Report on Historical data files QA/QC

Version of the report	Changes made by	Nature of changes
VR2021_04	L. Solabarrieta & A. Rubio	Report generation

System/Site: South/MAZA
Data set: [Totals/Radials] Radials
Period: 15-Feb-2016 – 30-Jul-2020

INFO ON QA/QC Settings and Calibration for info time: 15-Feb-2016 – 30-Jul-2020

%%% AVRB_QC info:
OceanSITES quality flagging for Average Radial Bearing QC test. Thresholds set to [200-270] deg.

%%% CSPD_QC info:
OceanSITES quality flagging for Velocity Threshold QC test. Threshold set to 1.2 m/s.

%%% DEPH_QC info:
OceanSITES quality flagging for depth coordinate.

%%% MDFL_QC info:
OceanSITES quality flagging for Median Filter QC test. Threshold set to 5 km, 30 deg, 1 m/s,

%%% owtr_QC info:
OceanSITES quality flagging for Over-water QC test.

%%% POSITION_QC info:
OceanSITES quality flagging for position coordinates

%%% RDCT_QC info:
OceanSITES quality flagging for Radial Count QC test. Thresholds set to 200 vectors.

%%% TIME_QC info: OceanSITES quality flagging for temporal coordinate.

%%% VART_QC info:
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 m/s.

%%% Calibration info for time: 15-Feb-2016 12:00:00
2015-12-21T00:00:00Z
%%% Calibration info for time: 30-Jan-2017 12:00:00
2017-01-24T00:00:00Z
%%% Calibration info for time: 18-Jan-2018 12:00:00
2018-01-17T00:00:00Z
%%% Calibration info for time: 13-Jan-2020 12:00:00
2019-12-05T00:00:00Z

RESULTS OF HIST DATA INSPECTION

General comments:

The performing of the antenna has been almost continuous during most of the analyzed period (more than 4 years), except for few unfunctioning hours/days. The gap in the plots of 2018 is due to Range change, as explained in the last paragraph of this section.

The antenna has been calibrated 4 times.

A change in the Bearing Angle and Range Resolution has been observed in few files in the raw dataset. Files with this change have been removed before the generation of the Temporal Aggregated (TA) file, to compile the netcdf file characteristics.

Year	General comment	Periods to be reflagged	Reason for new fagging	Sugg. 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 there is high temporal availability, around central radials, up to half of the range distance.

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

Period	General comments	Nb. analysed hours	80%- 80% obj.
2016	0 % spatial availability 80% of time	321	n
2017	0 % spatial availability 80% of time	363	n
2018	0 % spatial availability 80% of time	66	n
2019	0 % spatial availability 80% of time	349	n
Jan-Jul 2020	0 % spatial availability 80% of time	182	n

***data at midday are just analysed to simplify the plots**

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.
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

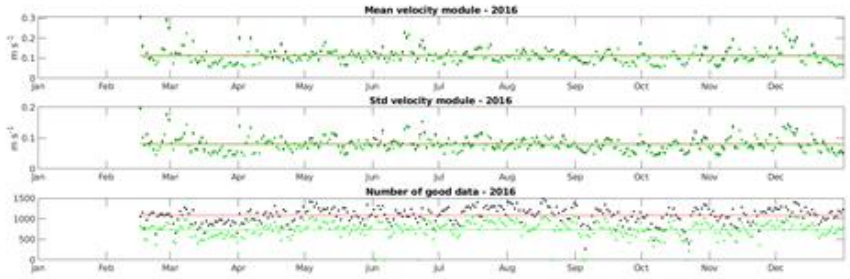
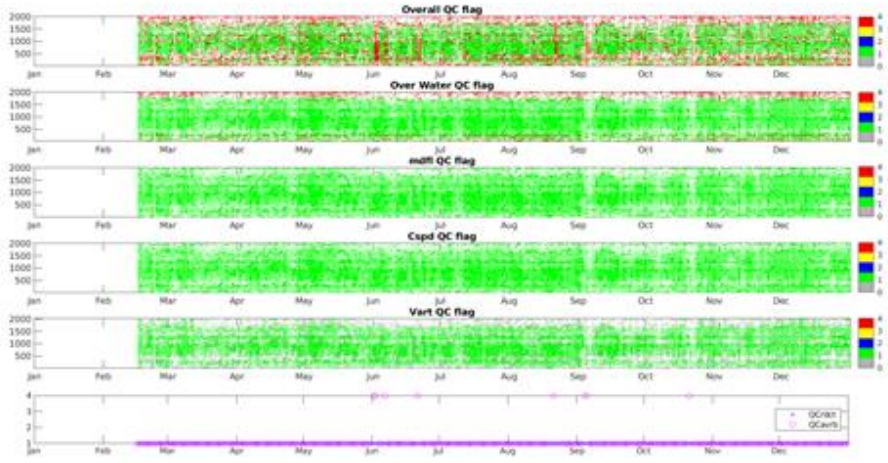
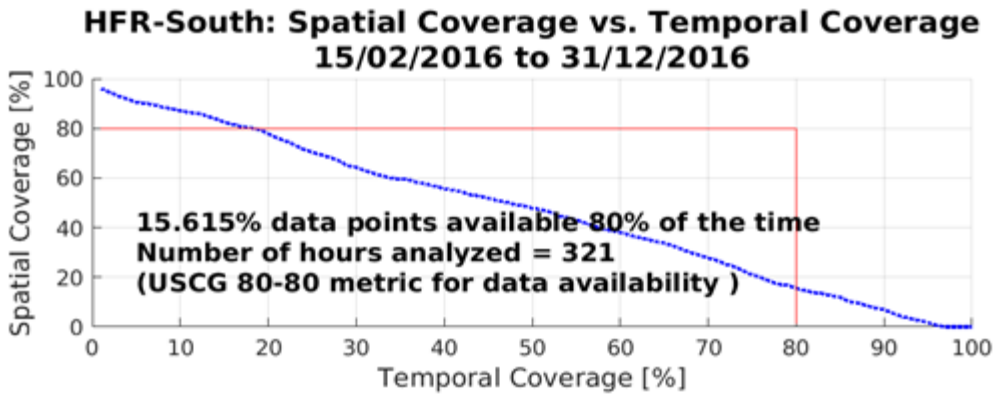
Fig A – Temporal series of the spatial average of the current velocity module (top panel), its standard deviation (middle panel) and the grid points of the total coverage (bottom panel). Black dots are the values obtained considering all the data in the domain, in green those considering only data with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

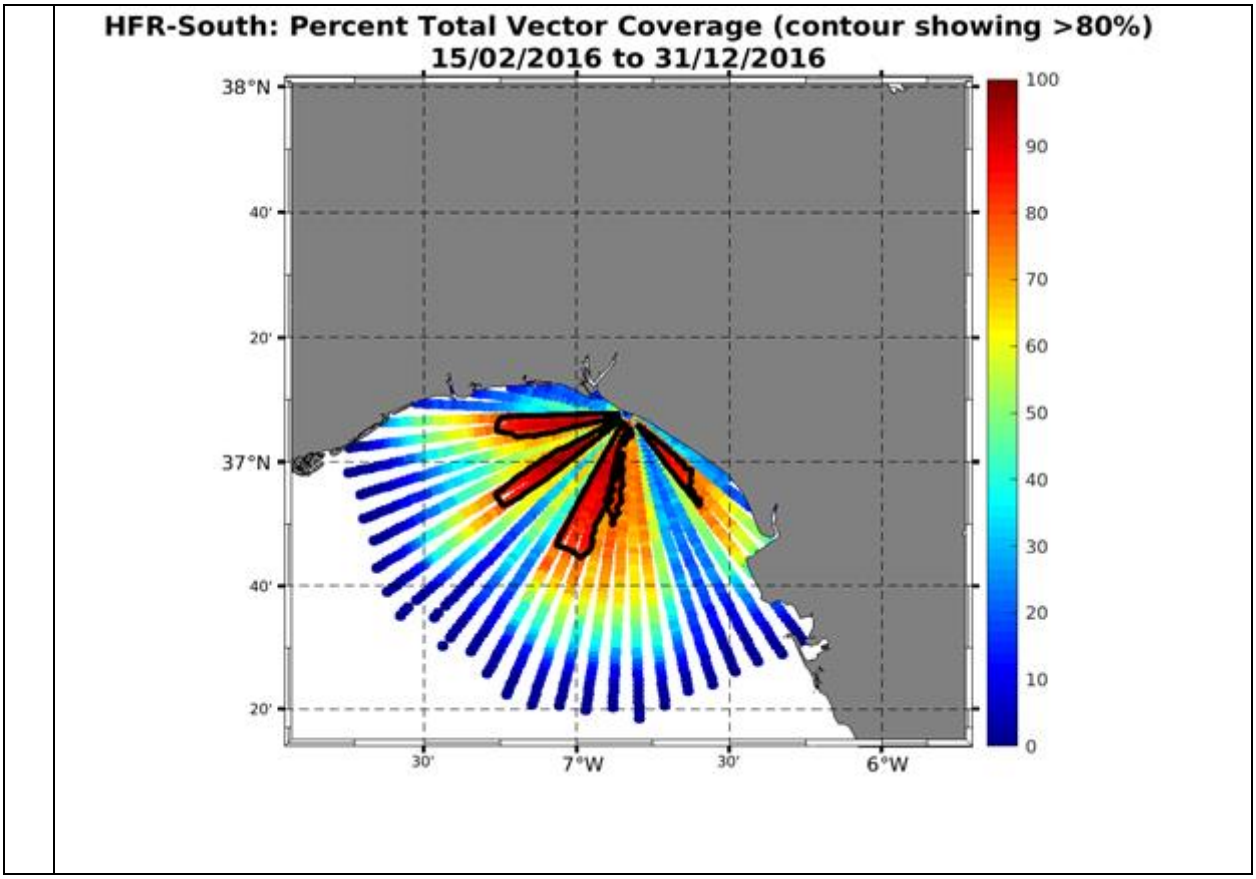
Fig B - Temporal series of the QC flags for all the grid nodes with data

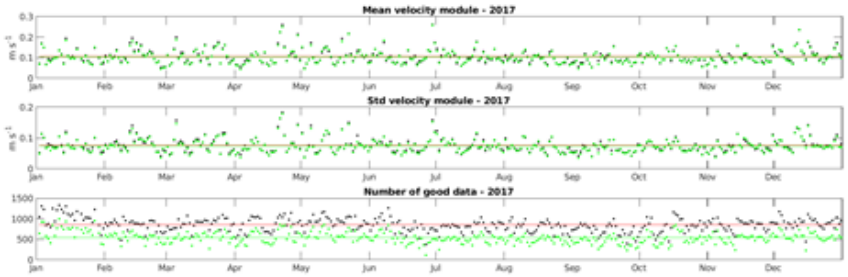
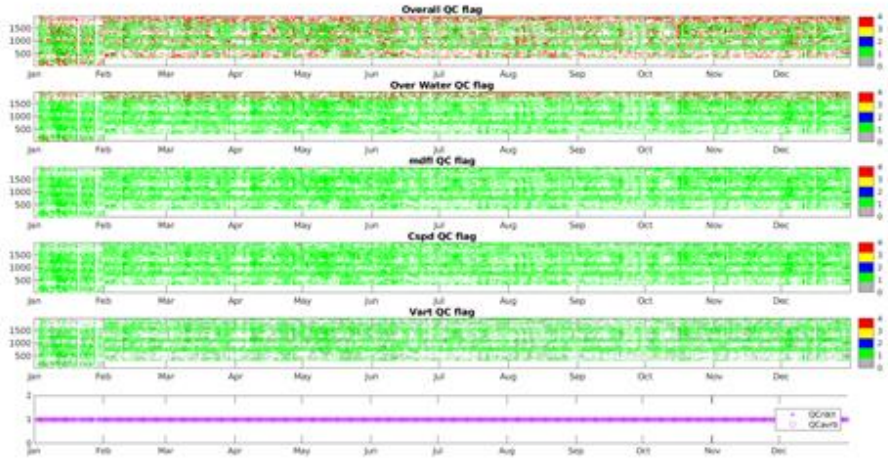
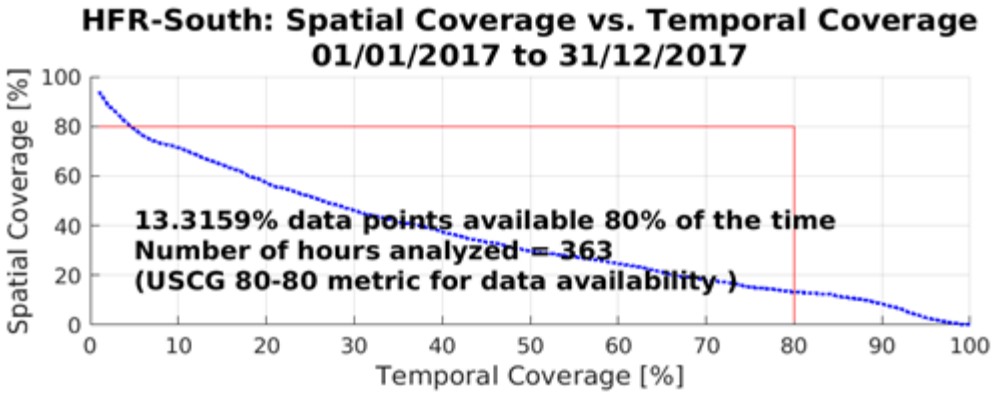
Fig D - Spatial (x-axis) vs. temporal (y-axis) coverage 80/80 annual metric. Allows to check if the system has reached the goal of providing surface currents over the 80% of the area during 80% of the time.

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: 2016	
A	
B	
D	
E	


HFR-South: Percent Total Vector Coverage (contour showing >80%)
15/02/2016 to 31/12/2016
38°N
40'
20'
37°N
40'
20'
30'
7°W
30'
6°W
100
90
80
70
60
50
40
30
20
10
0

Period: 2017	
A	
B	
D	
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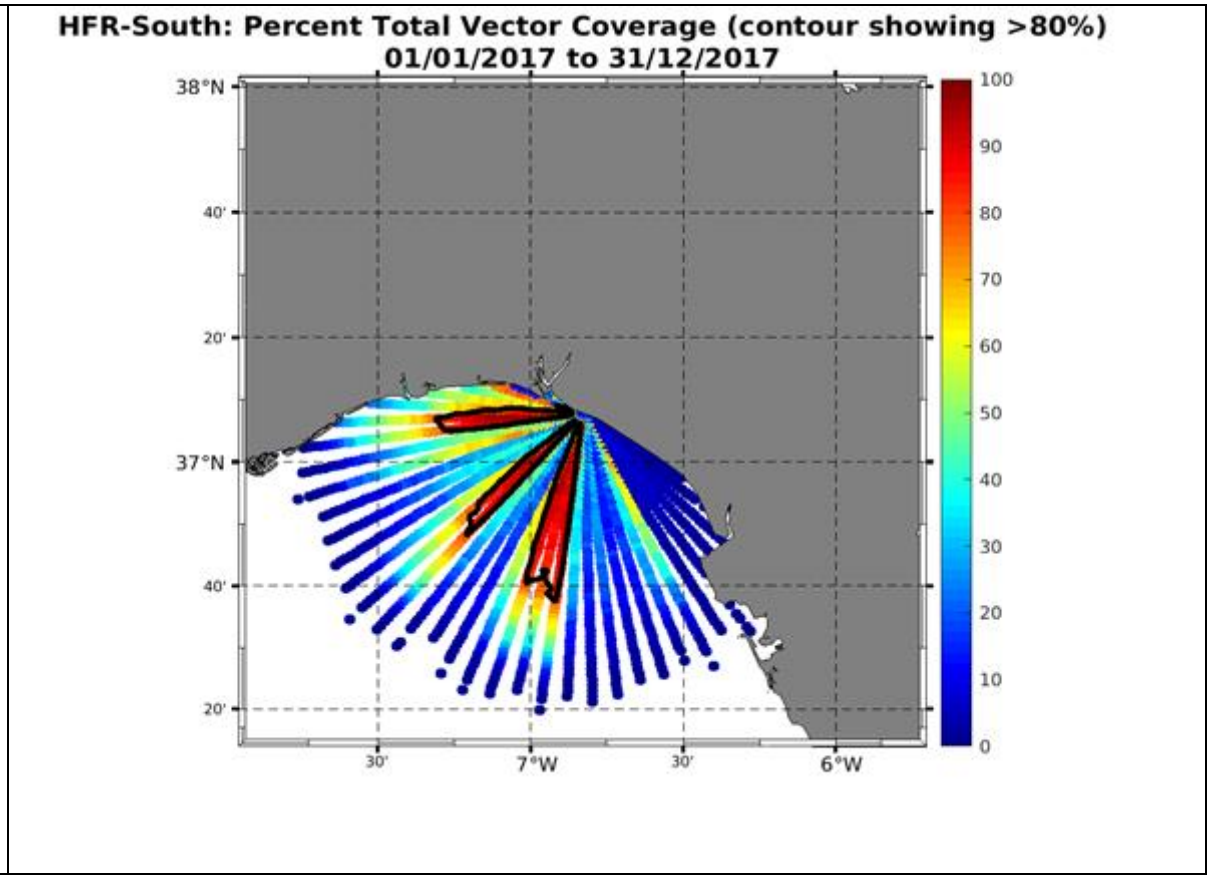
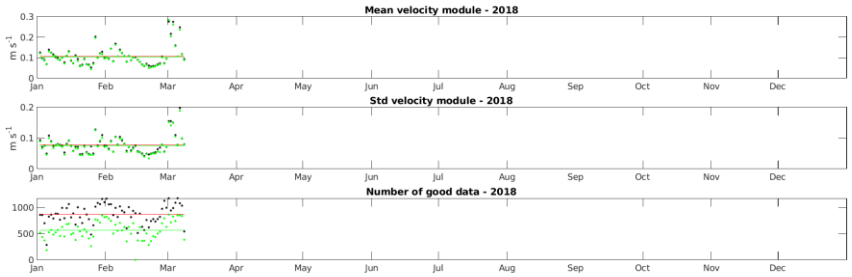

HFR-South: Percent Total Vector Coverage (contour showing >80%)
01/01/2017 to 31/12/2017
38°N
40'
20'
37°N
40'
20'
30'
7°W
30'
6°W
100
90
80
70
60
50
40
30
20
10
0

Period: 2018

A



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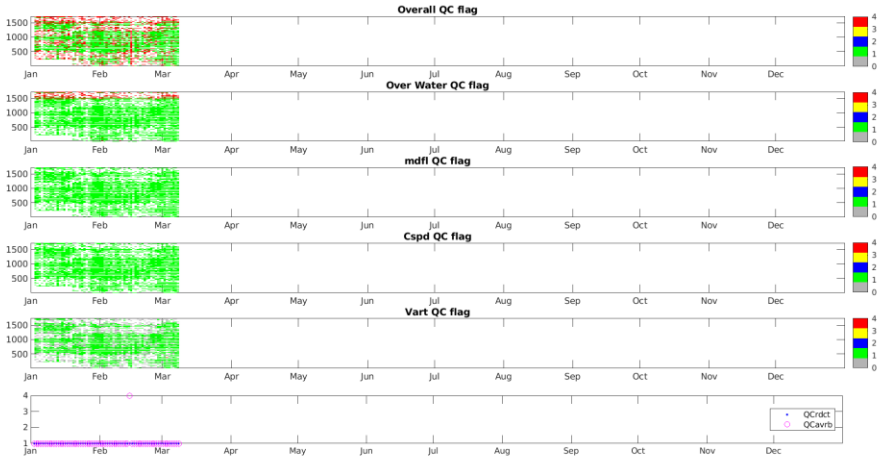
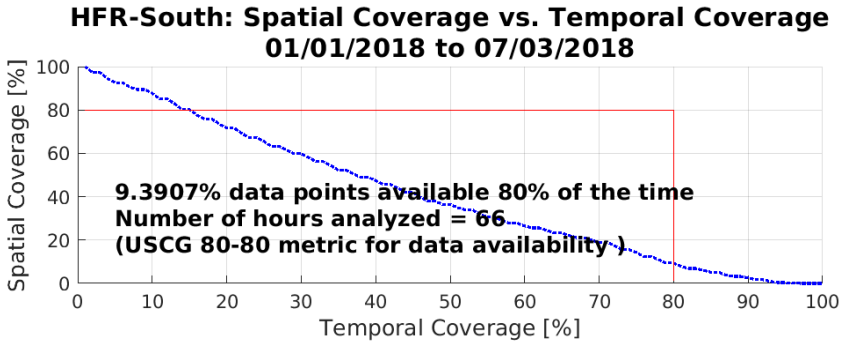
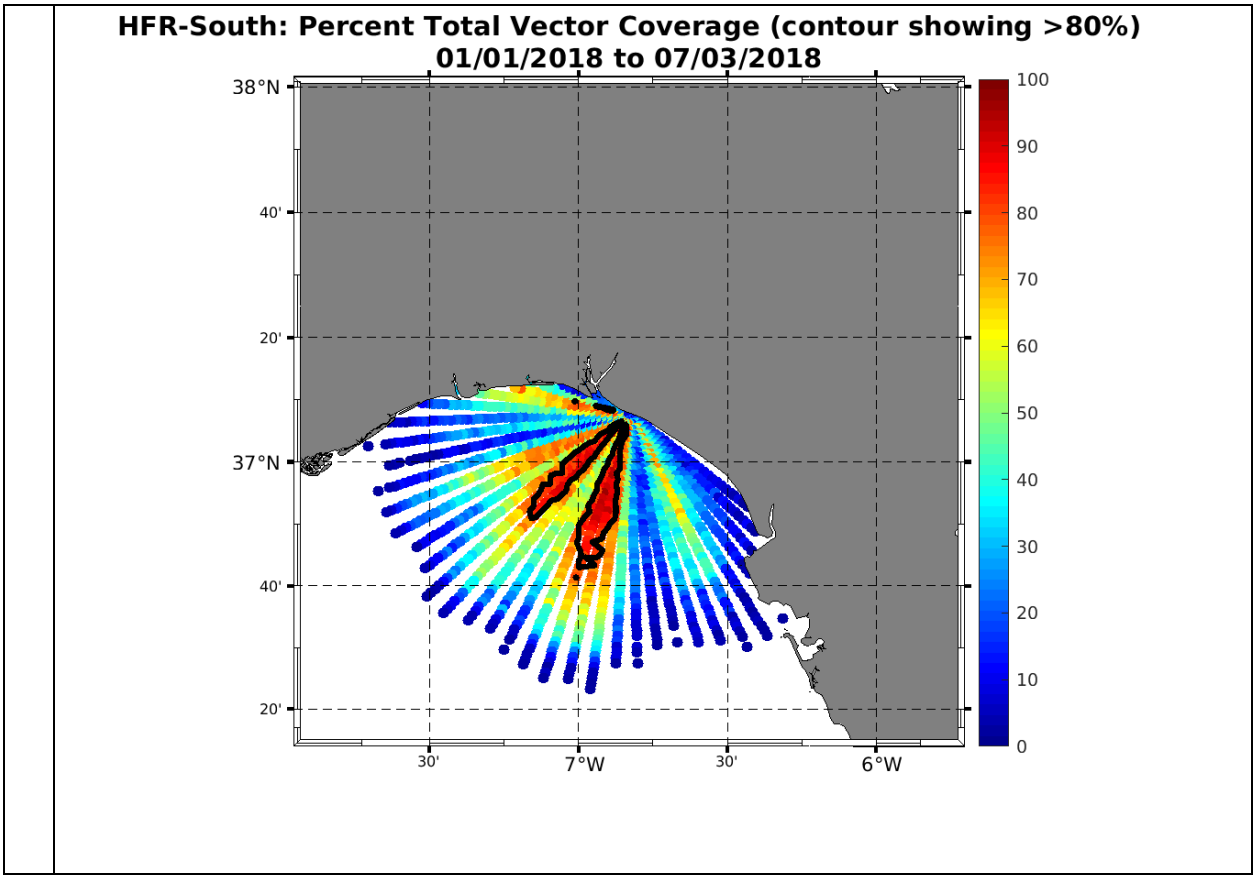
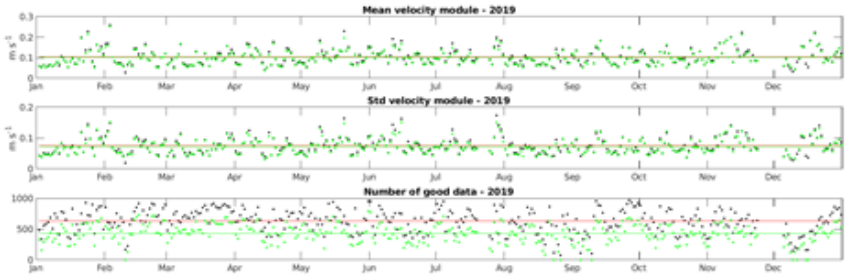
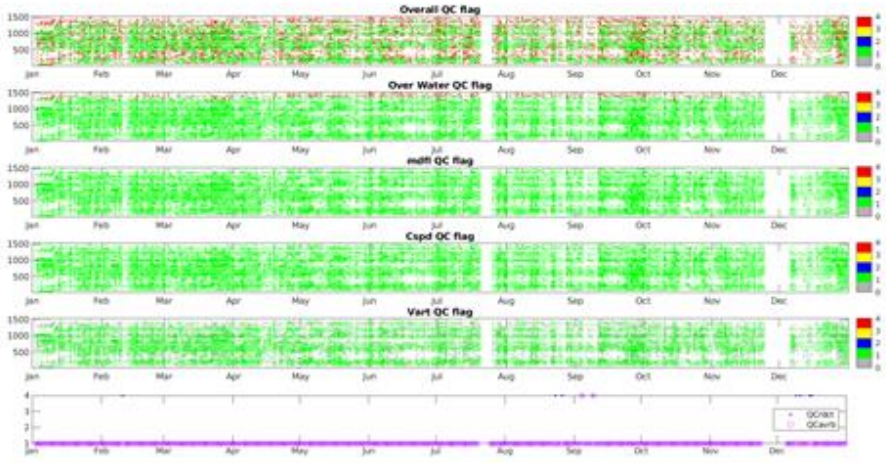
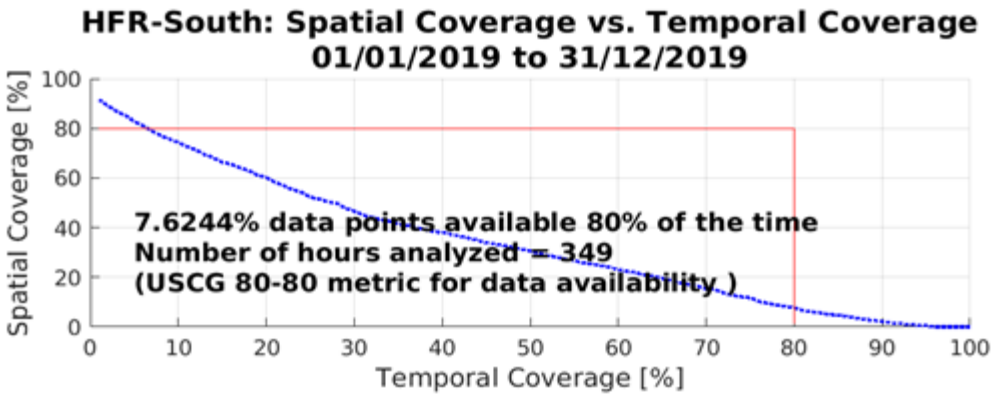


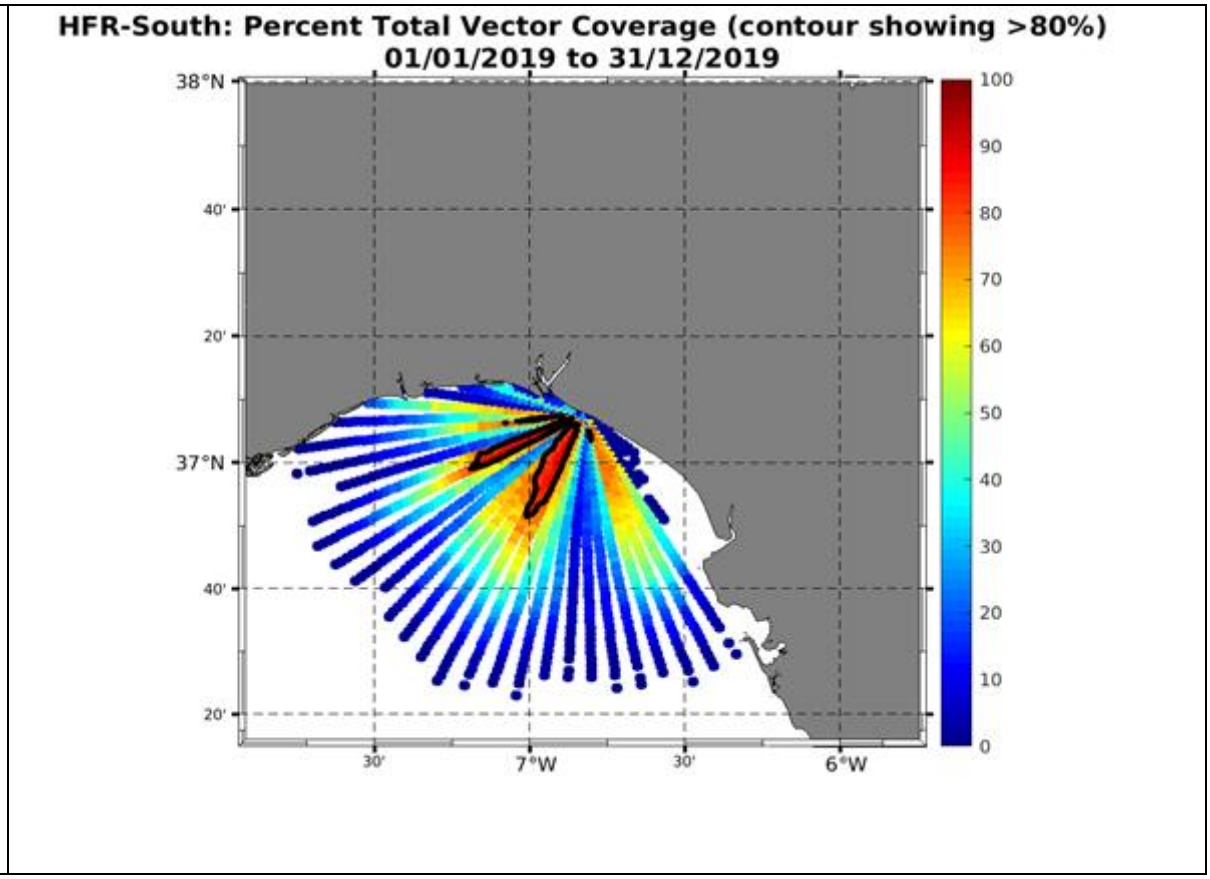
D

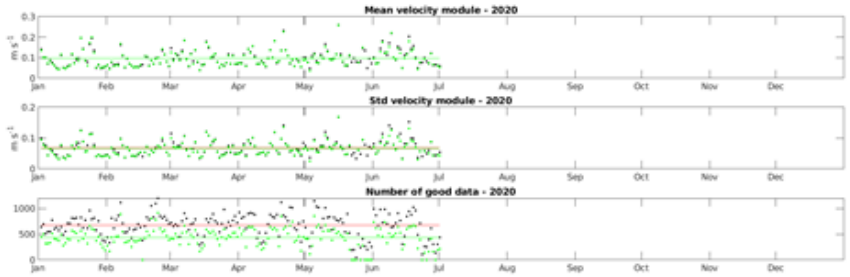
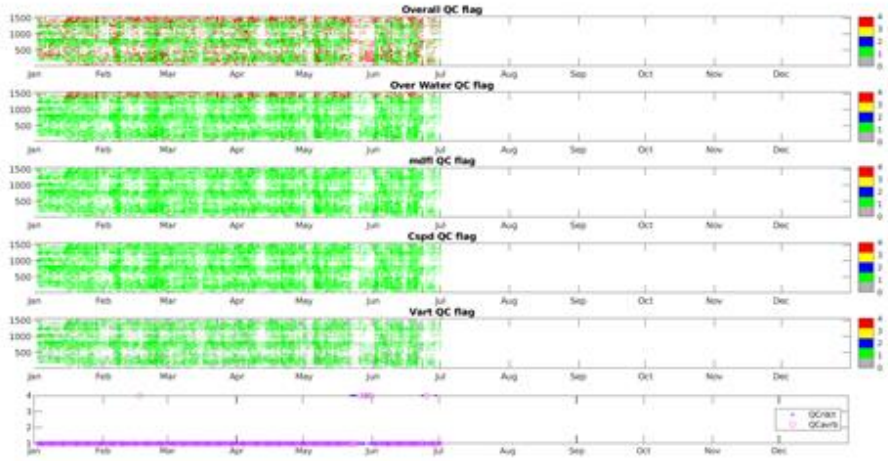
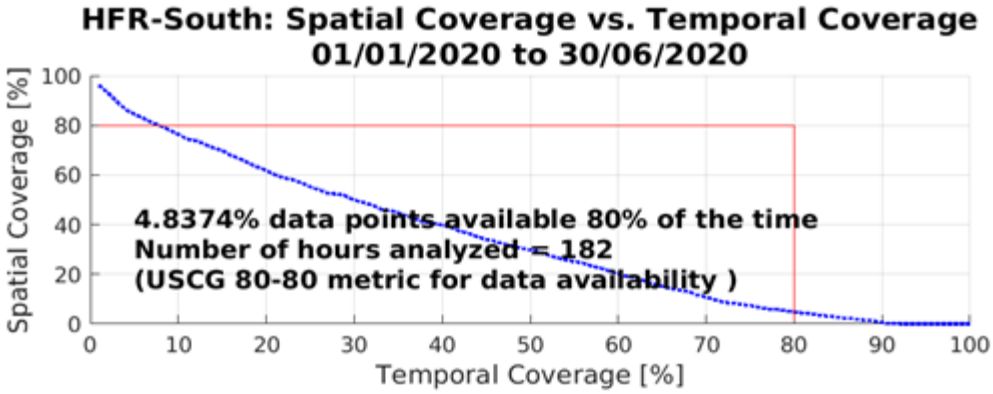


E


HFR-South: Percent Total Vector Coverage (contour showing >80%)
01/01/2018 to 07/03/2018
38°N
40'
20'
37°N
40'
20'
30'
7°W
30'
6°W
100
90
80
70
60
50
40
30
20
10
0

Period: 2019	
A	
B	
D	
E	


HFR-South: Percent Total Vector Coverage (contour showing >80%)
01/01/2019 to 31/12/2019
38°N
40'
20'
37°N
40'
20'
30'
7°W
30'
6°W
100
90
80
70
60
50
40
30
20
10
0

Period: Jan-Jul 2020	
A	
B	
D	
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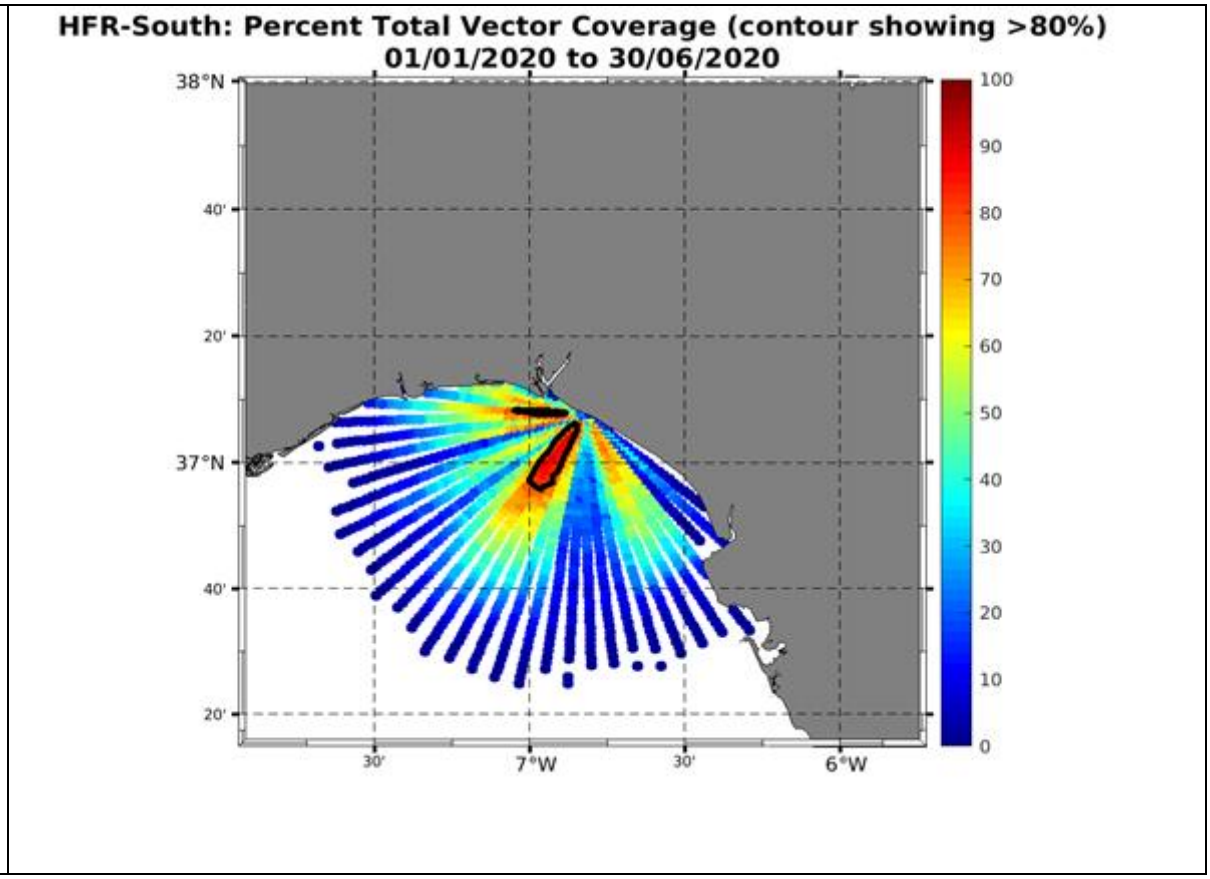
HFR-South: Percent Total Vector Coverage (contour showing >80%)
01/01/2020 to 30/06/2020
38°N
40'
20'
37°N
40'
20'
30'
7°W
30'
6°W
100
90
80
70
60
50
40
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0