User Guide for the Aquarius Radio-Frequency Interference (RFI) products

This is a product developed by NASA Goddard Space Flight Center (GSFC).

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This product contains monthly-averaged Radio Frequency Interference (RFI) data for ascending/descending passes as detected by the Aquarius radiometers and scatterometer. The data is available for ascending (northward) and descending (southward) passes of the satellite only and ascending/descending passes combined.

The values stored in this product are the percentage of radiometer and scatterometer measurements identified as corrupted by interference by the RFI detection algorithms [1,2] within each data point, averaged over one month. An additional RFI flag [3] is used to identify locations where the measured brightness temperature over land exceeds the expected limits of surface emissivity. This flag is not used to remove samples from further processing, but, in generating the radiometer RFI data, 100% RFI is assigned to points where this flag is raised.

This product can be used to reproduce the RFI maps available on the Aquarius website at University of Maine (https://aquarius.umaine.edu/cgi/gal_radiometer.htm for the radiometer, and https://aquarius.umaine.edu/cgi/gal_scatterometer.htm for the scatterometer), by plotting the variables Rad_RFI_percent_AscDes_AllBeams and Scat_RFI_percent_AscDes_AllBeams on the latitude/longitude grid. Additionally, the user can generate maps by using only a particular beam or only ascending passes, for example. All combinations of beams and ascending/descending passes are possible.

This product contains information about RFI, but it is also relevant for the retrieved Sea Surface Salinity (SSS). Over the ocean, the RFI percentage in this product corresponds to the amount of raw measurements discarded due to RFI contamination before SSS retrieval. Therefore, maps of the RFI percentage can give the user an indication of where RFI is more likely to have affected the quality of SSS retrievals, for a particular month, or for a series of months.

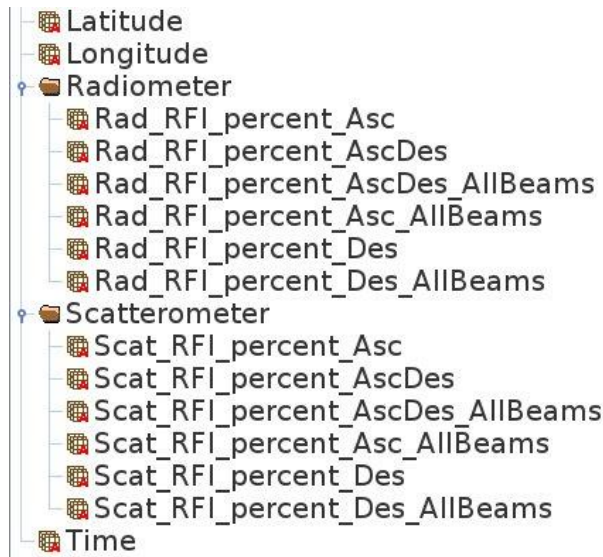The file is structured as in Figure 1.

Figure 1. File structure.

Time: start time of the mothly averaging period [UTC], size= 1

Latitude: latitude of cell center [degrees North], size= 360

Longitude: longitude of cell center [degrees East], size= 720

Radiometer
- **Rad_RFI_percent_Asc**: percent of radiometer samples flagged as RFI (individual beams; ascending passes only) [%], size = number of polarizations (2) x number of beams (3) x 360 x 720
- **Rad_RFI_percent_Des**: percent of radiometer samples flagged as RFI (individual beams; descending passes only) [%], size = number of polarizations (2) x number of beams (3) x 360 x 720
- **Rad_RFI_percent_AscDes**: percent of radiometer samples flagged as RFI (individual beams; ascending and descending passes combined) [%], size = number of polarizations (2) x number of beams (3) x 360 x 720
- **Rad_RFI_percent_Asc_AllBeams**: percent of radiometer samples flagged as RFI (all beams combined; ascending passes only) [%], size = number of polarizations (2) x 360 x 720
- **Rad_RFI_percent_Des_AllBeams**: percent of radiometer samples flagged as RFI (all beams combined; descending passes only) [%], size = number of polarizations (2) x 360 x 720
- **Rad_RFI_percent_AscDes_AllBeams**: percent of radiometer samples flagged as RFI (all beams combined; ascending and descending passes combined) [%], size = number of polarizations (2) x 360 x 720

Scatterometer
- **Rad_RFI_percent_Asc**: percent of scatterometer samples flagged as RFI (individual beams; ascending passes only) [%], size = number of polarizations (2) x number of beams (3) x 360 x 720
- **Rad_RFI_percent_Des**: percent of scatterometer samples flagged as RFI (individual beams; descending passes only) [%], size = number of polarizations (2) x number of beams (3) x 360 x 720
- **Rad_RFI_percent_AscDes**: percent of scatterometer samples flagged as RFI (individual beams; ascending and descending passes combined) [%], size = number of polarizations (2) x number of beams (3) x 360 x 720
- **Rad_RFI_percent_Asc_AllBeams**: percent of scatterometer samples flagged as RFI (all beams combined; ascending passes only) [%], size = number of polarizations (2) x 360 x 720

- **Rad_RFI_percent_Des_AllBeams**: percent of scatterometer samples flagged as RFI (all beams combined; descending passes only) [%], size = number of polarizations (2) x 360 x 720
- **Rad_RFI_percent_AscDes_AllBeams**: percent of scatterometer samples flagged as RFI (all beams combined; ascending and descending passes combined) [%], size = number of polarizations (2) x 360 x 720

For the polarizations, the first index corresponds to V-pol, the second to H-pol.

File Name Format

The bold characters indicate the dynamic part of the naming convention.

Q**YYYY_MM**_RFI.h5

References

[1] David M. Le Vine, Paolo de Matthaeis, Christopher S. Ruf, and David D. Chen, "Aquarius RFI Detection and Mitigation Algorithm: Assessment and Examples," *IEEE Transactions on Geoscience and Remote Sensing*, Vol. 52, No. 8, August 2014.
[2] David Le Vine and Paolo de Matthaeis, "Aquarius Active/Passive RFI Environment at L-band", *IEEE Geoscience and Remote Sensing Letters*, Vol. 11, No. 10, October 2014.
[3] Yan Soldo, David M. Le Vine, Paolo de Matthaeis and Philippe Richaume. "L-Band RFI Detected by SMOS and Aquarius", *IEEE Transactions on Geoscience and Remote Sensing*, Vol. 55, No. 7, July 2017.