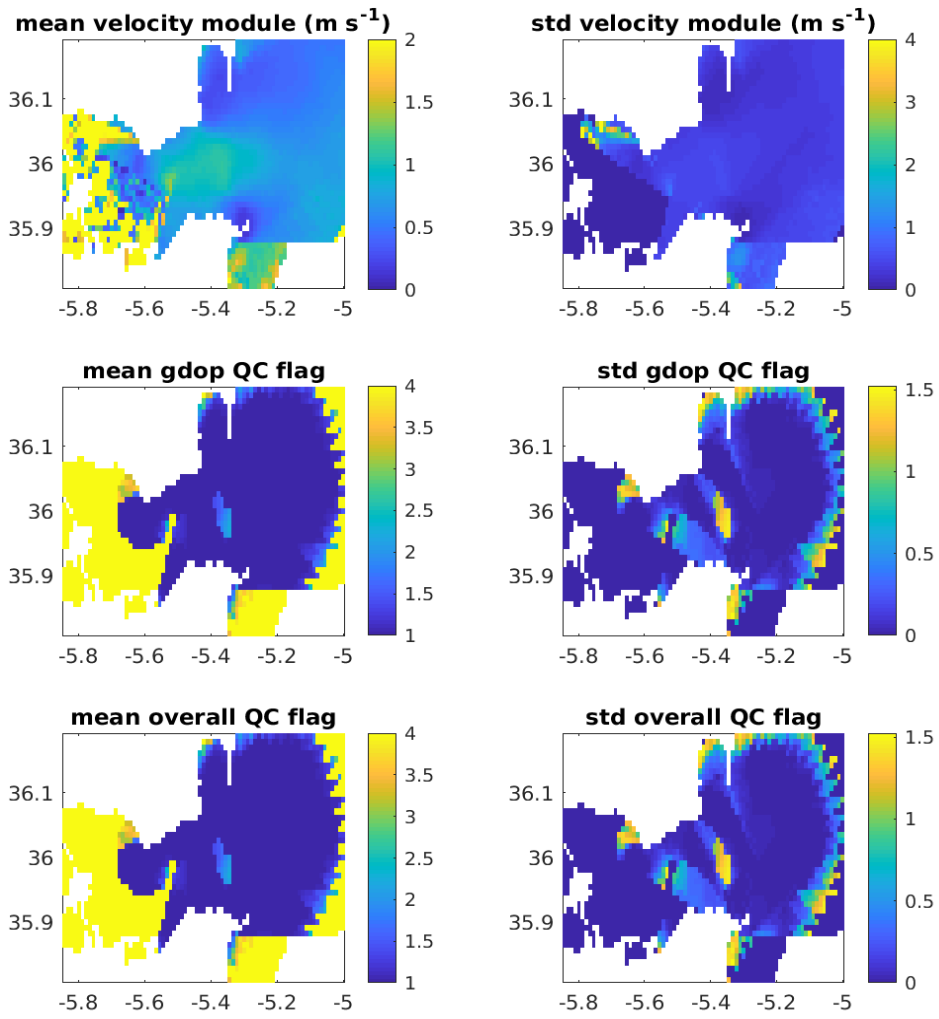
A



B

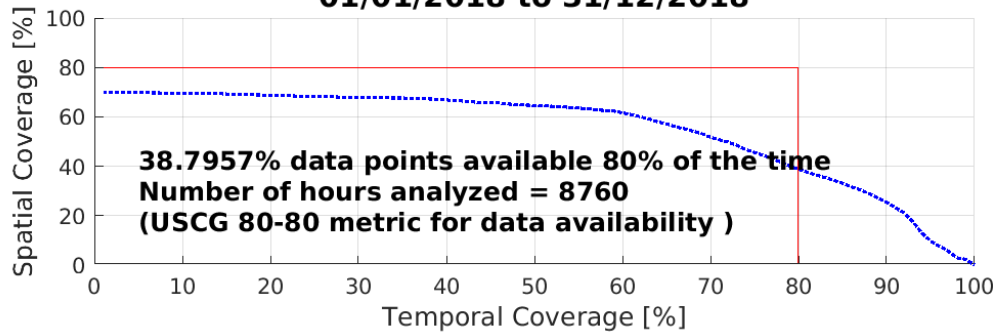


C



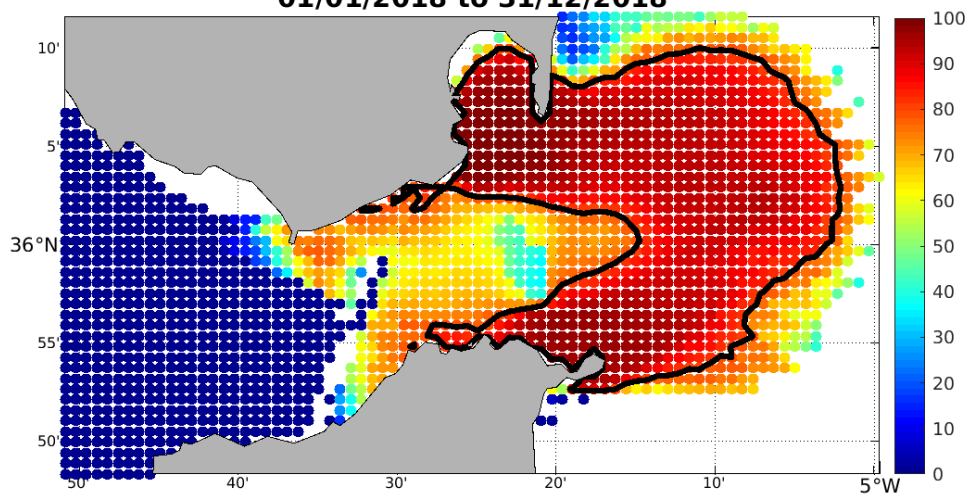
D

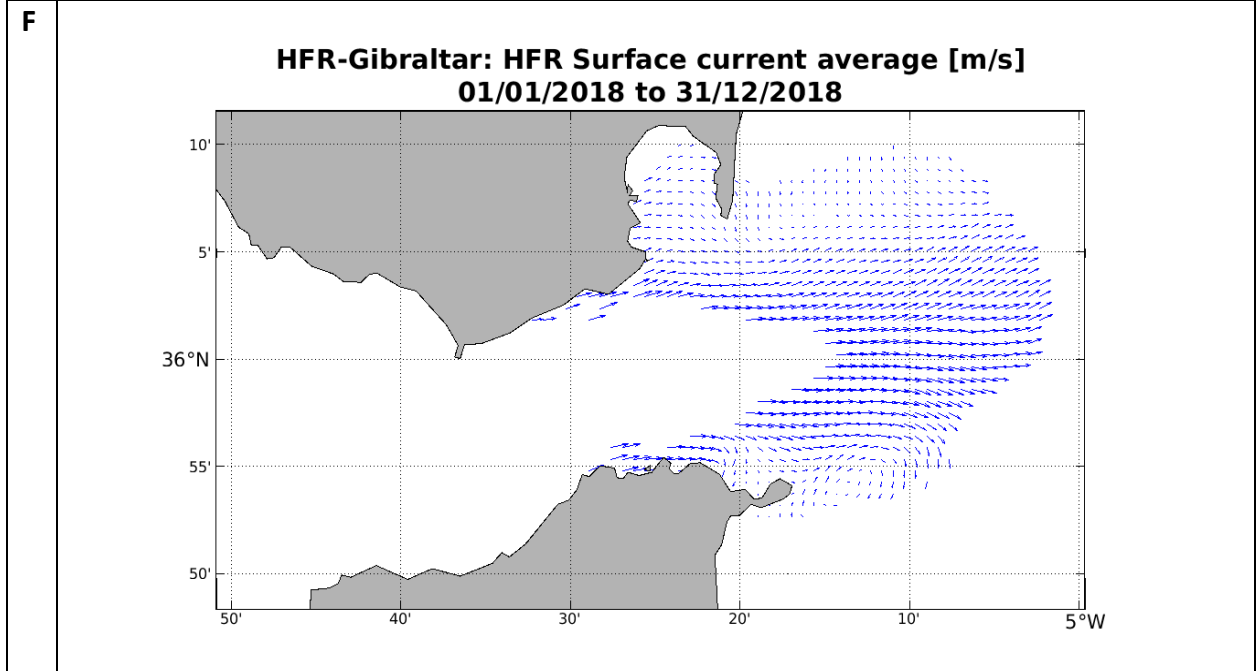
HFR-Gibraltar: Spatial Coverage vs. Temporal Coverage 01/01/2018 to 31/12/2018



E

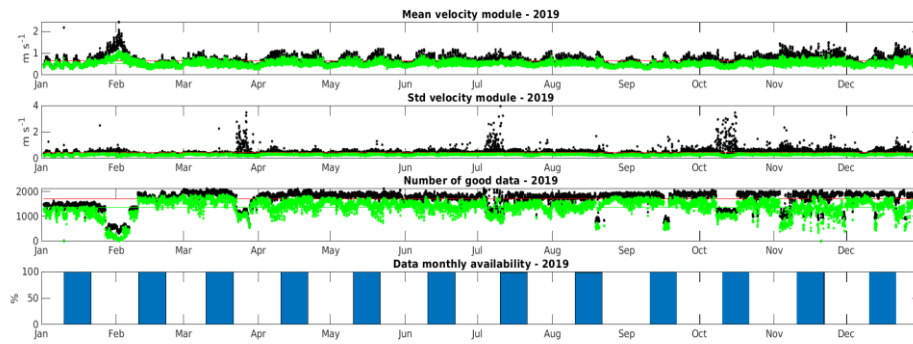
HFR-Gibraltar: Percent Total Vector Coverage (contour showing >80%) 01/01/2018 to 31/12/2018



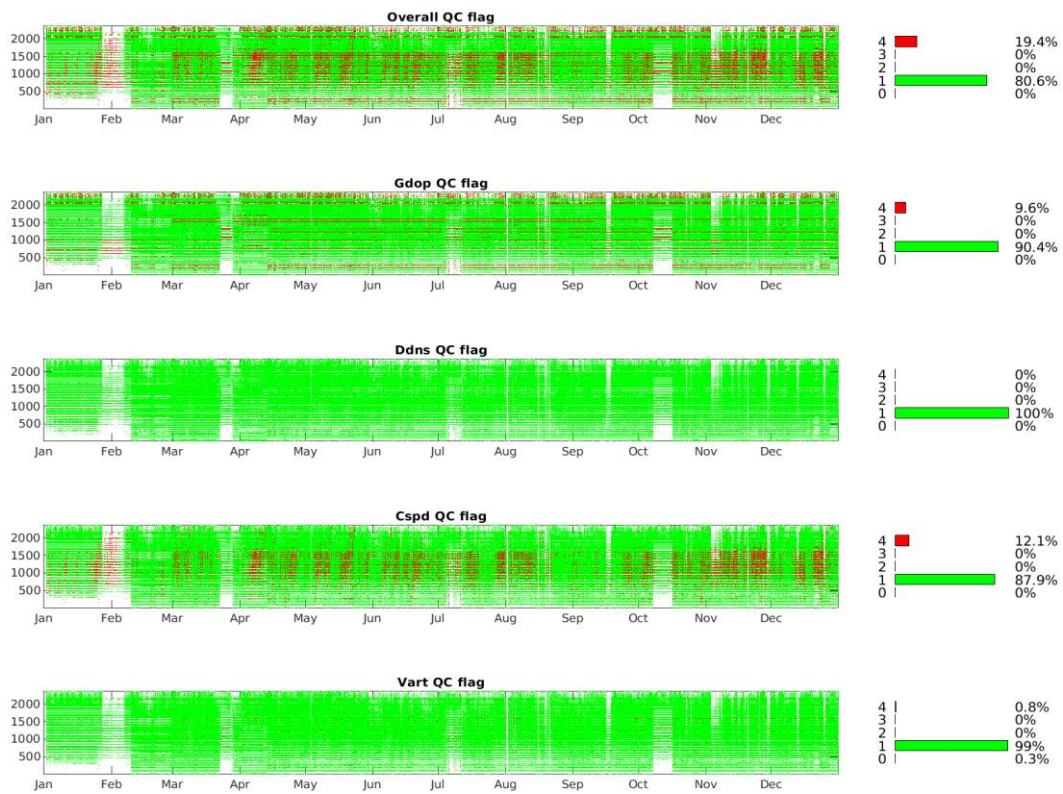


Period: 2019

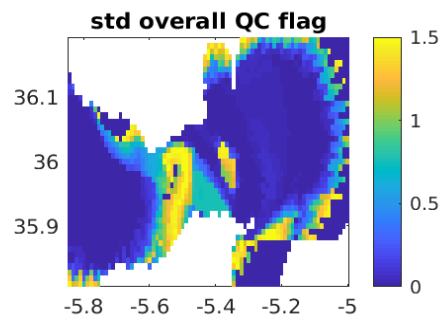
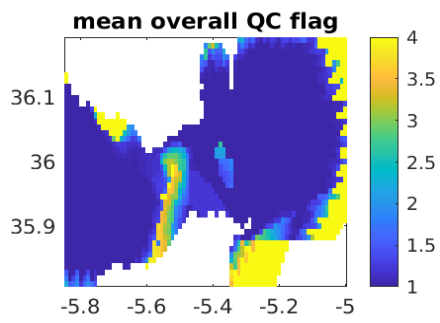
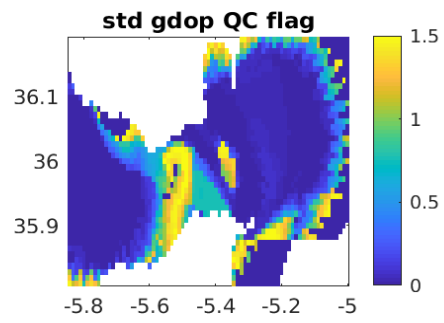
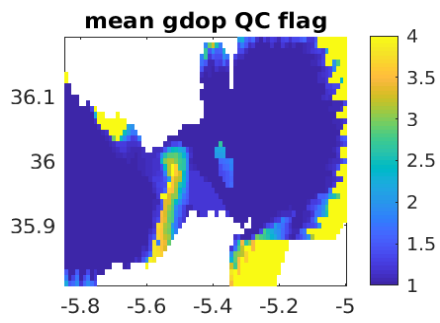
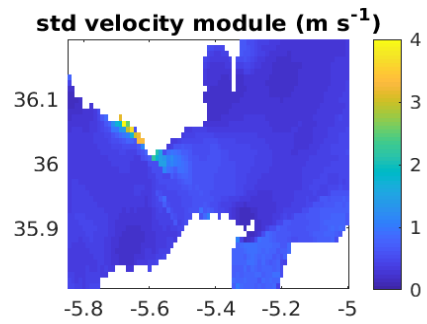
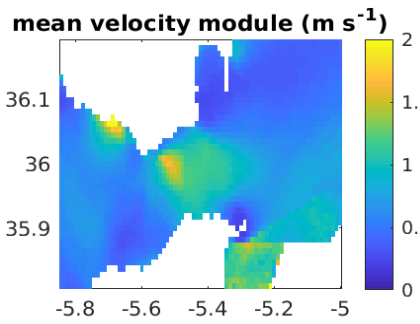
A



B

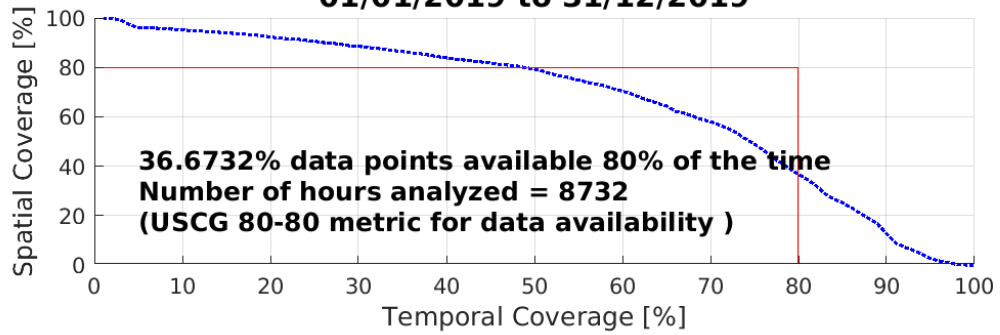


C



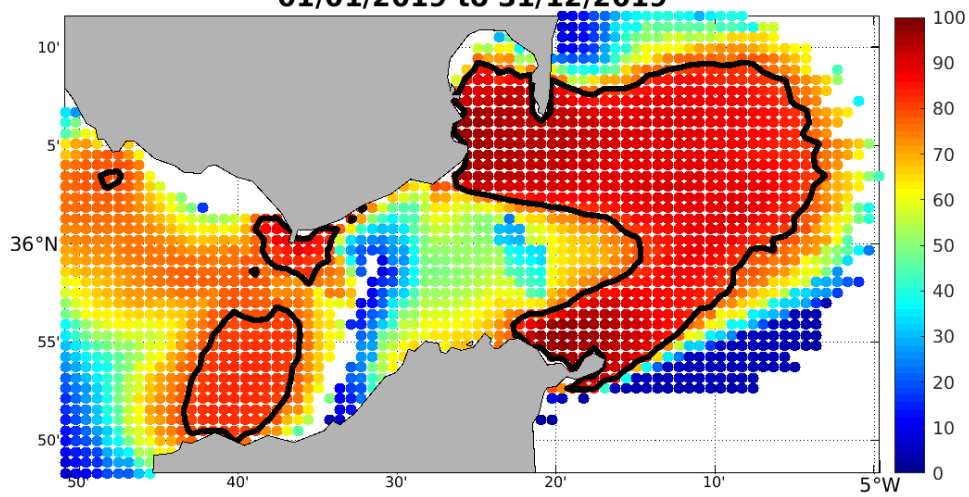
D

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



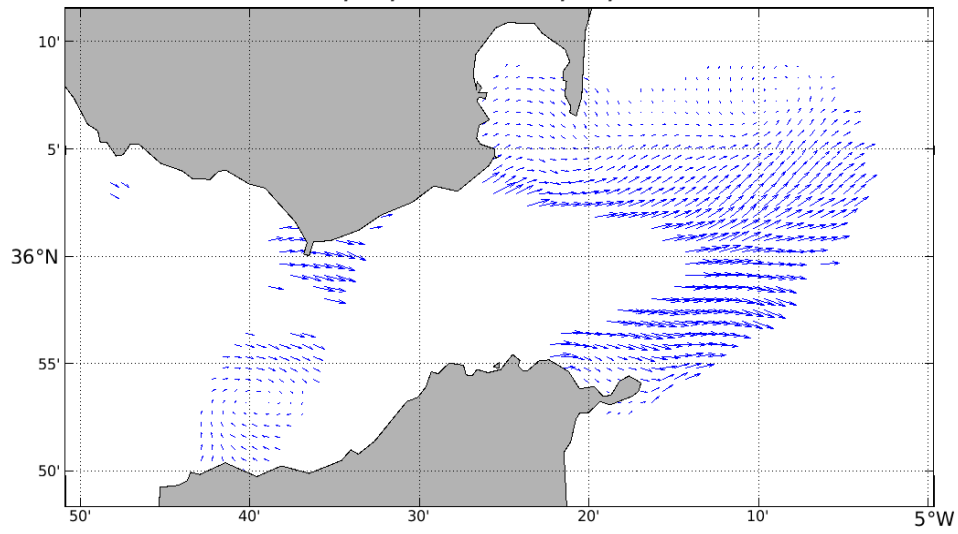
E

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



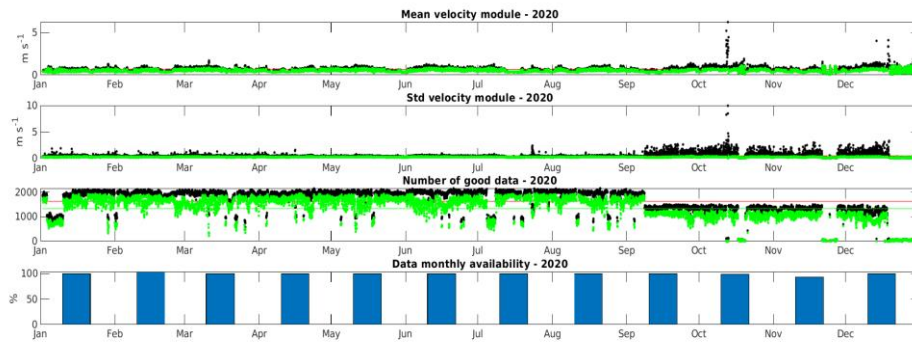
F

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

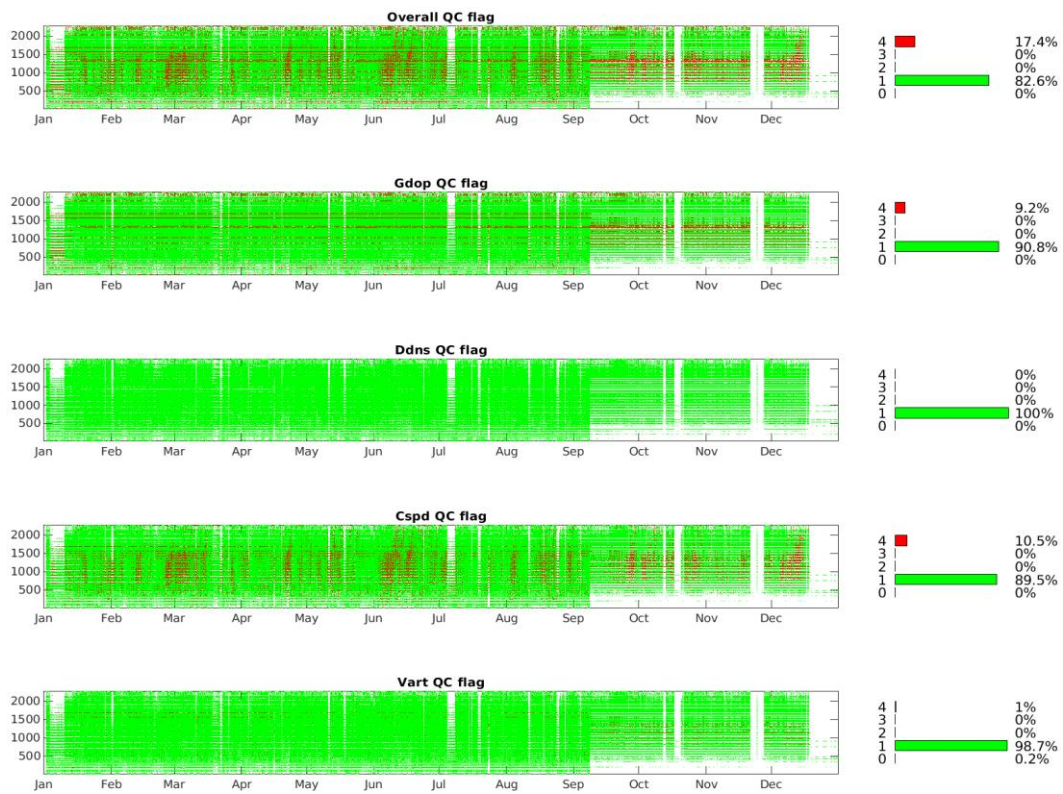


Period: 2020

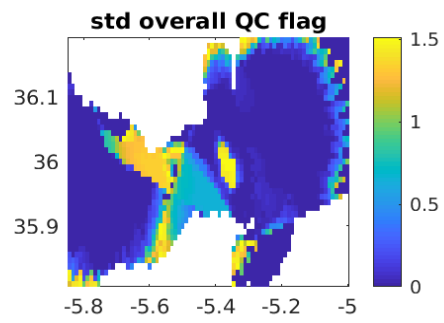
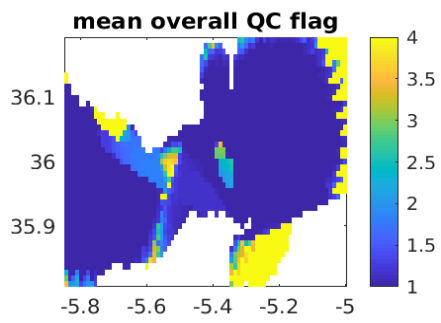
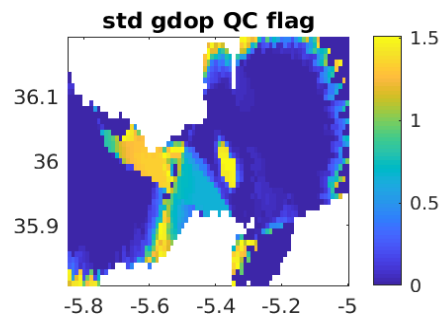
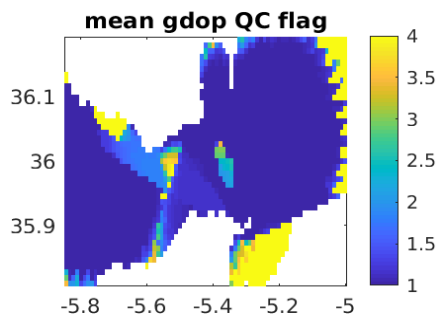
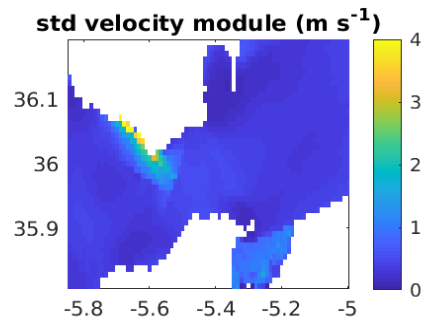
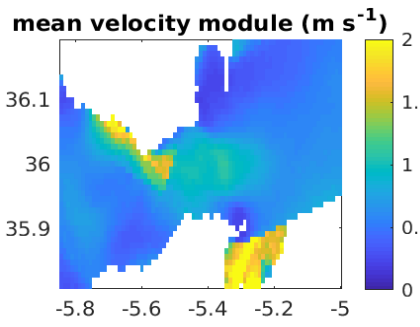
A



B

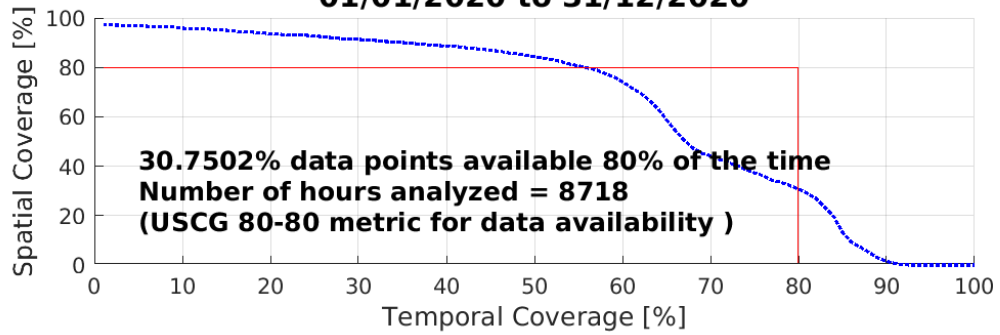


C



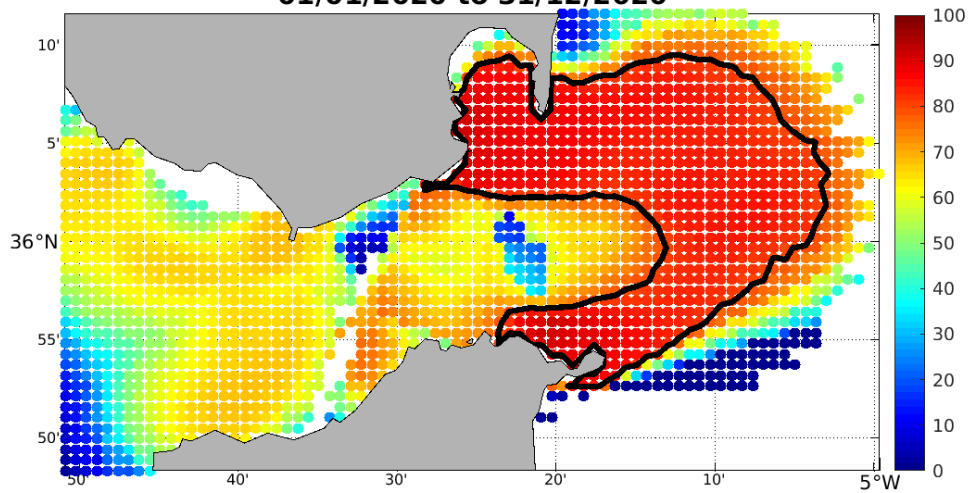
D

HFR-Gibraltar: Spatial Coverage vs. Temporal Coverage 01/01/2020 to 31/12/2020



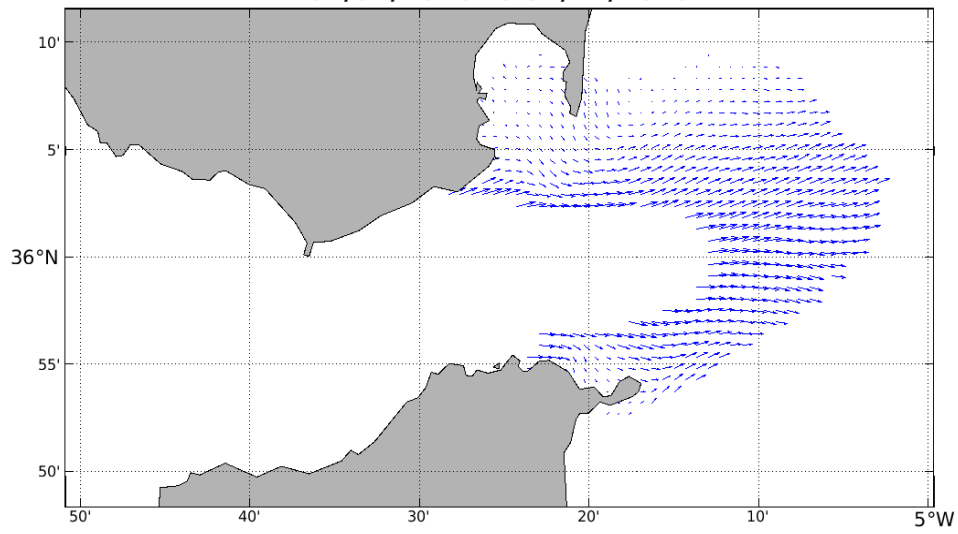
E

HFR-Gibraltar: Percent Total Vector Coverage (contour showing >80%) 01/01/2020 to 31/12/2020



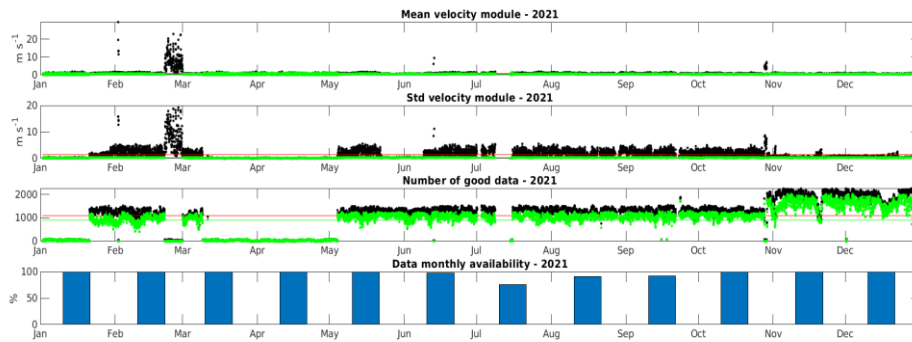
F

**HFR-Gibraltar: HFR Surface current average [m/s]
01/01/2020 to 31/12/2020**

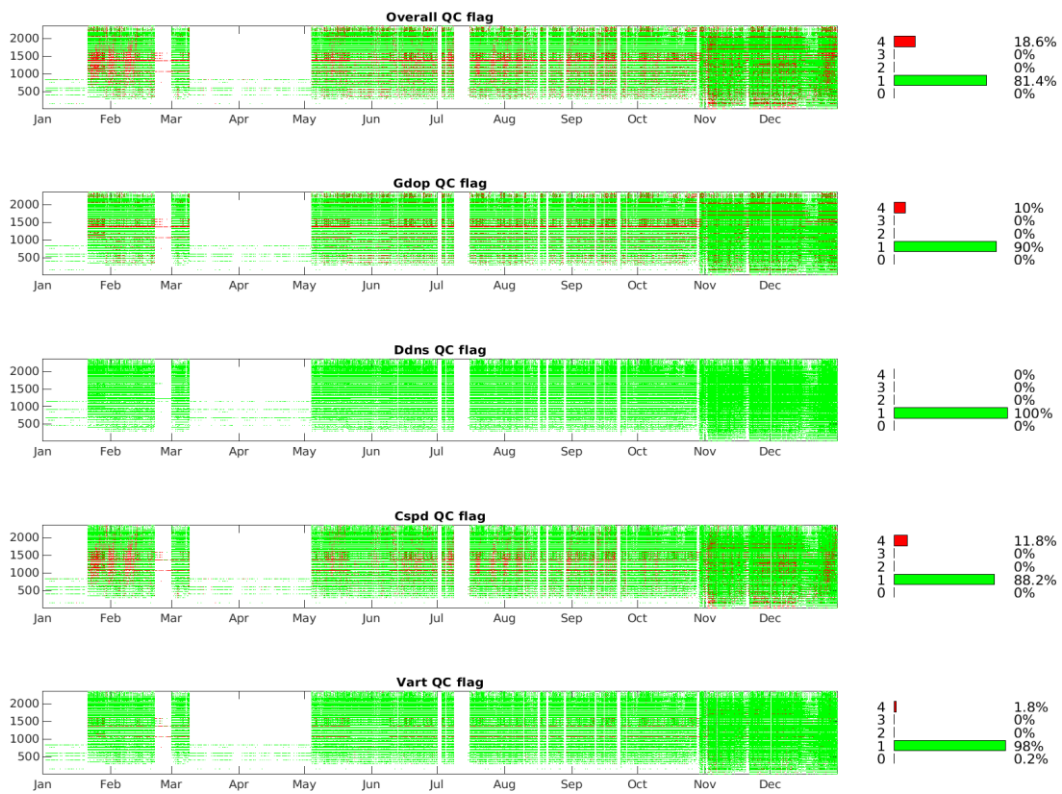


Period: 2021

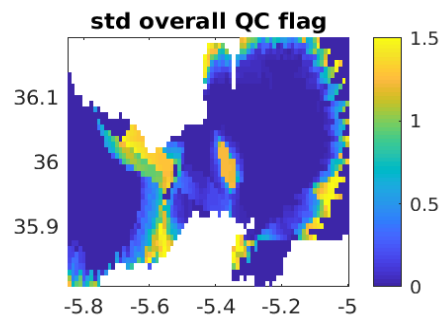
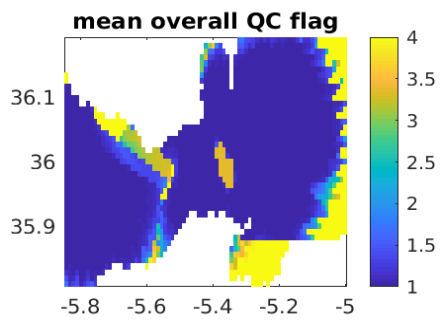
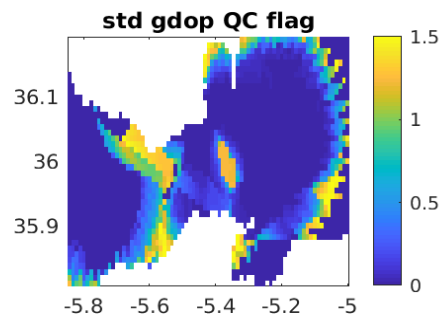
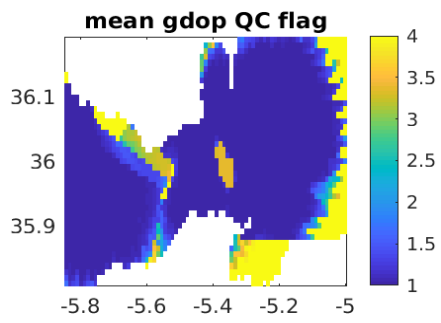
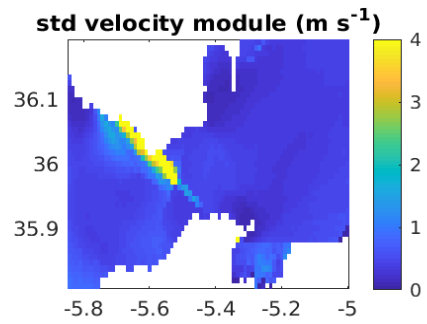
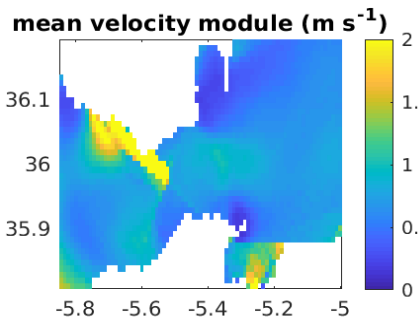
A



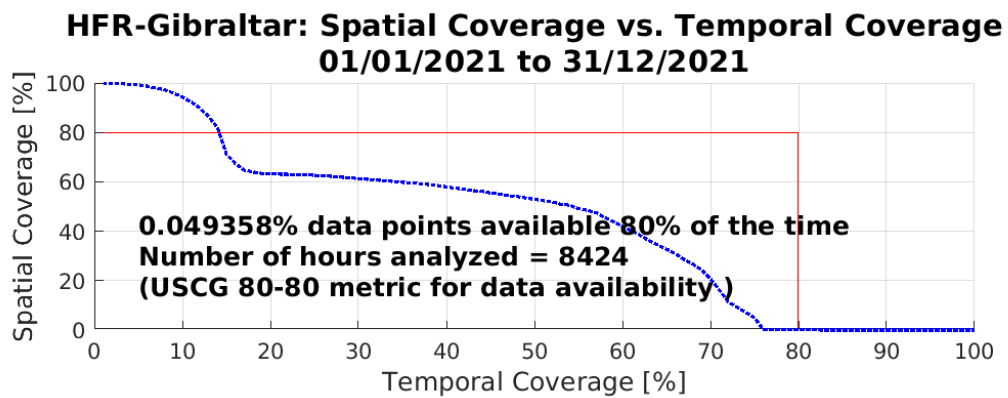
B



C

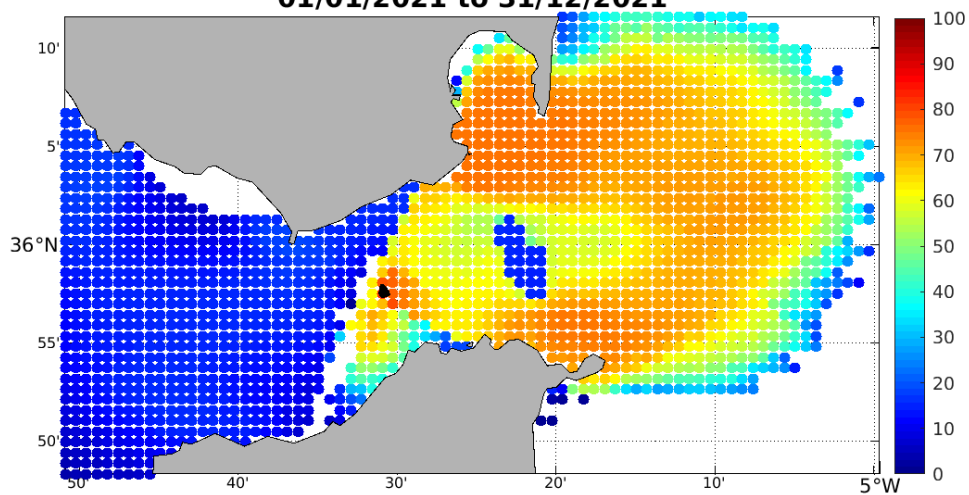


D



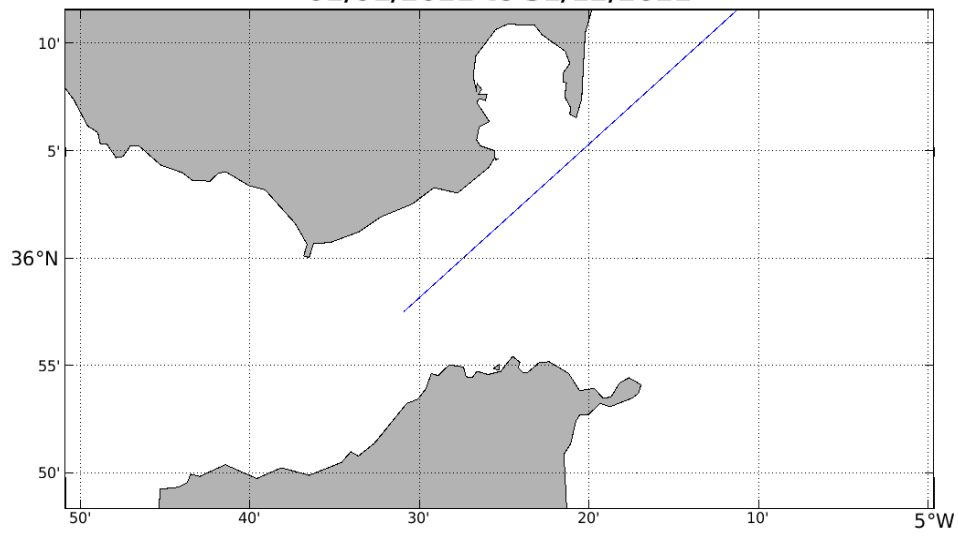
E

HFR-Gibraltar: Percent Total Vector Coverage (contour showing >80%) 01/01/2021 to 31/12/2021



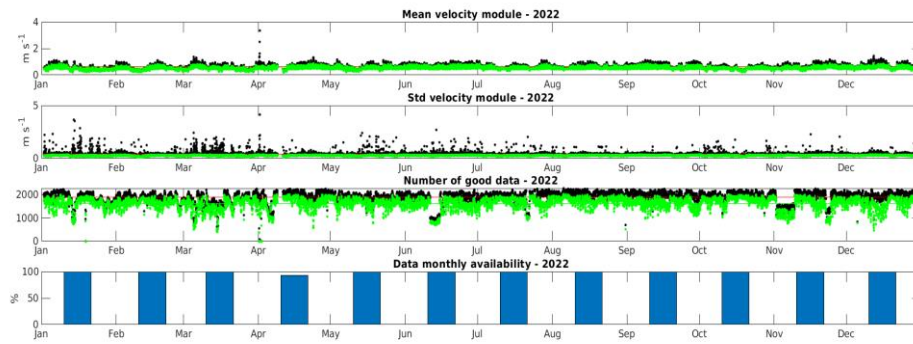
F

**HFR-Gibraltar: HFR Surface current average [m/s]
01/01/2021 to 31/12/2021**

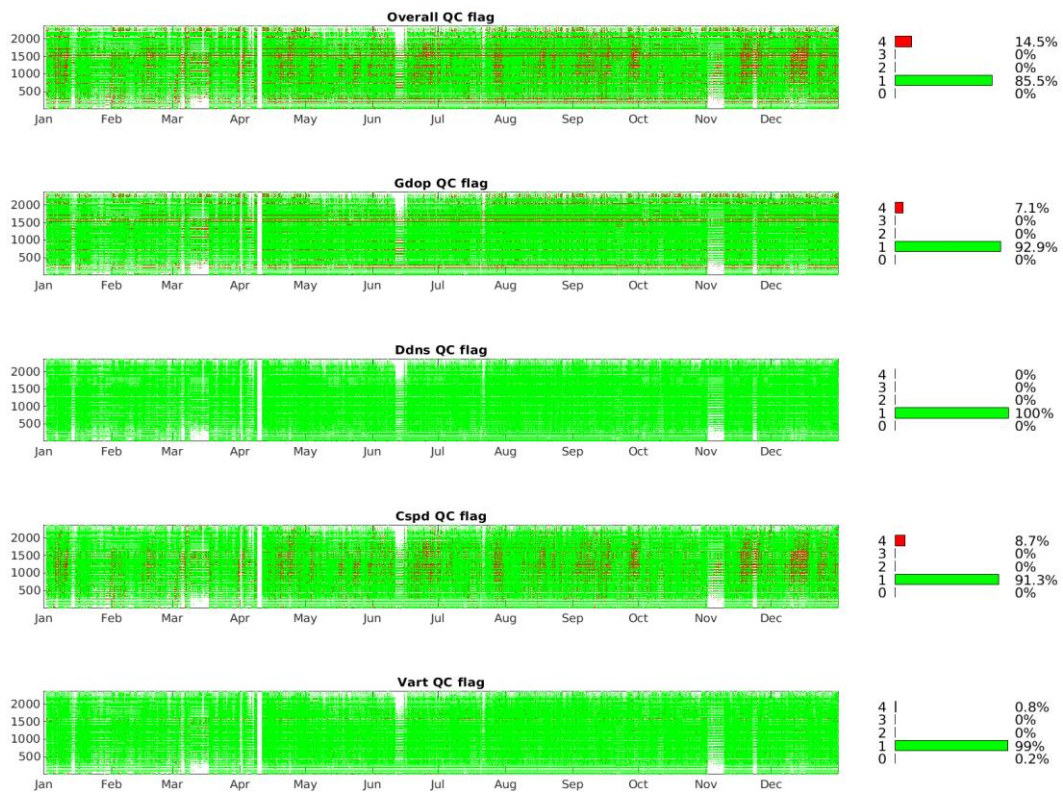


Period: 2022

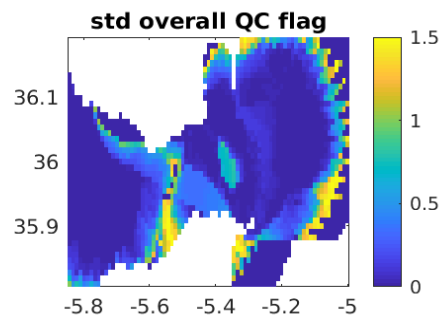
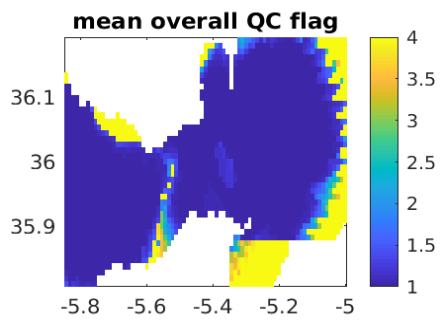
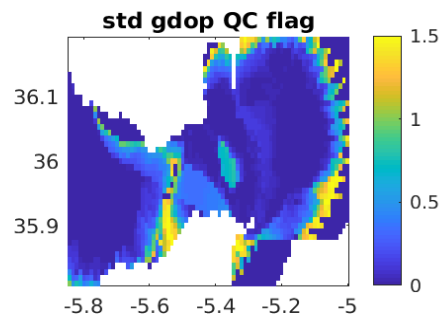
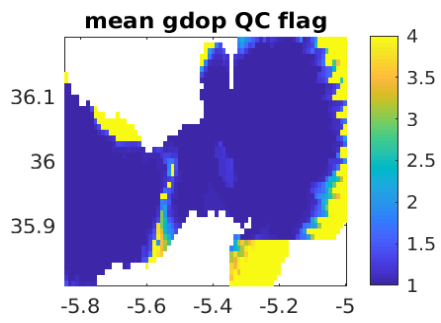
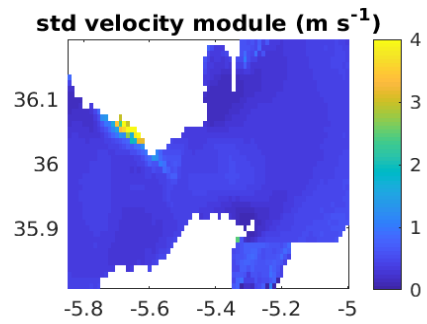
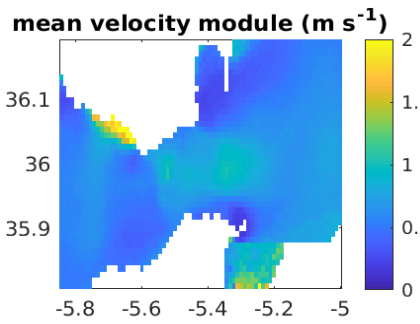
A



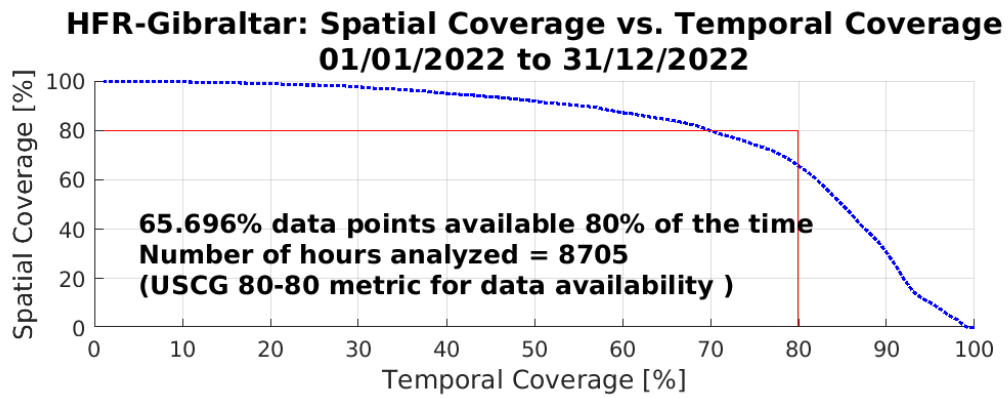
B



C

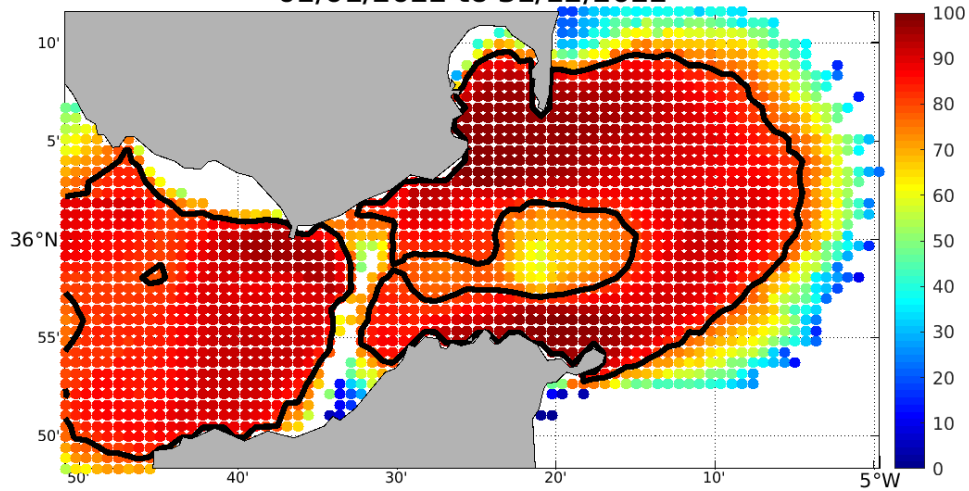


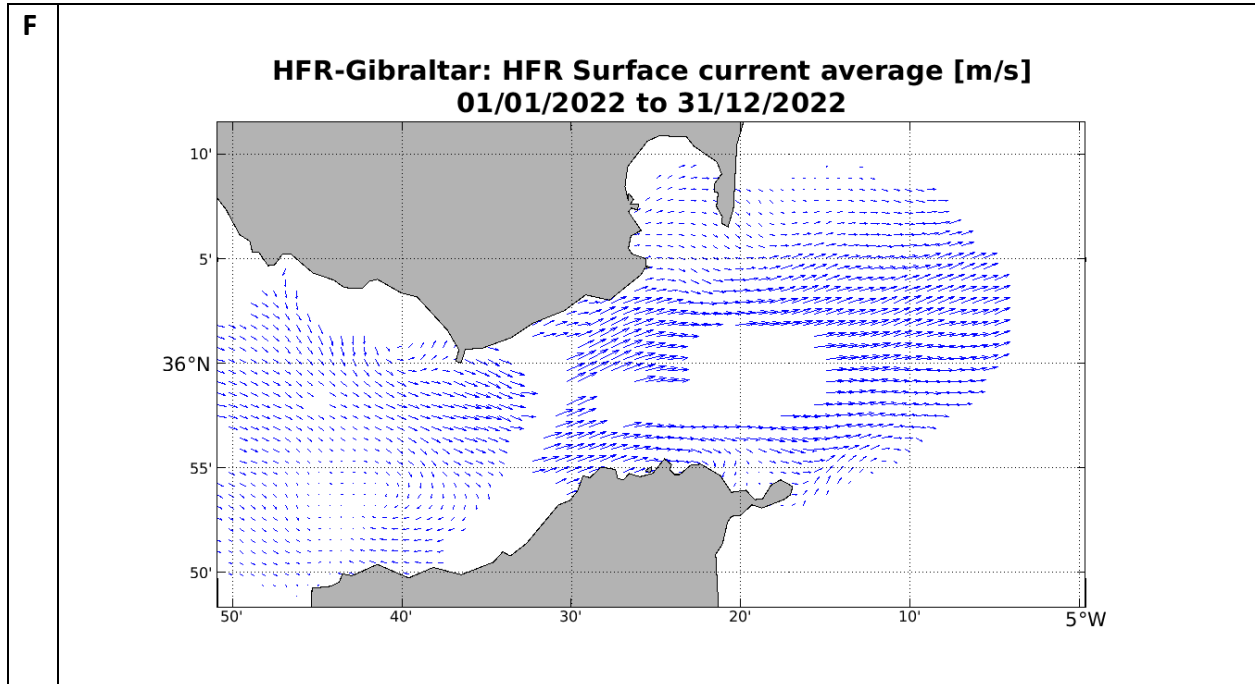
D



E

HFR-Gibraltar: Percent Total Vector Coverage (contour showing >80%) 01/01/2022 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
VR2023_11	L. Solabarrieta & I. Manso	Update 2022
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