**INFO ON QA/QC Settings and Calibration**

%% QC info for all the period 15-Feb-2016 – 22-Jul-2020
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 time: 15-Feb-2016
2751_PdE_MAZAG: 2019-12-05T00:00:00Z; 590_IHOC_PL018: 2020-01-16T00:00:00Z; 590_IHOC_PL019: 2013-12-09T00:00:00Z

%% Calibration info for time: 06-Jun-2016 08:00:00
2751_PdE_MAZAG: 2019-12-05T00:00:00Z; 590_IHOC_PL017: 2020-01-16T00:00:00Z; 590_IHOC_PL018: 2020-01-16T00:00:00Z; 590_IHOC_PL019: 2013-12-09T00:00:00Z

%% Calibration info for time: 29-Sep-2019
590_IHOC_PL018: 2015-06-17T00:00:00Z; 2751_PdE_MAZAG: 2018-12-26T00:00:00Z; 590_IHOC_PL017: 2018-09-05T00:00:00Z; 590_IHOC_PL019: 2013-12-09T00:00:00Z

%% Calibration info for time: 22-Jan-2020 11:00:00
590_IHOC_PL018: 2020-01-16T00:00:00Z; 2751_PdE_MAZAG: 2019-12-05T00:00:00Z; 590_IHOC_PL019: 2013-12-09T00:00:00Z; 590_IHOC_PL017: 2018-09-05T00:00:00Z

%% Calibration info for time: 09-Jan-2020 12:00:00
2751_PdE_MAZAG: 2019-12-05T00:00:00Z; 590_IHOC_PL019: 2013-12-09T00:00:00Z; 590_IHOC_PL018: 2020-01-16T00:00:00Z; 590_IHOC_PL017: 2018-09-05T00:00:00Z

%% Calibration info for time: 24-Jan-2020 12:00:00
590_IHOC_PL018: 2020-01-16T00:00:00Z; 2751_PdE_MAZAG: 2019-12-05T00:00:00Z; 590_IHOC_PL019: 2013-12-09T00:00:00Z

**RESULTS OF HIST DATA INSPECTION**

**General comments:**

The available data series contains 4 and a half years of valid data

The system was installed on February 2016 with 3 antennas and a new antenna was set up on June 2016. This is the reason of the increase of the number of data (and good data) in the figure A (2016).
The number of good data presents a notable variability for the whole study period. The availability of number of good data varies when one of the antennas is not working and those periods need to be in account for temporal analysis of this dataset. They can be identified easily in the figures A for the different years.

<table>
<thead>
<tr>
<th>Year</th>
<th>General comment</th>
<th>Periods to be reflagged</th>
<th>Reason for new fagging</th>
<th>Sugg. Flag</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From 2016 to 2020 the spatial/temporal coverage for the USCG 80-80% objective is low, and it does not reach the 80%-80% goal. But there 2 areas have a quite stable availability (around 9º15’W, 36º45’N and 8º30’W, 36º45’N) since the installation of the 4th antenna during June 2016. The big number of grid points need to be taken in account for the understanding of the low percentages of the 80%-80% condition and the good coverage of figures E. 2020 is a specially bad year for the data availability.

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

<table>
<thead>
<tr>
<th>Period</th>
<th>General comments</th>
<th>Nb. analysed hours</th>
<th>80%-80% obj.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016 Feb-Dec</td>
<td>38.12 % spatial availability 80% of time</td>
<td>7687</td>
<td>n</td>
</tr>
<tr>
<td>2017</td>
<td>74.35 % spatial availability 80% of time</td>
<td>8701</td>
<td>n</td>
</tr>
<tr>
<td>2018</td>
<td>66.78 % spatial availability 80% of time</td>
<td>7885</td>
<td>n</td>
</tr>
<tr>
<td>2019</td>
<td>61.60% spatial availability 80% of time</td>
<td>8207</td>
<td>n</td>
</tr>
<tr>
<td>2020 Jan-Jul</td>
<td>7.96 % spatial availability 80% of time</td>
<td>4650</td>
<td>n</td>
</tr>
</tbody>
</table>

**Annex I Applied QA/QC tests**

<table>
<thead>
<tr>
<th>QC Flag Variable name</th>
<th>Short name</th>
<th>Short description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syntax</td>
<td>Syntax</td>
<td>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.</td>
</tr>
<tr>
<td>DDNS_QC Data Density Threshold</td>
<td>Data Density Threshold</td>
<td>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.</td>
</tr>
<tr>
<td>CSPD_QC Velocity Threshold</td>
<td>Velocity Threshold</td>
<td>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.</td>
</tr>
</tbody>
</table>
**Annex II QC Flags**

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

*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 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.
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.
HFR-South: Spatial Coverage vs. Temporal Coverage
15/02/2016 to 31/12/2016

38.1239% data points available 80% of the time
Number of hours analyzed = 7687
(USCG 80-80 metric for data availability)
HFR-South: Spatial Coverage vs. Temporal Coverage
01/01/2017 to 31/12/2017

74.3541% data points available 80% of the time
Number of hours analyzed = 8701
(USCG 80-80 metric for data availability)
Period: 2018
### C

**mean velocity module (m s\(^{-1}\))**

![Graph showing mean velocity module](image)

**std velocity module (m s\(^{-1}\))**

![Graph showing standard deviation of velocity module](image)

**mean gdop QC flag**

![Graph showing mean gdop QC flag](image)

**std gdop QC flag**

![Graph showing standard deviation of gdop QC flag](image)

**mean overall QC flag**

![Graph showing mean overall QC flag](image)

**std overall QC flag**

![Graph showing standard deviation of overall QC flag](image)

### D

**HFR-South: Spatial Coverage vs. Temporal Coverage**

01/01/2018 to 31/12/2018

- 66.7786% data points available
- 80% of the time
- Number of hours analyzed = 7885

(USCG 80-80 metric for data availability)
Period: Jan-Dec 2019
[Image of graphs and charts]

**C**

**mean velocity module (m s\(^{-1}\))**

- Values range from 36.2 to 37 m s\(^{-1}\).
- Standard deviation of velocity module (m s\(^{-1}\))

- Values range from 0 to 0.8 m s\(^{-1}\).

**mean gdop QC flag**

- Values range from 1 to 4.
- Standard deviation of gdop QC flag

- Values range from 0 to 1.5.

**mean overall QC flag**

- Values range from 1 to 4.
- Standard deviation of overall QC flag

- Values range from 0 to 1.5.

**D**

**HFR-South: Spatial Coverage vs. Temporal Coverage**

01/01/2019 to 31/12/2019

- **61.6048% data points available 80% of the time**
- **Number of hours analyzed = 8207**
  - **(USCG 80-80 metric for data availability)**
HFR-South: Percent Total Vector Coverage (contour showing >80%)
01/01/2019 to 31/12/2019

HFR-South: HFR Surface current average [m/s]
01/01/2019 to 31/12/2019
Period: Jan-Jul 2020

A

B

C

mean velocity module (m s⁻¹)

std velocity module (m s⁻¹)

mean gdop QC flag

std gdop QC flag

mean overall QC flag

std overall QC flag
HFR-South: Spatial Coverage vs. Temporal Coverage
01/01/2020 to 22/07/2020

7.9682% data points available 80% of the time
Number of hours analyzed = 4650
(USCG 80-80 metric for data availability)

HFR-South: Percent Total Vector Coverage (contour showing >80%)
01/01/2020 to 22/07/2020

HFR-South: HFR Surface current average [m/s]
01/01/2020 to 22/07/2020