Evaluation of RapidScat Ocean Vector Winds for Data Assimilation and Reanalysis

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RapidScat was a Ku Band scatterometer flown aboard the International Space Station (ISS)

- The GMAO routinely assimilated RapidScat-derived wind vectors from 12 May 2015 through 20 Aug 2016 and was the first modeling and assimilation center in the world to do so routinely
- The instrument underwent a number of discrete changes in the character of its signal-to-noise, resulting in an observations whose quality degraded over time
- The inclination of the ISS resulted in spatial coverage that was complementary to existing scatterometer measurements from ASCAT (top)

A post-mission assessment of the RapidScat data record was performed with the aim of incorporating the data into future reanalysis systems

- The instrument degradation was seen by comparing the differences between the observations and short-term forecasts (background departures, bottom red, blue)
- The observations were neutral-to-degrading in the final five months of the mission, as illustrated via the FSOI metric (bottom green)
  - Forecast Sensitivity to Observations-Impact (FSOI) is a measure of how observations contribute to the reduction (negative) or increase (positive) of 24 hour forecast error
- The assimilation procedure treats observation error, which determines the observation weight within the analysis solution, as static and predefined
- The forecast degradation seen as the SNR degraded illustrates that, if these observations are to be incorporated into future reanalysis, the evolving character of the observations – specifically their errors - need to be considered
- Further analysis was performed on post-mission reprocessed data, showing that the changes in SNR state are better handled for in the retrieved ocean vector wind data record

10 May – 9 June 2015
0000 UTC Cycles Only
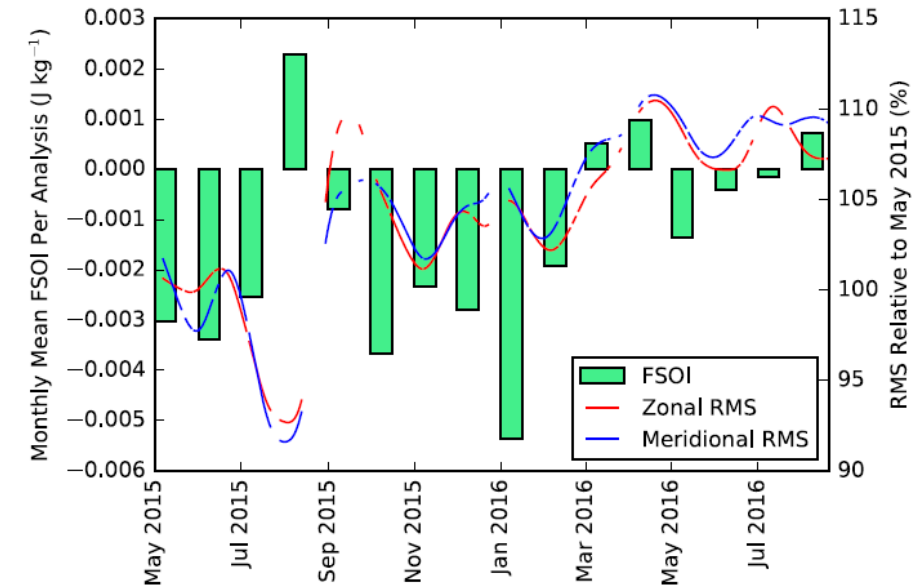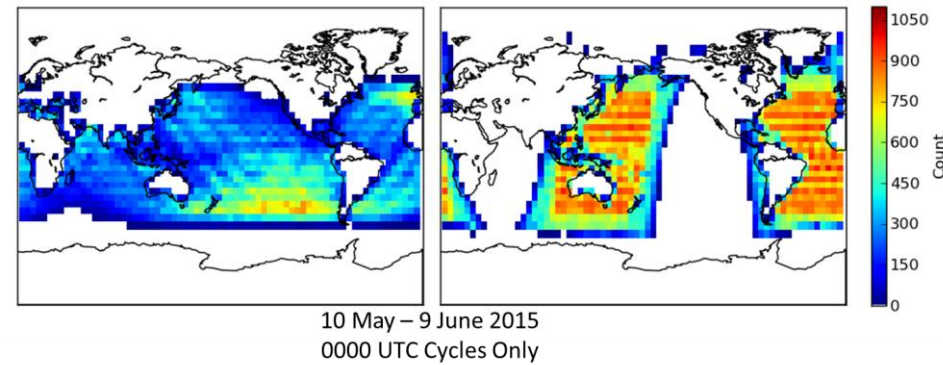
Assimilated counts (top), zonal and meridional background departure relative RMS (bottom red, blue), and monthly FSOI (bottom green) per analysis over the assimilated data record of RapidScat in GMAO Forward Processing

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