

RAIN ACCUMULATION (RA) PRODUCT FOR AQUARIUS

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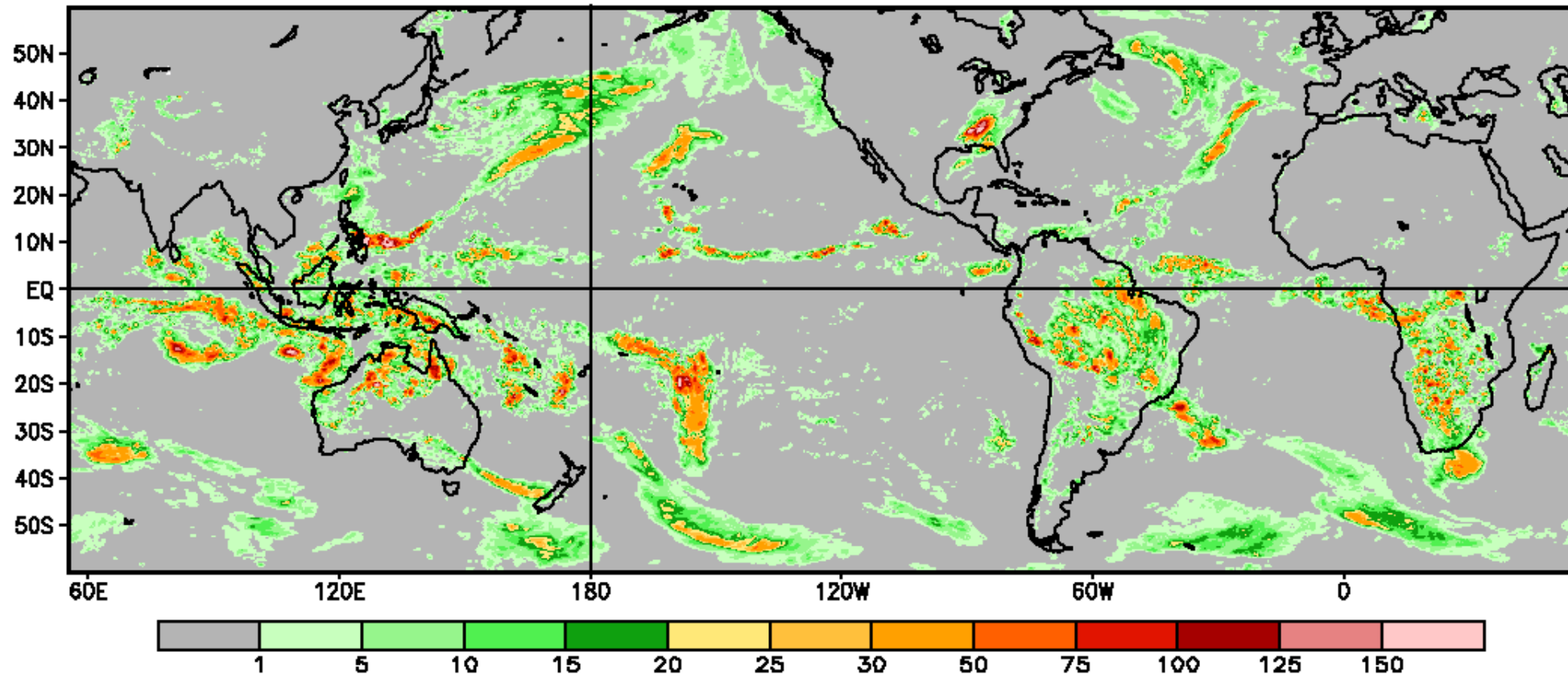
Abstract

The influence of precipitation on the sea surface salinity (SSS) measurements is an important issue for users of the Aquarius data (AQ L2) as discussed in a companion paper. This poster presents a new ancillary Rain Accumulation (RA) data product developed by the Central FL Remote Sensing Lab that integrates the collocated precipitation with the AQ Level 2 (L2) science dataset. We use the NOAA precipitation product CMORPH (Climate Prediction Center – Morphing Technique) that has a global coverage between $\pm 60^\circ$ latitude, a spatial resolution of 0.25° and a sampling window of 30 minutes. In addition to the instantaneous rain rate, this overlay product to the AQ L2 science data provides rain accumulation for the previous 24 hours in time steps of 30 minutes. The spatial integration of the precipitation product over the AQ IFOV is performed using the weighted average based on the antenna beam efficiency. The purpose of this poster is to describe the RA product and to present validation results using independent environmental data records (EDR) WindSat rain retrievals. The WindSat EDR's have a large number of rain event collocations (< 30 min) with the AQ observation.

1.1

PRECIPITATION PRODUCT

- Based on NOAA CMORPH
 - Global coverage between $\pm 60^\circ$ lat and 30 min windows

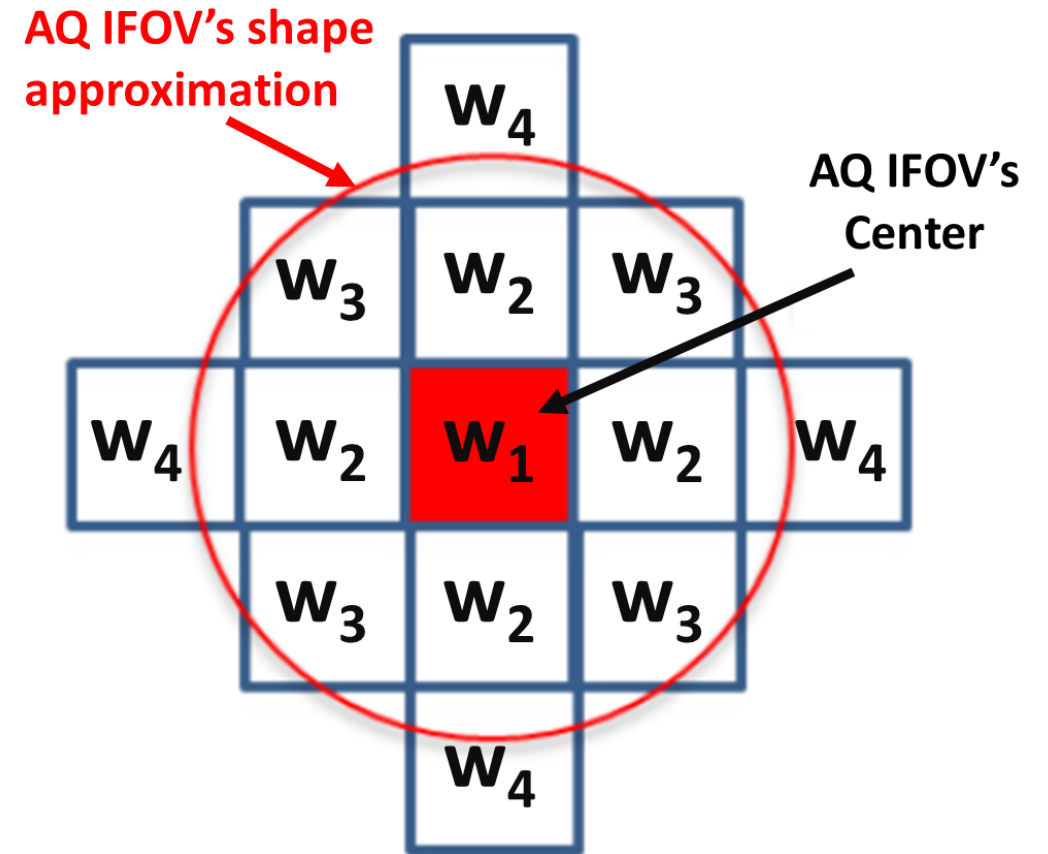


Daily Precipitation for Jan – 1 – 2011 , Spacial Resolution 0.25° , Units mm/day

* CMORPH image courtesy from <https://catalog.data.gov/dataset/cmorph-8-km-a-method-that-produces-global-precipitation-estimates-from-passive-microwave-and-in>

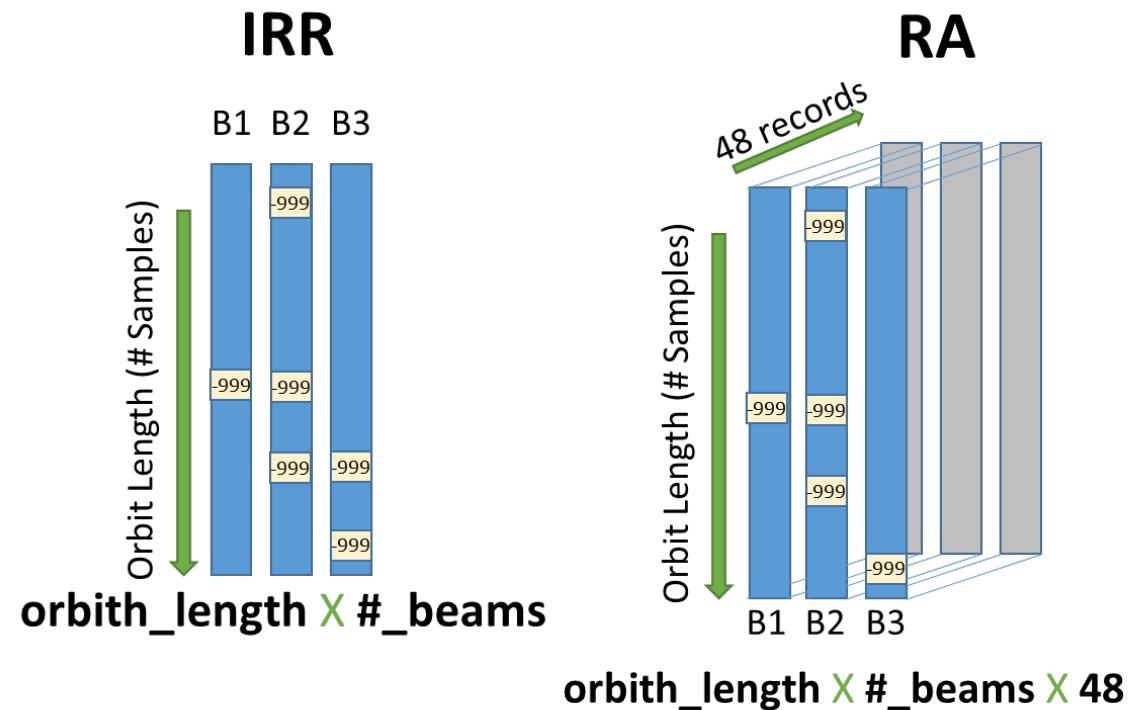
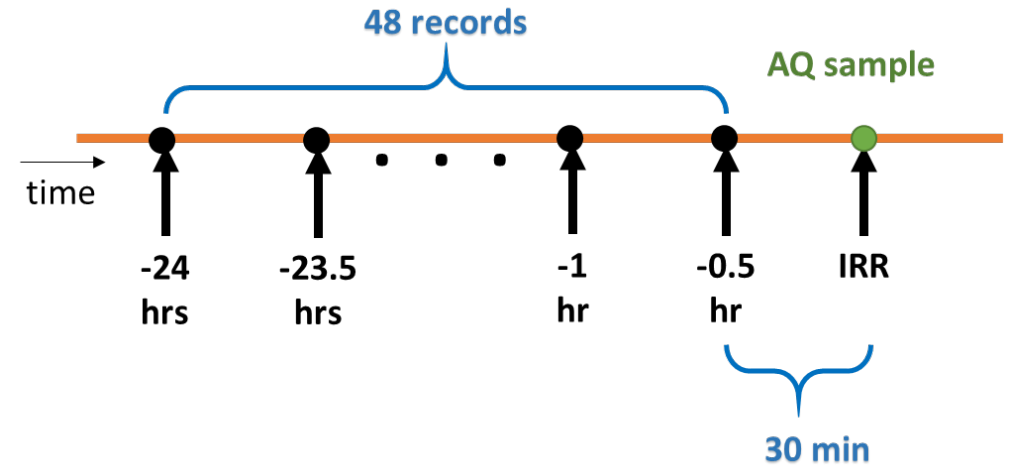
1. 2 cont

- The product is an overlay for the AQ-L2 product
- Spatial integration over AQ IFOV
 - Assumes circular foot print of 100 km
 - Uses 13 x 0.25° boxes
 - weighted average based on antenna beam efficiency



1. 3 cont

- Provides instantaneous and historical information of precipitation integrated over AQ foot print for previous 24 hours in 0.5 hr steps
- 49 records are associated with each AQ sample
 - Instantaneous RR (IRR)
 - 30 min samples for previous 24 hrs

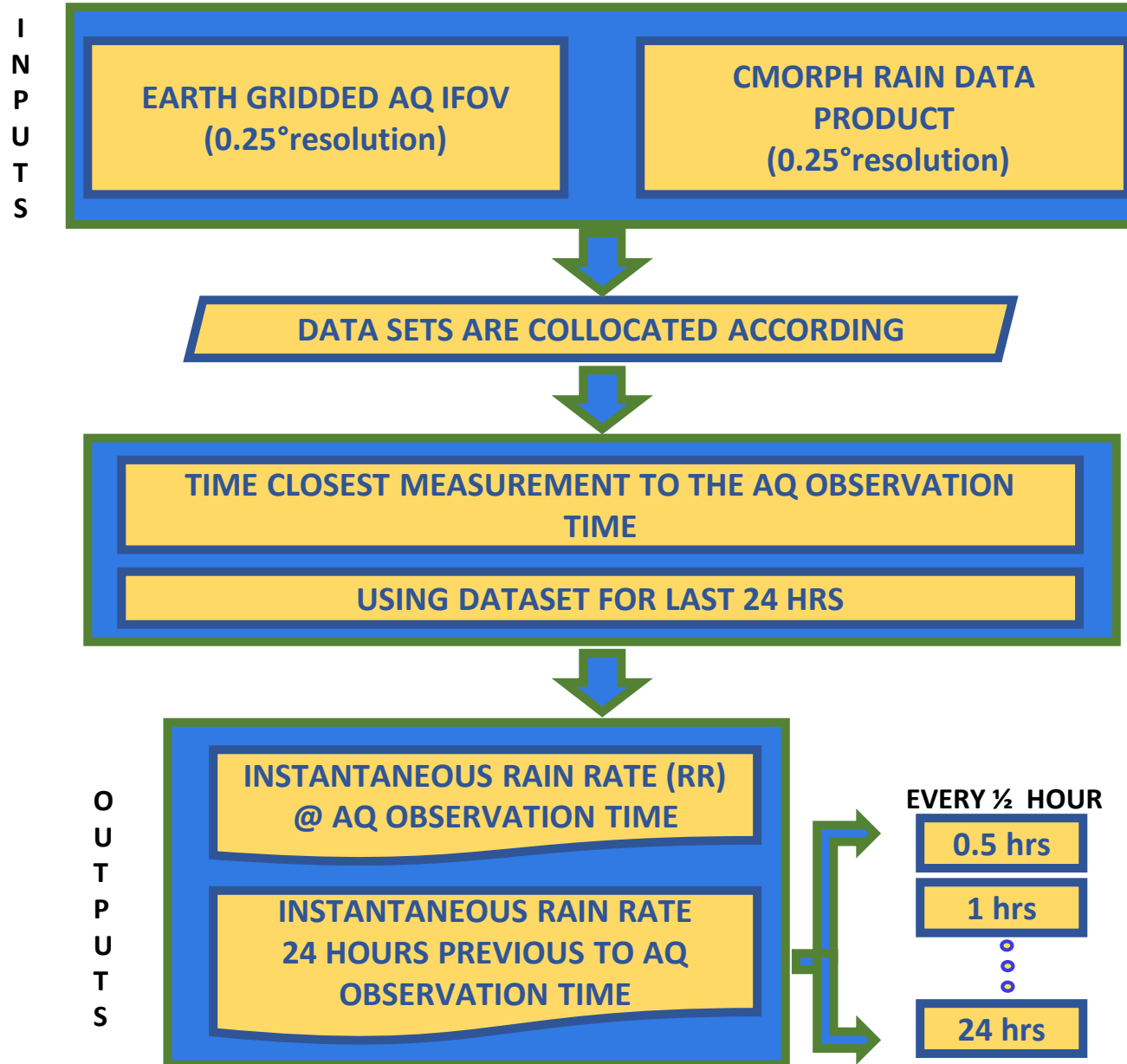


1.4 cont

- The Rain Accumulation Product is part of the **CFRSL Impact Model (RIM)** that provides data in **hdf5** format (Available at PODAAC):
 - Collocated history of precipitation (**RA Product**)
 - **IRR** – Instantaneous Rain Rate
 - **RA** – Rain Accumulation (previous 24 hrs)
 - Other rain parameters
 - **BF** – Rain Beam Fill Fraction
 - **RIM_{SSS}** – SSS estimated based on RIM
 - **PS** – Probability of Salinity Stratification

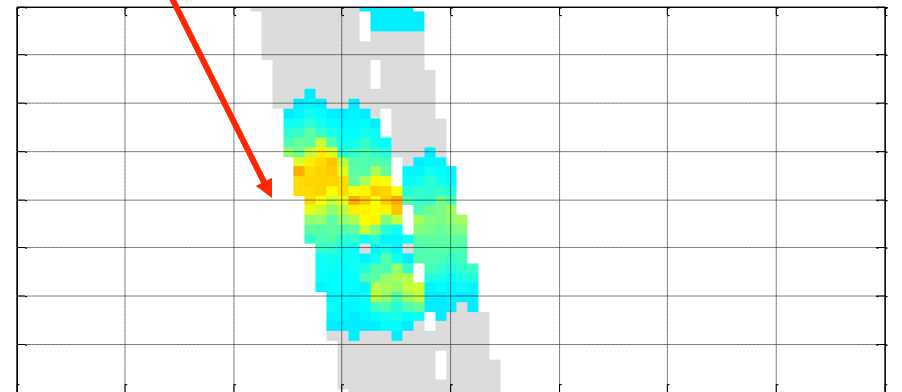
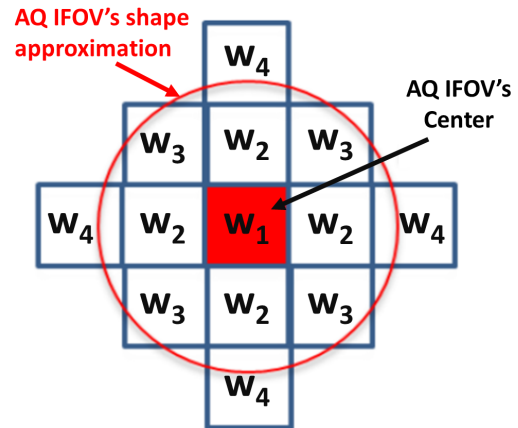
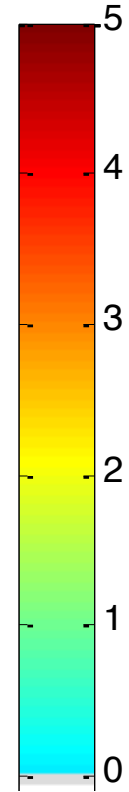
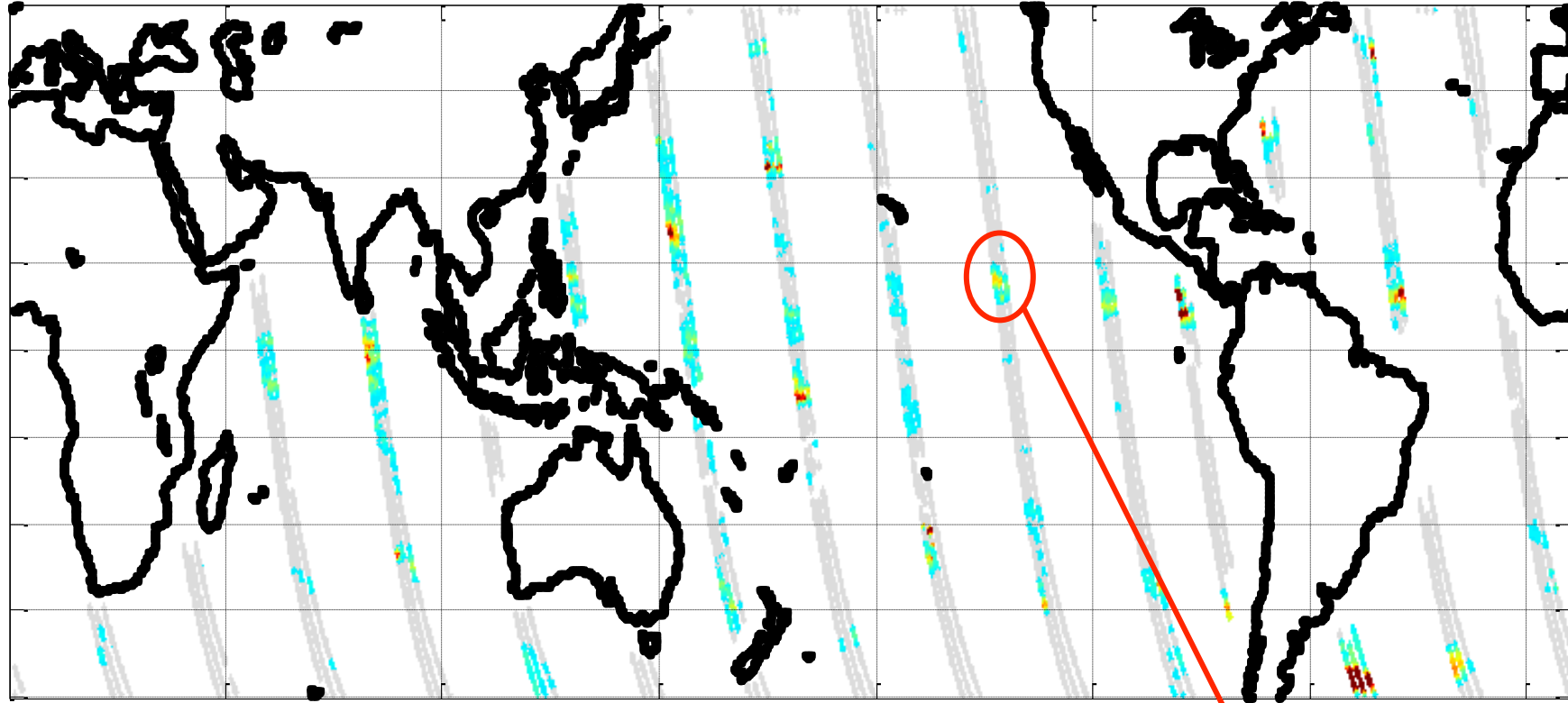
2.1

ALGORITHM

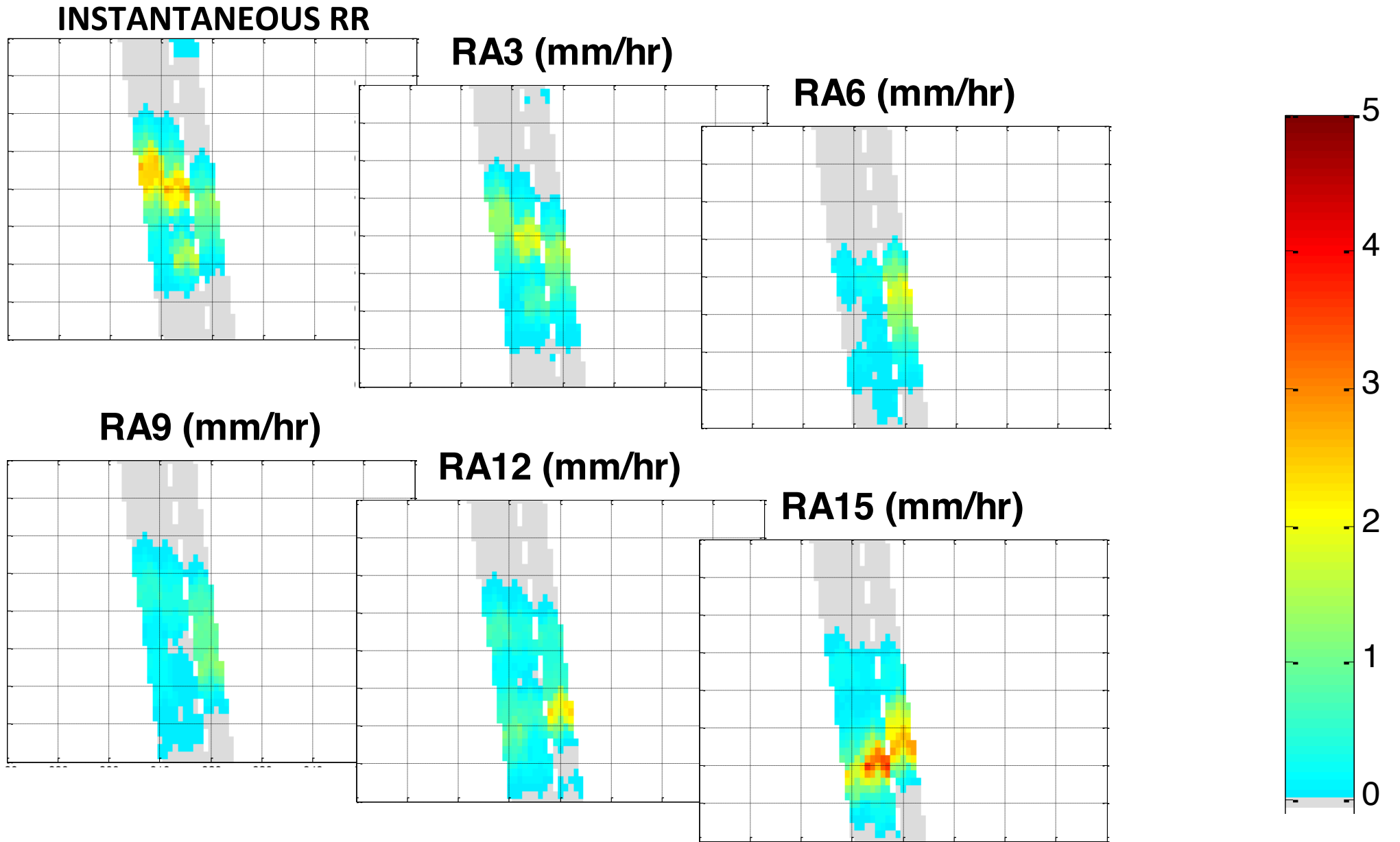


2.1

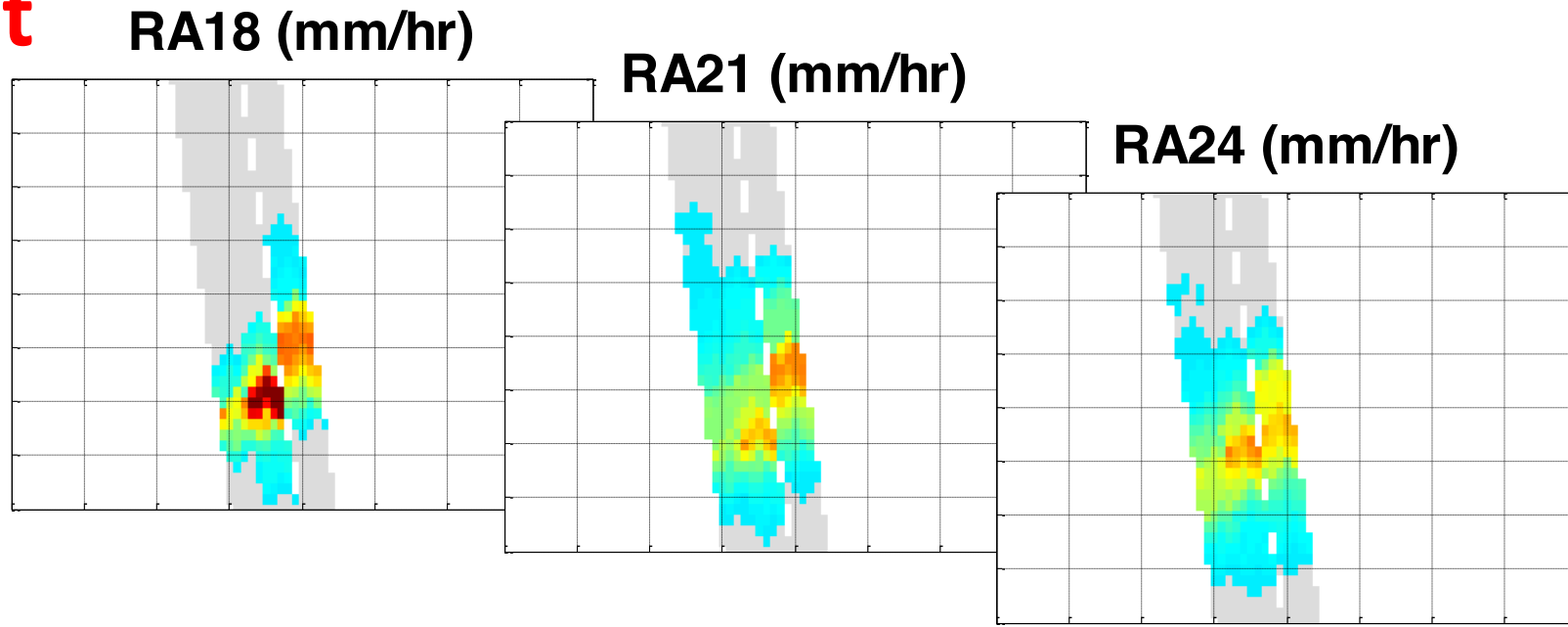
INSTANTANEOUS RAIN RATE OVER AQ FOOT PRINT



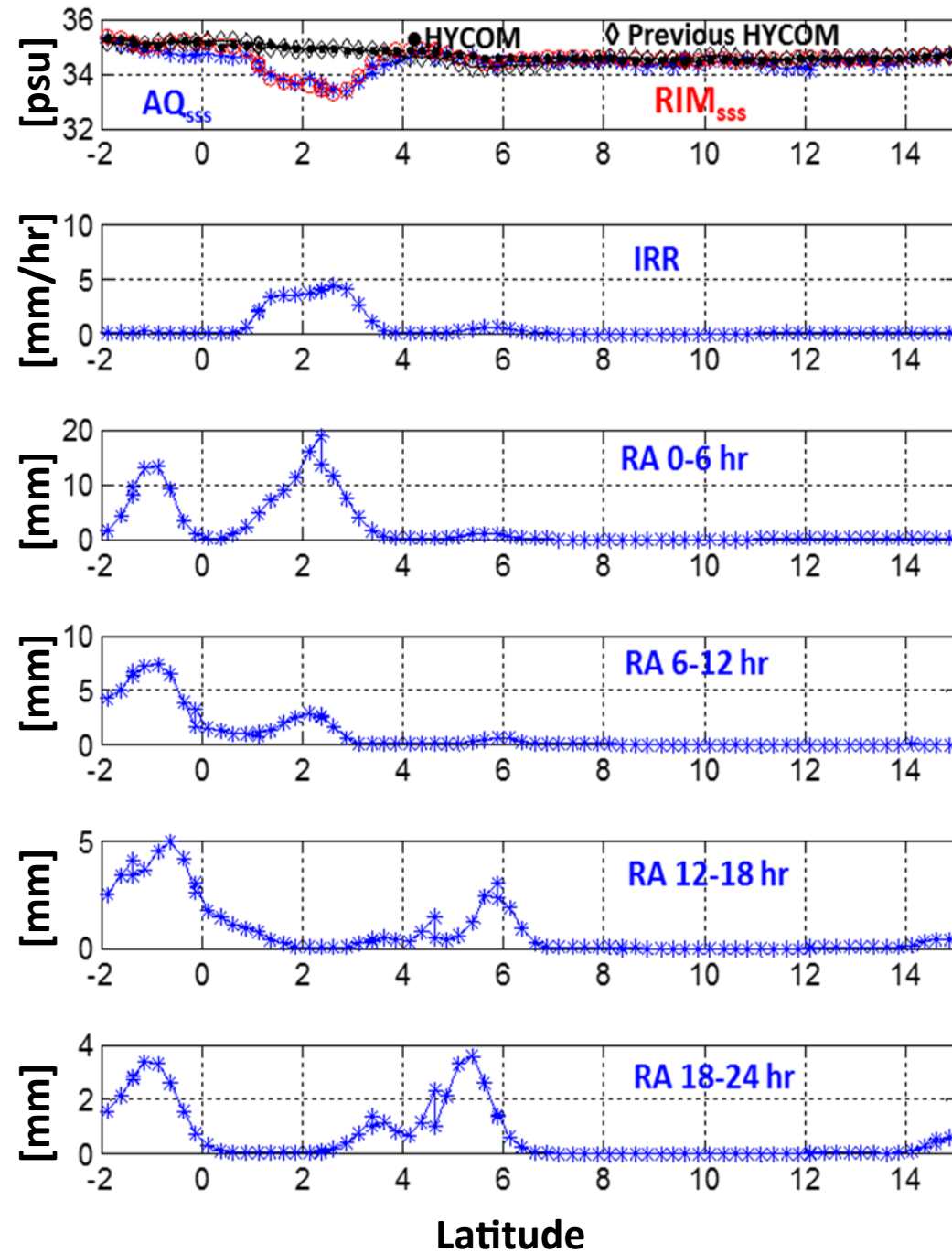
2.2



2. 2 cont

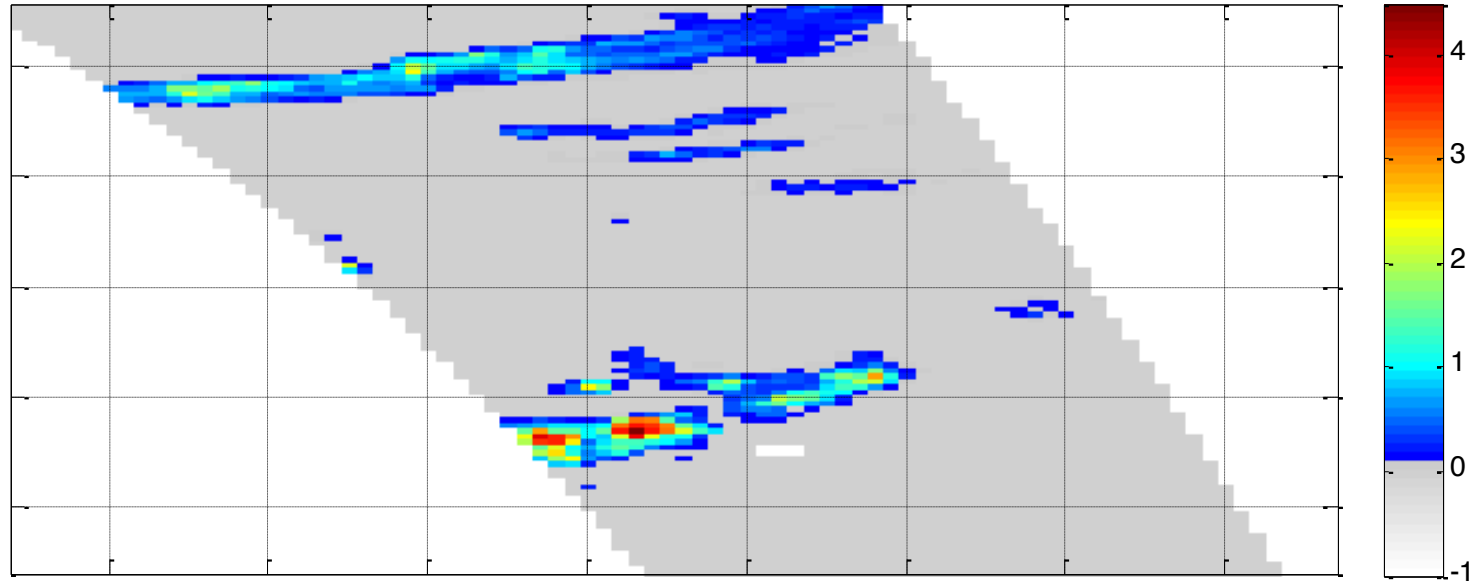


2. 3 cont

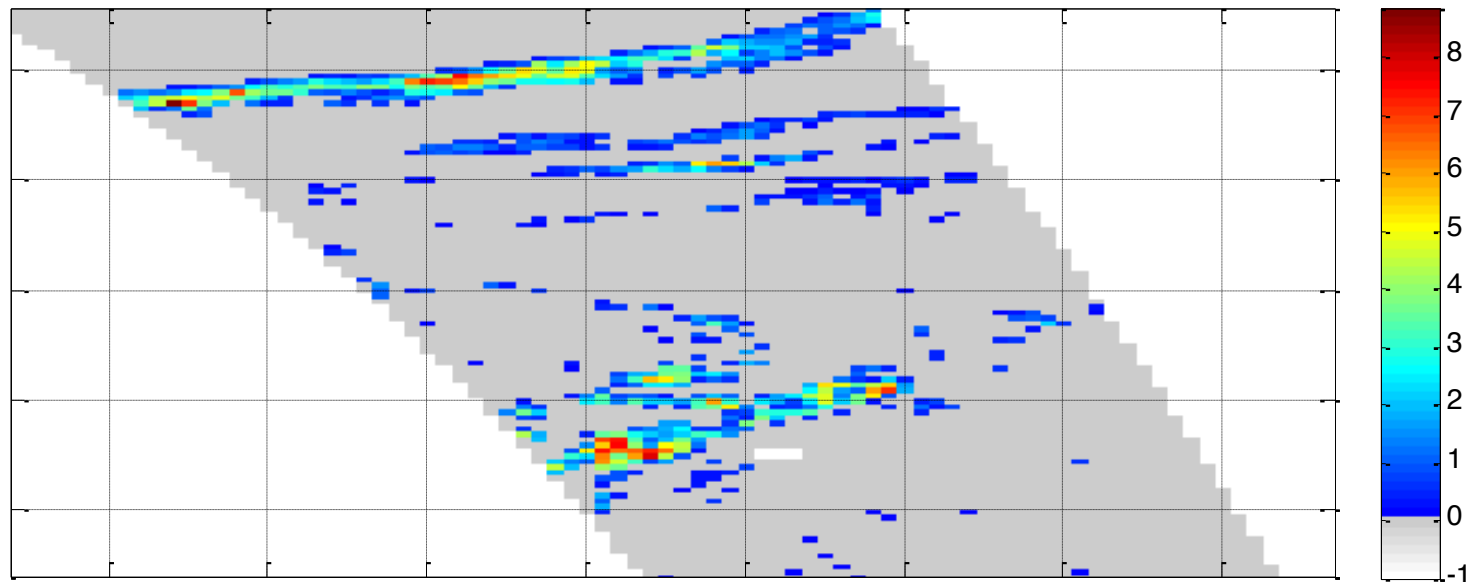


3.1

VALIDATION CLOSEST TIME CMORPH COLLOCATION TO WINDSAT



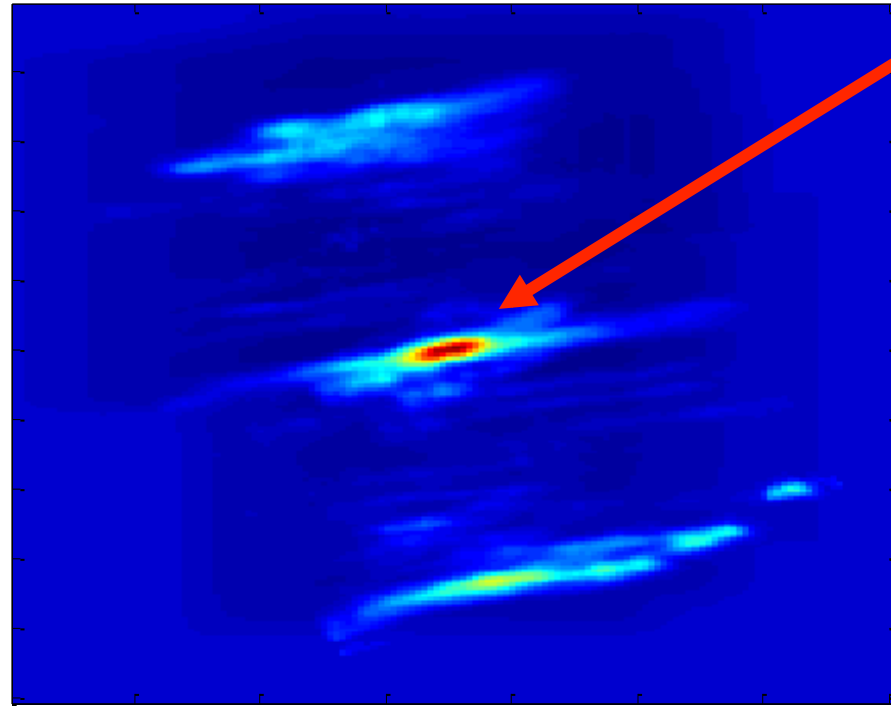
INSTANTANEOUS WINDSAT RR



I will update those two images

3.2 cont

NORMALIZED CROSS CORRELATION MATRIX



I will update
this image

- Normalized cross-correlation reflects :
- Shifting of 2 pixels (50 Kms) in horizontal direction.
 - Maximum correlation equals to 0.6026

4

AQ RA Product Summary

- Beta version will be available on PODAAC in early 2015
- Validation performed using well-calibrated WindSat EDR rain measurements ensures reliability
- Useful source of ancillary data for comprehensive analysis of the rain effect on measurement of sea surface salinity
- Recommend inclusion of IRR into L-2 V4.0 as the AQ “rain flag”