Combining Data Assimilation with an Algorithm to Improve the Consistency of VIIRS Chlorophyll: Toward a Multidecadal, Multisensor Global Record

NASA ROSES 2013 NNH13ZDA001N-SNPP

2.1.3 Other New NASA Data Products from Suomi NPP Measurements

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Objective:

Use data assimilation and bias correction to produce enhanced representations of VIIRS global ocean chlorophyll

A proposed Level 4 product
Ice fields are shown in white.
Missing data in black.
Differences in sampling between SeaWiFS (top) and MODIS (bottom) due to 1) aerosol masking in the North Indian and Equatorial Atlantic and 2) the Antarctic.
Differences in sampling between MODIS-Aqua (top) and VIIRS (bottom). The differences are smaller than between MODIS and SeaWiFS. Notice increased coverage by VIIRS in Southern Ocean.
Note the plumes of high chlorophyll in the Southern Ocean that are artifacts of sampling. Missing data along some continental shelves, which is due to the underlying model domain.
Bias-Correction Using In Situ Chlorophyll Data

We use 3 archives:
   NODC
   SeaBASS
   AMT

Quality checked using blended analysis (used for bias correction of SST by the Reynolds methodology) for the period 2012-2014
After QC, we have 611 data points of chlorophyll for 2012-2014.
Statistics for 2012-2014
Comparison with In situ Data
(Satellite-weighted; open ocean only)

<table>
<thead>
<tr>
<th></th>
<th>Bias (Median% diff)</th>
<th>Uncertainty (SIQR)</th>
<th>N</th>
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</thead>
<tbody>
<tr>
<td>MODIS-Aqua v2013:</td>
<td>5.0%</td>
<td>23.3%</td>
<td>140</td>
</tr>
<tr>
<td>VIIRS v2015:</td>
<td>23.8%</td>
<td>27.6%</td>
<td>158</td>
</tr>
</tbody>
</table>

(for 2002-2009 we had 1757 data points matchups for MODIS)
Global Annual Median Chlorophyll

SeaWiFS: $r = -0.654$, $P<0.02$

MODIS-Aqua

Assimilated/In Situ Adjusted: $r = -0.219$, NS

Gregg and Rousseaux, JGR-Oceans
2014
Plans

Obtain more in situ data

Obtain new MODIS-Aqua 2015 re-processing

Develop statistics; assess the need for bias correction

Begin discussions on how to implement Level-4 assimilated data products