Remote Sensing Systems
www.remss.com

# The Cross-Calibrated Multi-Platform (CCMP) Ocean Vector Wind Analysis (V2.1)

**Lucrezia Ricciardulli, Joel Scott, Carl Mears, Frank Wentz**
*Remote Sensing Systems*

***Ross Hoffman*** *AER*
***Bob Atlas*** *NOAA*

NOAA's 37 meeti
Sapporo,

Photo Courtesy:

# CCMP Winds

- CCMP: A satellite-based gridded wind vector analysis dataset produced using a background model wind field and in-situ (buoys)

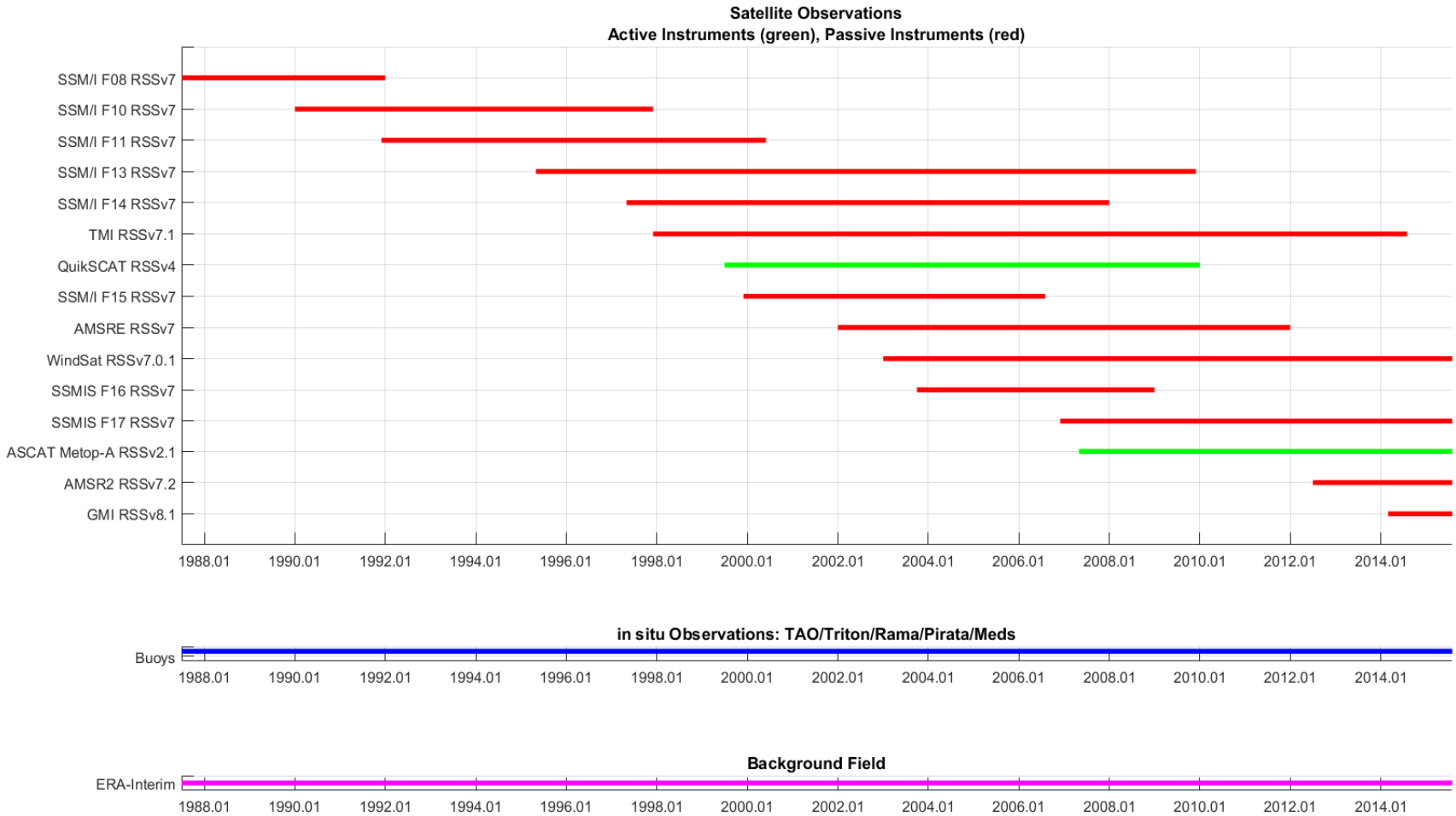
- GRID: 6-hourly global maps at 0.25 deg resolution, 1987-2015.

- FOCUS: provide users with satellite-based consistent and gap-free surface wind over the globe at high spatial and temporal resolution.

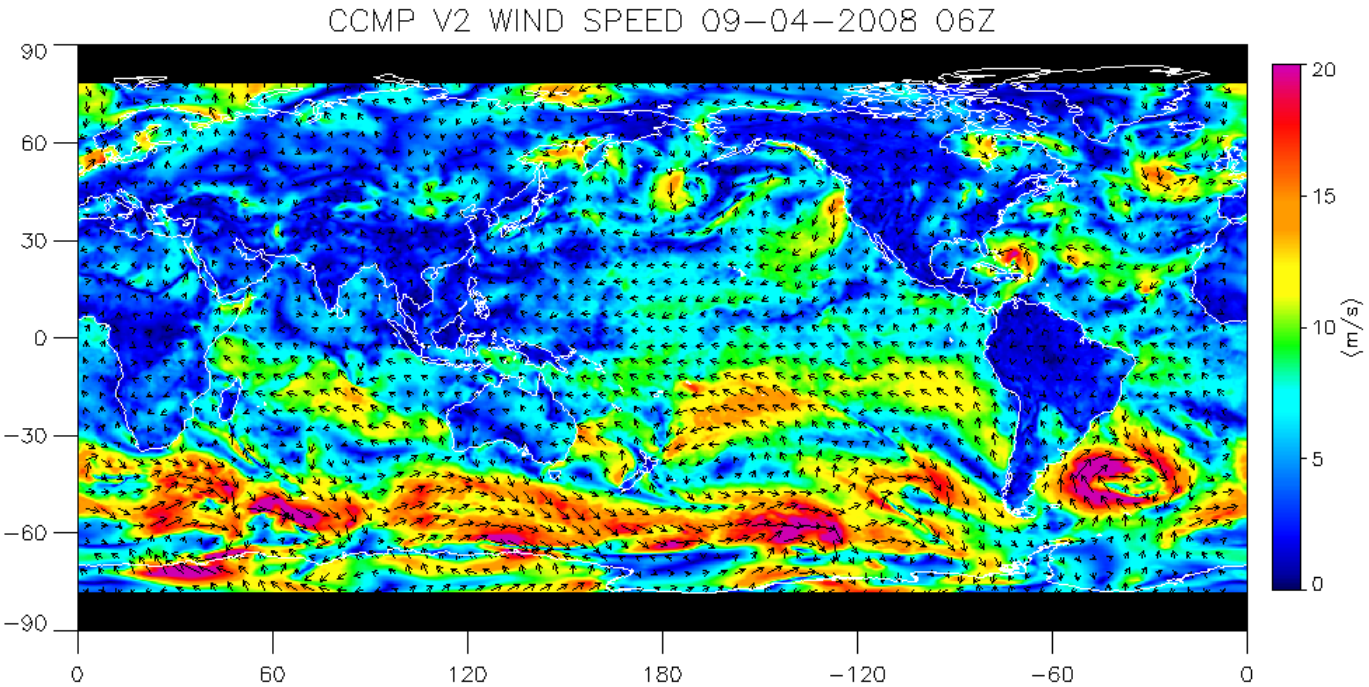
- USES: Well suited for model comparisons, and wind daily to interannual variability analysis.

- CCMP V1: The original dataset CCMP V1.1 was developed by Robert Atlas and his team (Atlas et al, 1996, Hoffman et al, 2003, and Atlas et al, 2011). First-look product, some inconsistencies in satellite data versions

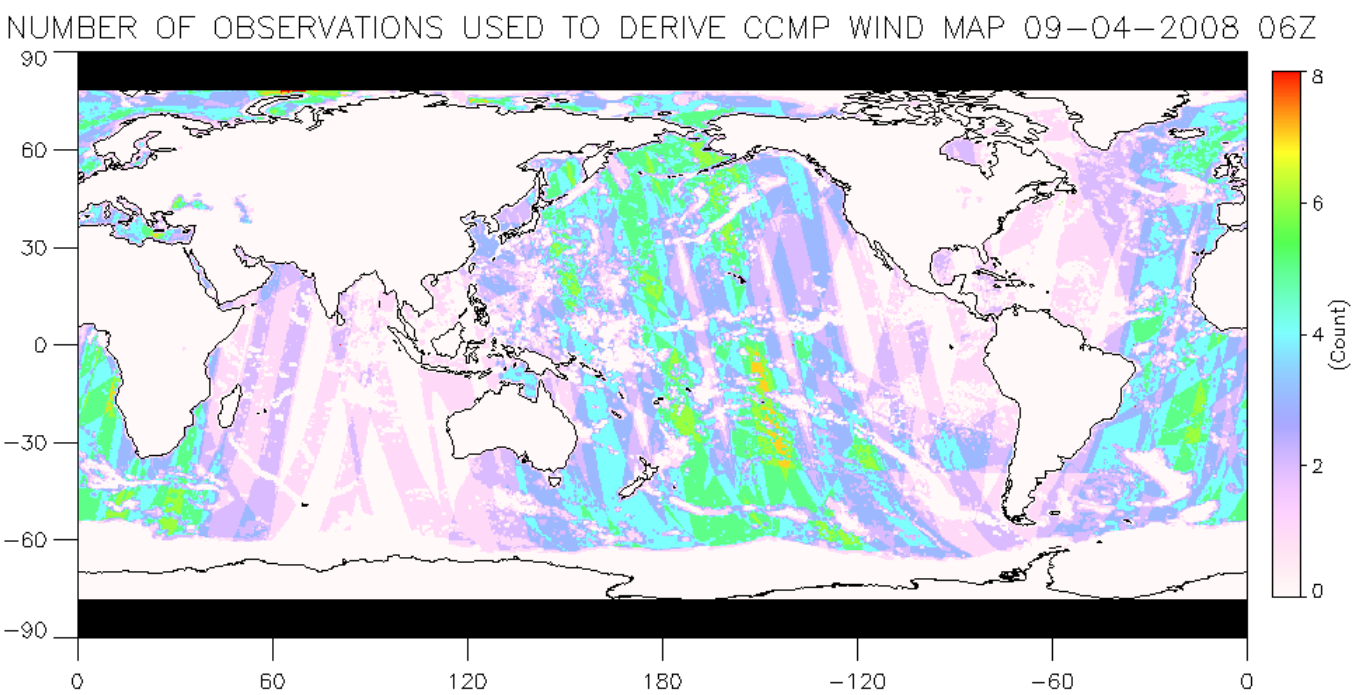
- CCMP V2: Funding for the original CCMP ended in 2012. Motivated by the considerable demand for the continuation of this widely used dataset, in 2015 the processing code was transferred to Remote Sensing Systems with the objective of producing an updated, improved, and consistently reprocessed version of the vector wind analysis, CCMP V2.0 [Scott et al, 2016].


Satellite Observations
Active Instruments (green), Passive Instruments (red)
SSM/I F08 RSSv7
SSM/I F10 RSSv7
SSM/I F11 RSSv7
SSM/I F13 RSSv7
SSM/I F14 RSSv7
TMI RSSv7.1
QuikSCAT RSSv4
SSM/I F15 RSSv7
AMSRE RSSv7
WindSat RSSv7.0.1
SSMIS F16 RSSv7
SSMIS F17 RSSv7
ASCAT Metop-A RSSv2.1
AMSR2 RSSv7.2
GMI RSSv8.1
1988.01
1990.01
1992.01
1994.01
1996.01
1998.01
2000.01
2002.01
2004.01
2006.01
2008.01
2010.01
2012.01
2014.01
in situ Observations: TAO/Triton/Rama/Pirata/Meds
Buoys
Background Field
ERA-Interim

| | CCMP V2.0 | CCMP V1.1 First-Look |
|---|---|---|
| Satellite data version | RSS RTM V7 and higher | RSS RTM pre-version 7 (depending on year and instrument) |
| Instruments | (15)<br>SSM/I F08, F10, F11, F13, F14, F15; SSMIS F16, F17; AMSRE, AMSR2, TMI, GMI, WindSat, QuikSCAT, ASCAT-A | (12)<br>SSM/I F08, F10, F11, F13, F14, F15; AMSRE, TMI, WindSat, QuikSCAT, SeaWinds |
| Model background | 0.25 deg ERA-Interim Wind reanalysis | 1-deg ERA-40 Wind Reanalysis (1987-1999) and 1-deg ECMWF Operational Wind Analysis(1999-2011) |
| In Situ data | Quality-filtered moored buoys from TAO/Triton, RAMA, NDBC, Pirata, Meds | GTS buoys and ship data |
| Years | July 1987 to July 2015 | July 1987 to Dec ember 2011 |
| Products | Gridded daily file (L3) (25 Mb/file) | Orbital (L2.5)<br>Gridded daily file (L3)<br>Gridded pentad and monthly (L3.5) |
| Data Format (L3) | NetCDF 4 CF 1.6 compliant | NetCDF 3 |
| Data In file | U and V wind components (0-50 m/s), 10m neutral equivalent winds; Number of observations | |
| Data Producers | RSS | AER/NASA GSFC |
| Data Access | www.remss.com/measurements/ccmp | Podaac.jpl.nasa.gov |

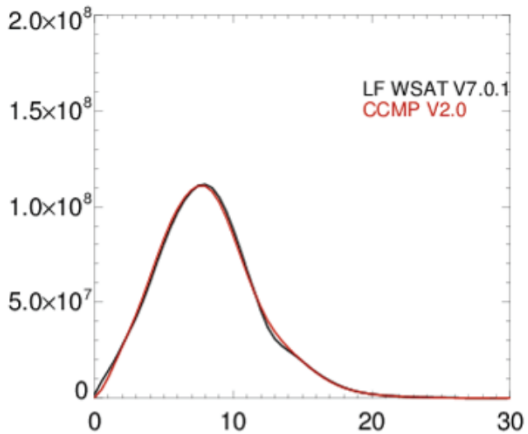


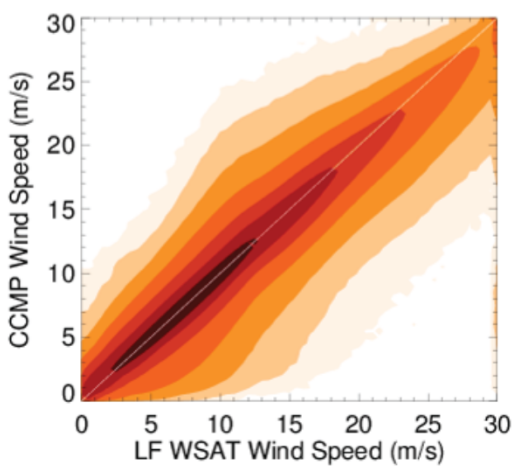

Sample
6-hourly
Wind map

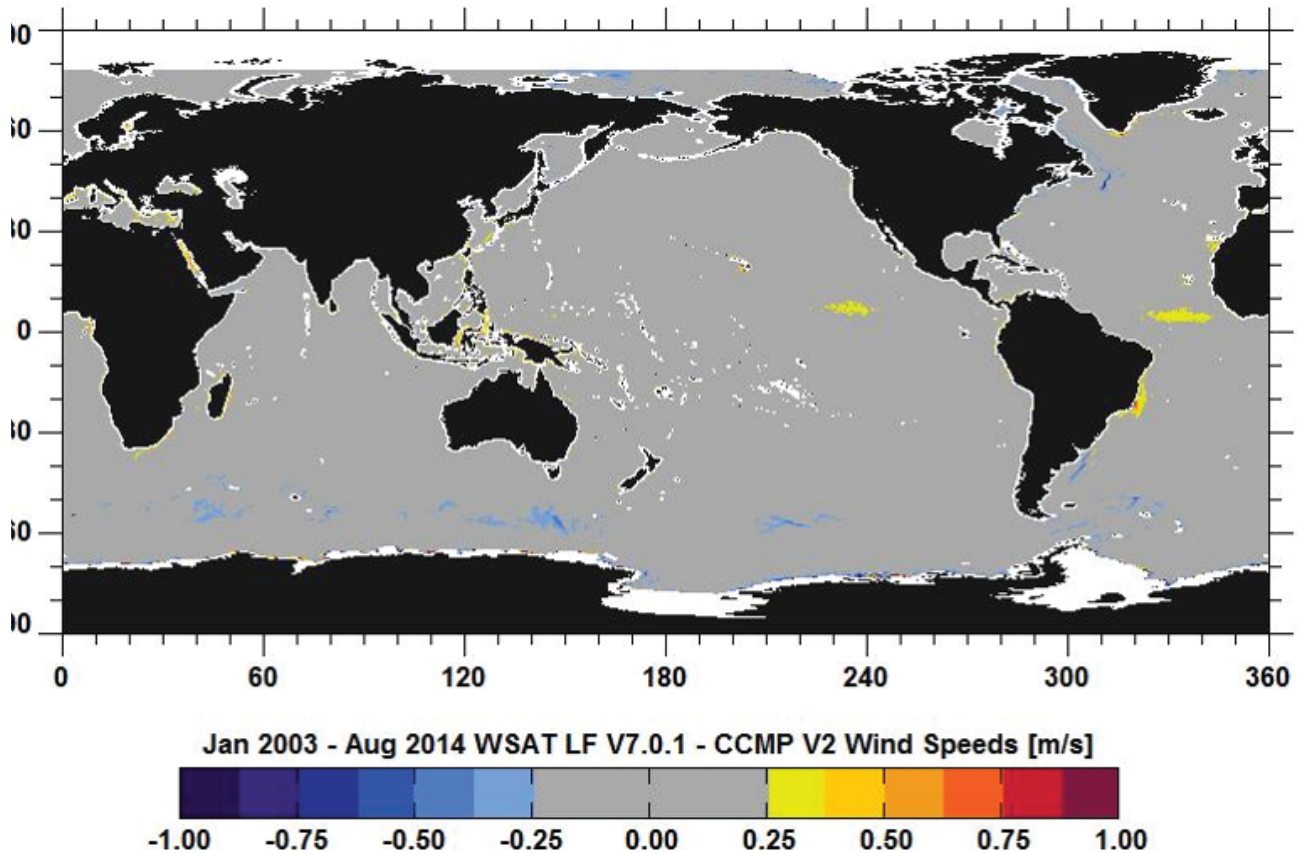



# Satellite Obs
Per gridpoint
For sample map

# CCMP – WindSat wind speeds

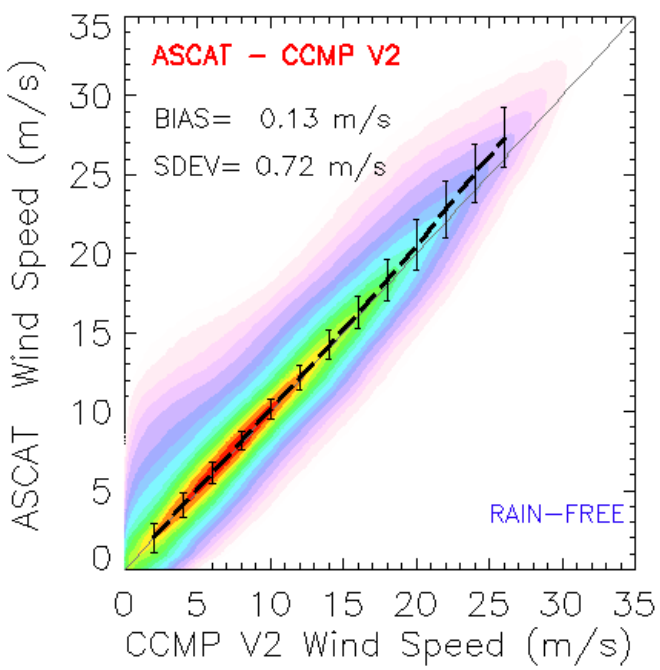


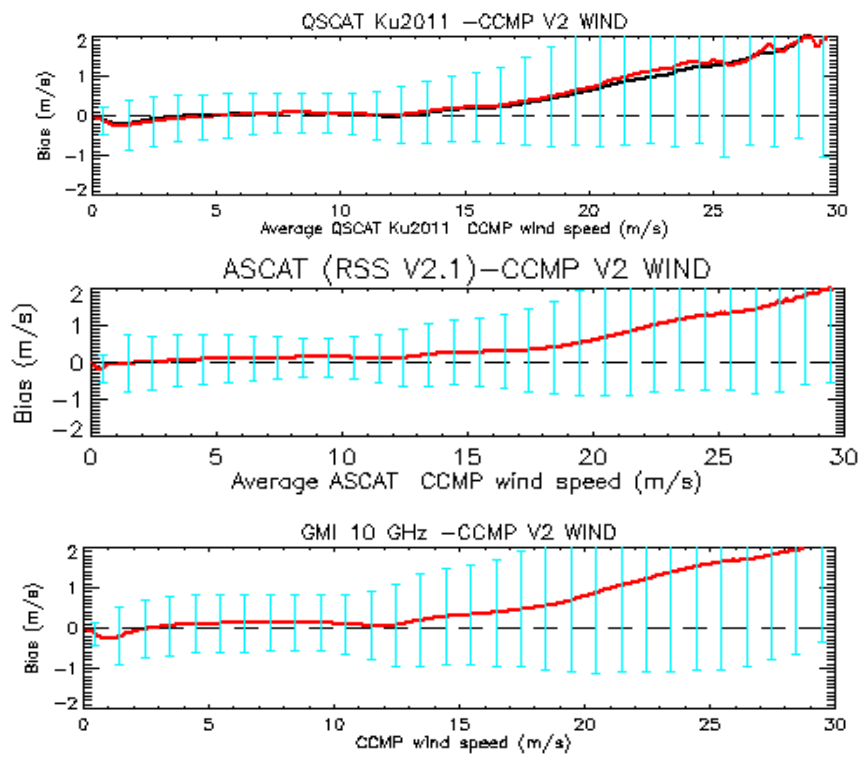



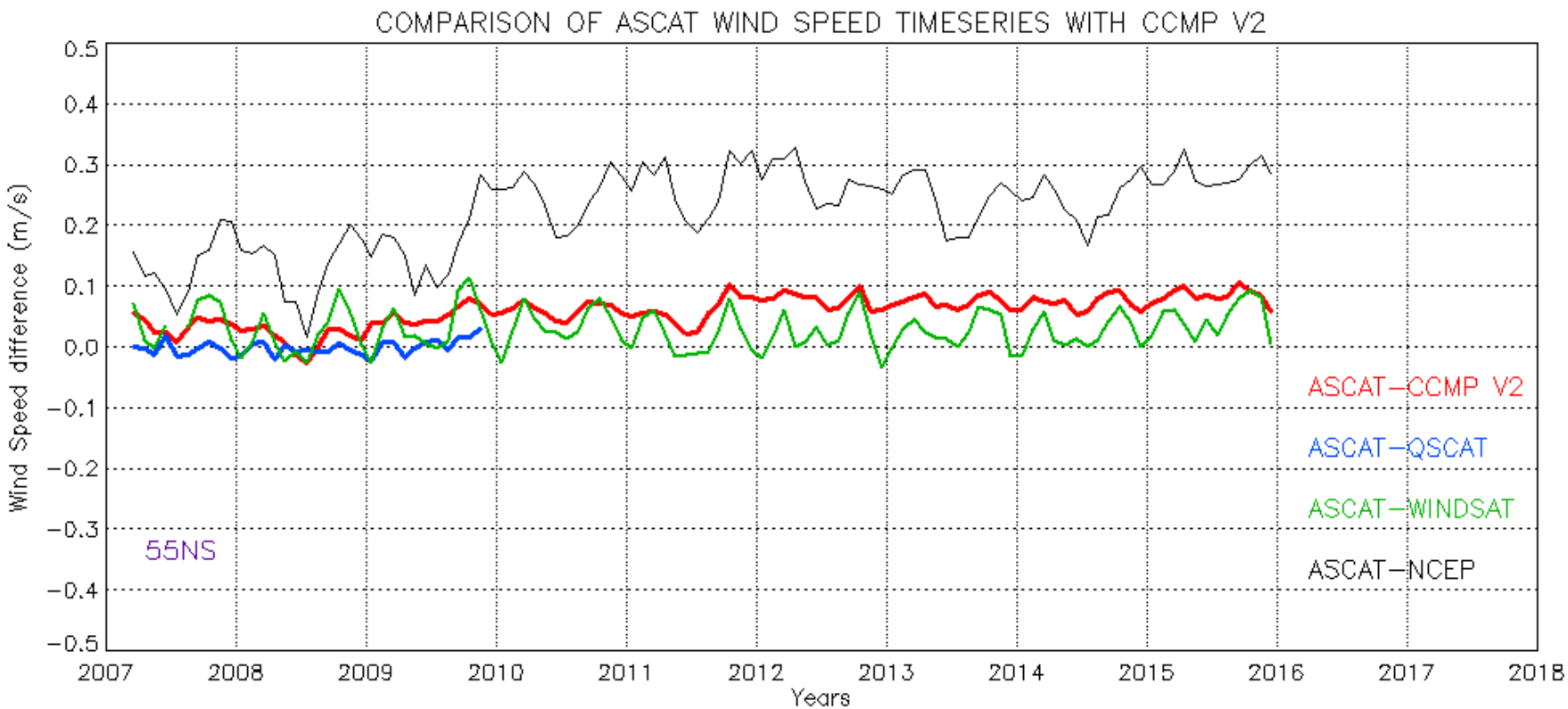
# CCMP at High winds

- At high winds, CCMP V2.0 < satellite observations by about 5%.
- ERA-Interim used as background field < satellites at high winds.
- VAM integrates satellite and background field→ CCMP high winds < satellite-only
- In CCMP V2.0 no correction has been applied to any input, including the Era-Interim.
- Next CCMP reprocessing: adjustment will be applied to Era-Interim at high winds



# CCMP Timeseries Stability

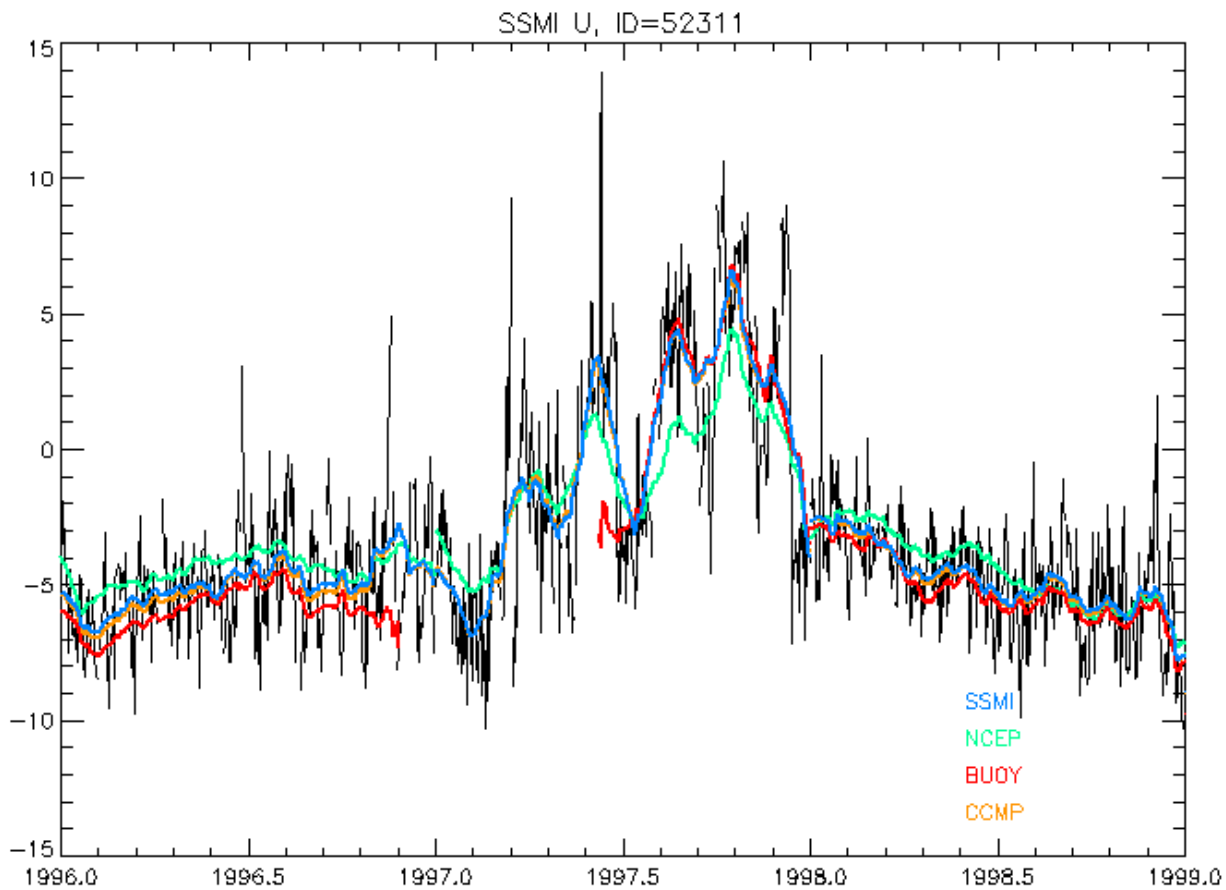


# Example: El-Nino winds

**Comparison with SSMI rain-free, buoy, and NCEP (colocated with SSMI @ buoy location).**

**97/98**
**El Nino**

**buoy**
**WMO_ID=52311**
**(0N, 180E)**




**From Capotondi and Ricciardulli, AGU Oceans 2016**

# Key Strengths

- Data continuity, no gaps, 1987-2015.
- Global coverage 78NS
- Satellite-based, based on recently intercalibrated satellite data.
- Stability of the temporal record
- Gridded, high spatial and temporal resolution: 0.25 deg, 6-hourly.
- Well established and documented methodology
- Timeseries being produced past 2015.
- Well-suited for analysis of high frequency (daily) to interannual variability, ENSO events, both at global and regional scale.

# Limitations

- Data latency: Processed with a data latency of 6-12 months (buoy update).

- Future reprocessing: Version V2.0 methodology was kept very similar to V1.1. A new version is planned for 2017 (adjustments of the model background winds at high wind)

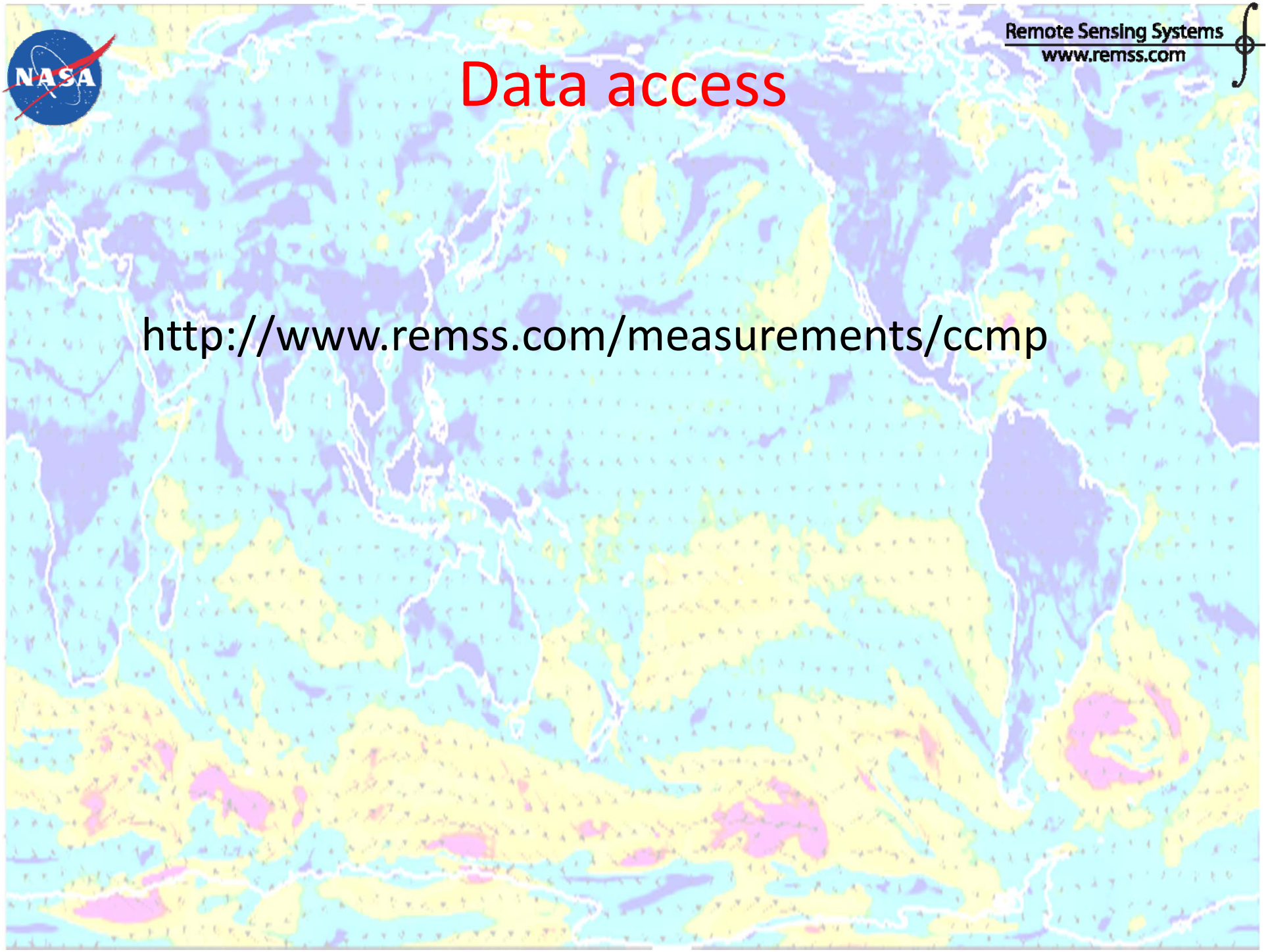
- Global Trends: Not advised to use CCMP V2.0 for analysis of global wind trends (trend signal is extremely small). ERA-interim background wind field has some small spurious biases that occur when the new observing systems are added.

- High winds: Caution is advised for data in high winds (greater than 15 m/s).

- Observations in rain: Satellite observations in rain are not incorporated

- Version 2.0 is different from V1.1. Users should not mix the two datasets.

- Data not available in the Polar Regions

# Data access

http://www.remss.com/measurements/ccmp