Development and initial analysis of the DEEP-C surface energy flux product

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DEEP-C Meeting, NOC, 6th Nov 2015
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Data updated


- Geodetic weighting and days in a month are considered in CERES satellite data

- Updated data are at the site http://www.met.reading.ac.uk/~sgs01cll/asym/as.html

- Effect is minor in general, but large for cross-equator energy transport
Multi-annual mean

Warm surface over Gulf Stream and Kuroshio current

*Kwon et al* (2010 *J Clim*)

Good variation agreement between data sets

Cold tongue + Tropical Instability Wave

*Willett et al* (2006 *Prog in Oceanog*)

Reconstructed TOA radiation fluxes

(Allan et al 2014, GRL)

+ mass corrected atmospheric energy divergence of ERA-Interim

*Liu et al* (2015 *JGR*)
Uncertainty

Josey et al. 2013
Ocean Circulation & Climate

Our method
Thanks to Michael Mayer

NOC data?
Comparison of flux changes

Is SST the driver? (England et al. 2014)

Different in AMIP simulations

16 member
Latent Heat Flux Trend

\[ LHF = \rho L C_E U (Q_s - Q_a) \]  
\[ Q_s = 0.98(0.622e_s/P) \]  
\[ 10^3 C_E = a \exp[b(U + c)] + d/U + 1 \]  
\[ Q_a = \frac{a}{W + b} \left[ c W SST + d W + \frac{e SST}{f W - 7.55} - 9.74 \right] + 8.94 \]

\text{U: wind speed}  
\text{W: water vapour content}  
\text{SST}  
\text{P: mean sea level pressure}

Singh et al. 2005 MWR
Trends of SST, MSLP, wind and WV

1986-2008

Water vapour
Wind speed

6°N–6°S, 180°W–150°W

LH

LH (W/m²) (BASE 2001–2005)

LH anomaly (W/m²) (BASE 2001–2005)
Wind speed and LH flux trends

Prescribed SST or Surface data assimilated


Observed

3D data assimilated
Summary

- TOA and surface flux data are updated and can be downloaded from website [http://www.met.reading.ac.uk/~sgs01cll/asym/as.html](http://www.met.reading.ac.uk/~sgs01cll/asym/as.html)

- The zonal mean spread of surface fluxes is reduced using our method.

- Discrepancies exist over eastern Pacific, under investigation.

- Collaborate with Met Office for the product validation (Pat).

- Comparison with NOC data (Damien)