



## **OAFlux: Objectively Analyzed air-sea Fluxes**

Presently available flux datasets (1958-present):

• ocean evaporation; • latent and sensible heat fluxes; • surface meteorology Project website: http://oaflux.whoi.edu/

# Introducing the WHOI OAFlux Global Analysis of 0.25° Ocean Vector Wind (1987 – present)

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### The OAFlux global vector wind product

Global daily, 0.25°×0.25°, from July 1987 to present



- How was it constructed?
- How is it compared with other products (scatterometer in particular)?
- Advantages and potential drawbacks of the analysis
- Scientific benefits of the 20+ year vector wind time series







#### Strategy:

• Objective blending of microwave radiometer wind speeds, NWP wind vectors, and scatterometer

#### Methodology: Variational Analysis

- The same technique used to develop OAFlux heat flux products (Yu and Weller 2007)
- The technique is similar to those of SSMI wind analysis (Atlas et al., 1996) and FSU wind climatology (Bourassa et al., 2005)



OAFlux: 0.25°, daily

(1) Is the spatial resolution adequate?

(2) Can the temporal resolution be increased?





#### **Radiometers + NWP winds = Scatterometer?**





Daily Mean Wind Field 01-15-2000





#### **NSCAT:** A proxy for truth

#### • It is not assimilated, can be used as a source for independent validation.

• Wind stress curl,  $\operatorname{curl}(\tau) = \frac{\partial \tau_y}{\partial x} - \frac{\partial \tau_x}{\partial y}$ , is a more stringent measure for winds.

Mean 10/1996 - 6/1997





#### NSCAT 9-month mean curl( τ) Products comparison





OAFlux Stress Curl 9-month mean 0.25°















### **NSCAT 9-month mean curl(** $\tau$ **)** Comparison with NCEP and ERA40

OAFlux Stress Curl 9-month mean



NCEP Stress Curl 9-month mean ~1.875°



ERA40 assimilates SSM/I wind speed





## Radiometer vs Scatterometer: (1) Wind speed





WSP DIFF (SSMI - QSCAT) JAN-2000 60 30 -30 -60 200 CI = 0.5 m/s 30 150 -30 90 -150 -90 -1 -0.5 0 0.5 1

=>



### Radiometer vs Scatterometer (2) Global coverage





QSCAT Global Coverage JAN-2000







Impact on the product?





### **Impact of coverage on OAFlux product**









### **Comparison with NSCAT**







es were taken from http://numbat.coas.orego





# Summary

#### How was it constructed?

-- Objective blending of microwave radiometer wind speeds, NWP wind vectors, and scatterometer wind measurements.

#### What have we learnt from comparison with other products?

(1) Large-scale and small-scale structures are comparable to scatterometer products.

 $\rightarrow$  The 0.25° spatial resolution is adequate.

(2) Rain flag impacts the coverage of sensors and affects the accuracy of analyzed products. The ITCZ provides a clear example.

 $\rightarrow$  Increasing temporal resolution to higher than daily presents challenge.

#### Scientific benefits of the 20+ year vector wind time series

Together with existing heat flux and evaporation products, OAFlux provides consistent global mapping of air-sea exchanges of momentum, heat, and freshwater on timescales from synoptic to decadal.