

Ocean Heat Flux

WP2 Status

Scientific Requirement Consolidation

WP2 Objectives

- Consolidation of flux product requirements (WP21)
- Consolidation of flux product specifications (WP22)
- Consolidation of flux method and algorithms (WP23)
- Identification of the product algorithm strengths and limitations (WP24)
- Consolidation the strategy of the flux product evaluation and validation (WP25)
- Consolidation of the method aiming at the generation of a suitable ensemble of realization of turbulent fluxes (WP26)
- Refine architecture (WP27)

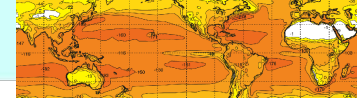
WP21

Consolidation of flux product requirements

- **Sampling**
- **Accuracy**
- **Input data**
- **Ancillary**
- **Error characteristics**

TIE-OHF Global Data Collection

TIE-OHF



	W _{sp}	Qa	SST	Ta	τ	LHF	SHF	LW	SW	Period	Spatial Resolution	Temporal Resolution	Format
IFREMER	X	X	X	X	X	X	X			1999 – 2009	0.25°×0.25°	Daily	NetCdf
HOAPS	X	X	X	X		X	X	X	X	1987 - 2008	0.5°×0.5°	6-hourly and Monthly	NetCdf
OAFLux	X	X	X	X		X	X	X	X	1985 - 2014	1°×1°	Daily	NetCdf
SEAFLUX	X	X	X	X		X	X			1998 - 2007	0.25°×0.25°	3-hourly	Binary
J-OFURO	X	X			X	X	X			1988 - 2008	1°×1° 0.25°×0.25°	Daily Monthly	NetCdf
ERA Interim	X	X	X	X	X	X	X	X	X	1992 - 2012	0.75°×0.75°	6-hourly	Grib
CFSR	X	X	X	X	X	X	X	X	X	1992 - 2010	0.38°×0.38°	6-hourly	Grib
NOCS2	X	X	X	X		X	X			1991 - 2010	1°×1°	Daily Monthly	NetCdf

Accuracy Review

➤ Bourras *et al*, 2006 (*J. Climate*)

- **Products**: LHF from HOAPS-2; J-OFURO; Jones; GSSTF2; BEL
- **Method**: Comparisons Vs Moorings (Tropical; NDBC; MFUK)
- **Results** :
 - ✓ RMS differences: 14W/m^2 - 41W/m^2
 - ✓ Better results at Mid-Latitudes than in the Tropical area
 - ✓ Main error sources:
 - Specific air humidity
 - Surface Wind Speed
 - Bulk Parametrization

Accuracy Review

➤ Tomita and Kubota, 2006 (*JGR*)

- **Products:** LHF from J-OFURO , HOAPS-1; GSSTF2; NRA1, NRA2, ERA15, ERA40
- **Method:** Comparisons Vs Moorings (TAO) and Vs JMA
- **Results :** Qa, Wsp, Sampling Issues

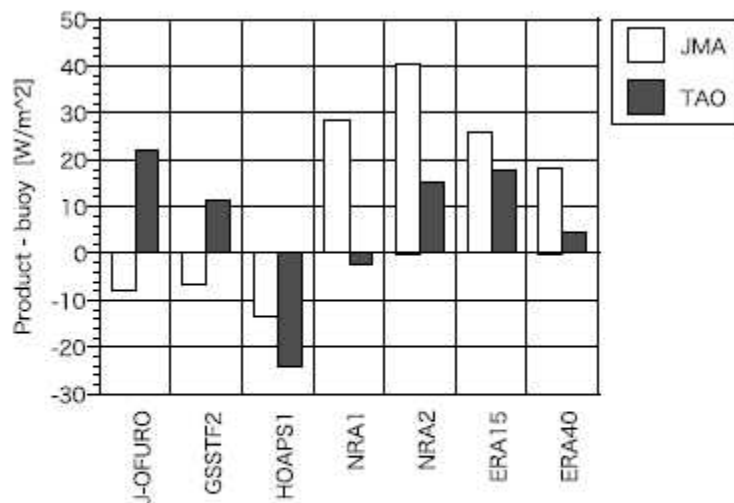
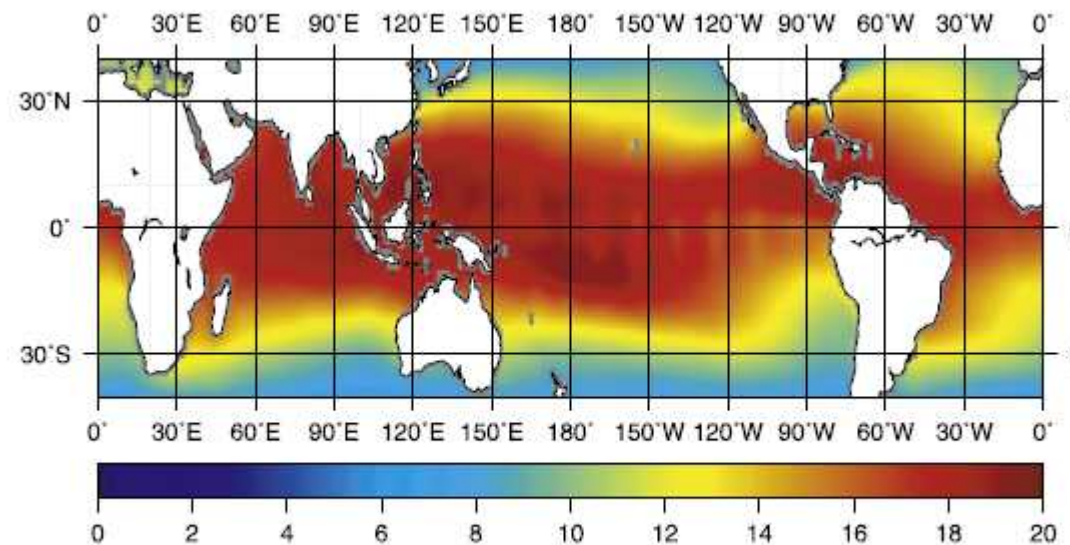


Figure 9. Bias (each global product - buoy) for each global product. Units are $W m^{-2}$.

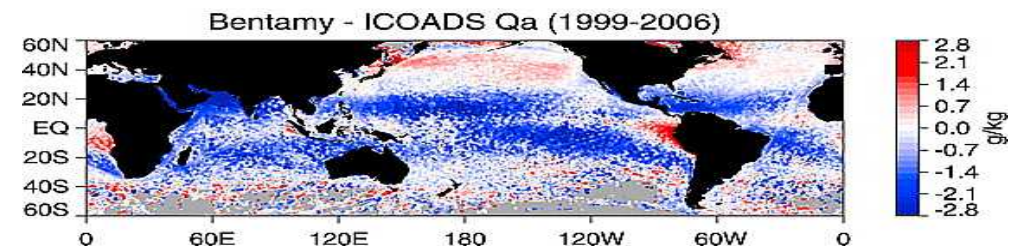
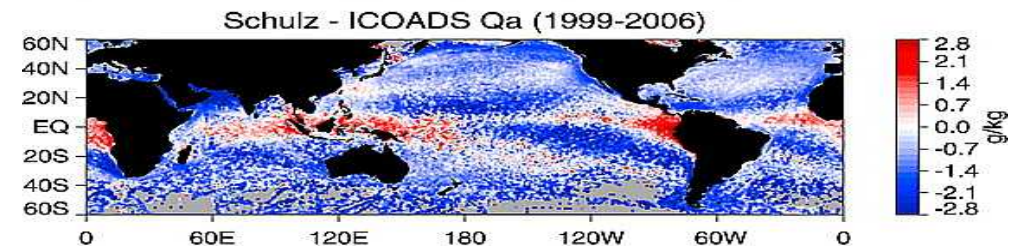
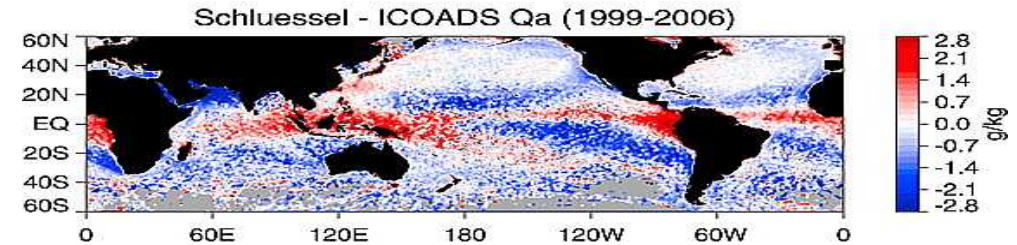
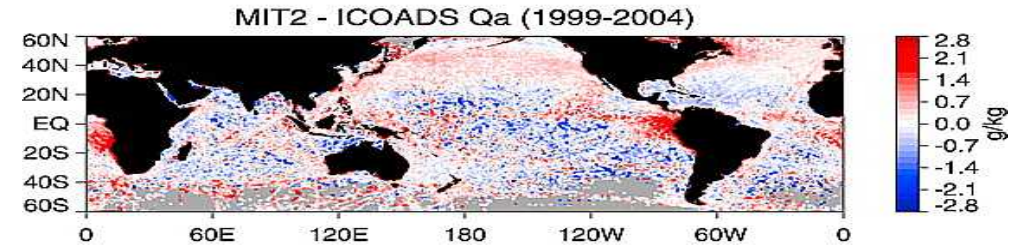
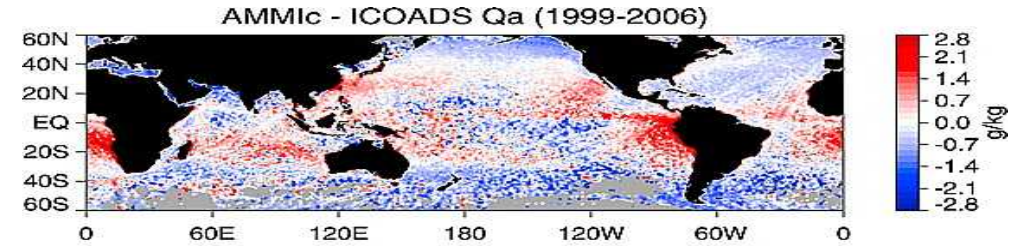
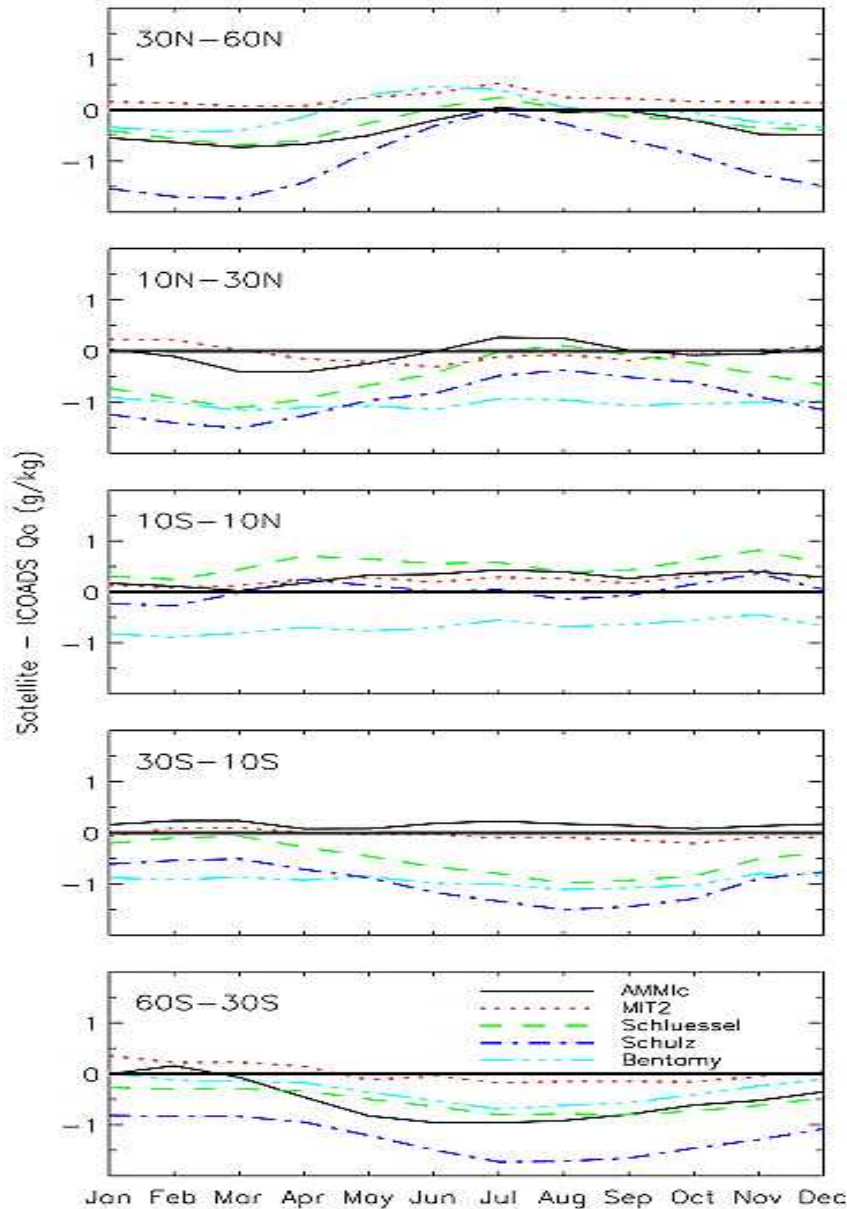
ERA40 Mean surface humidity 1992 - 1993



TIE-OHF Meeting, 26 - 27 January 2015, Paris

Accuracy Review

➤ Jackson et al, 2009 (JGR)



Impact of Basic Variables

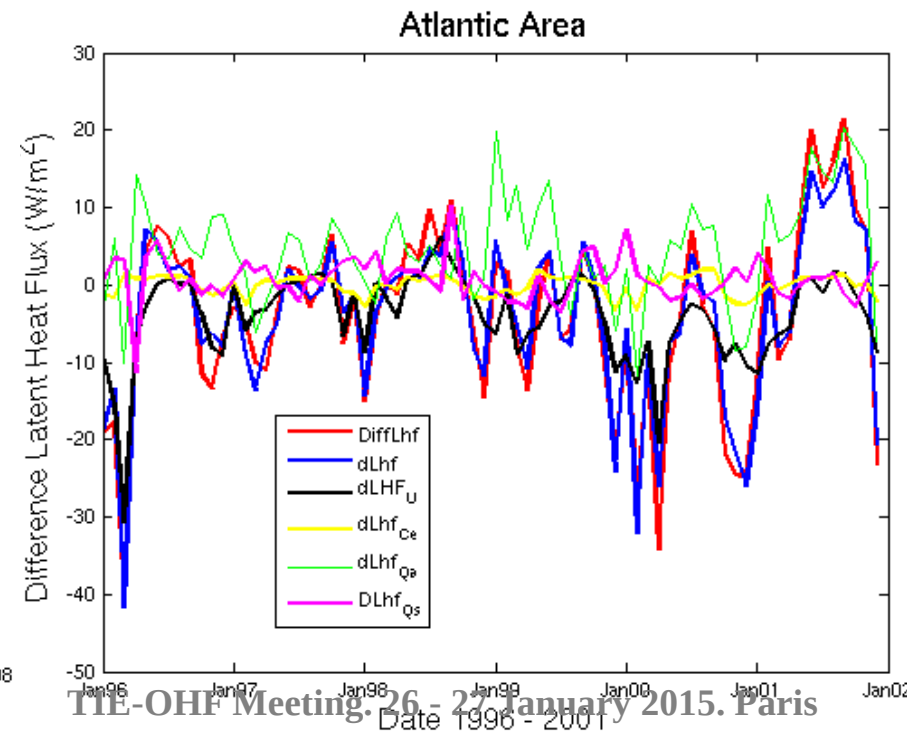
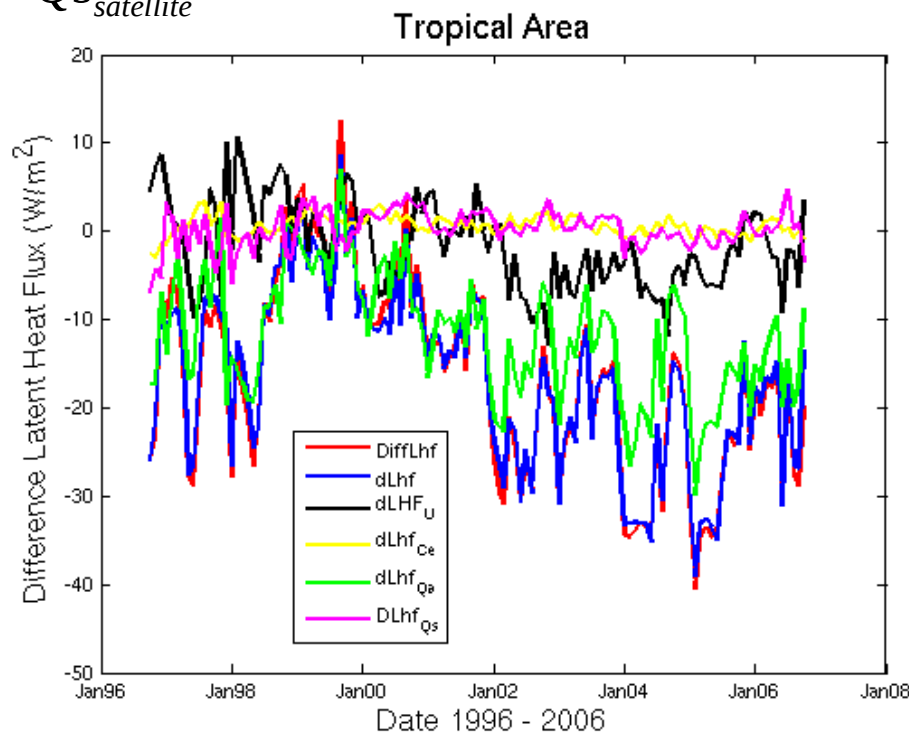
➤ Stantorelli et al, 2011 (JGR)

$$dLhf = (\partial Lhf / \partial U)dU + (\partial Lhf / \partial Ce)dCe + (\partial Lhf / \partial Qa)dQa + (\partial Lhf / \partial Qs)dQs$$

$$= dLHF_U + dLHF_{Ce} + dLHF_{Qa} + dLHF_{Qs}$$

$$Lhf = \rho \times Lv \times U \times (Qs - Qa) \text{ (Fairal et al, 2003)}$$

$$dU = U_{buoy} - U_{satellite}; dCe = Ce_{buoy} - Ce_{satellite}; dQa = Qa_{buoy} - Qa_{satellite}; dQs = Qs_{buoy} - Qs_{satellite}$$



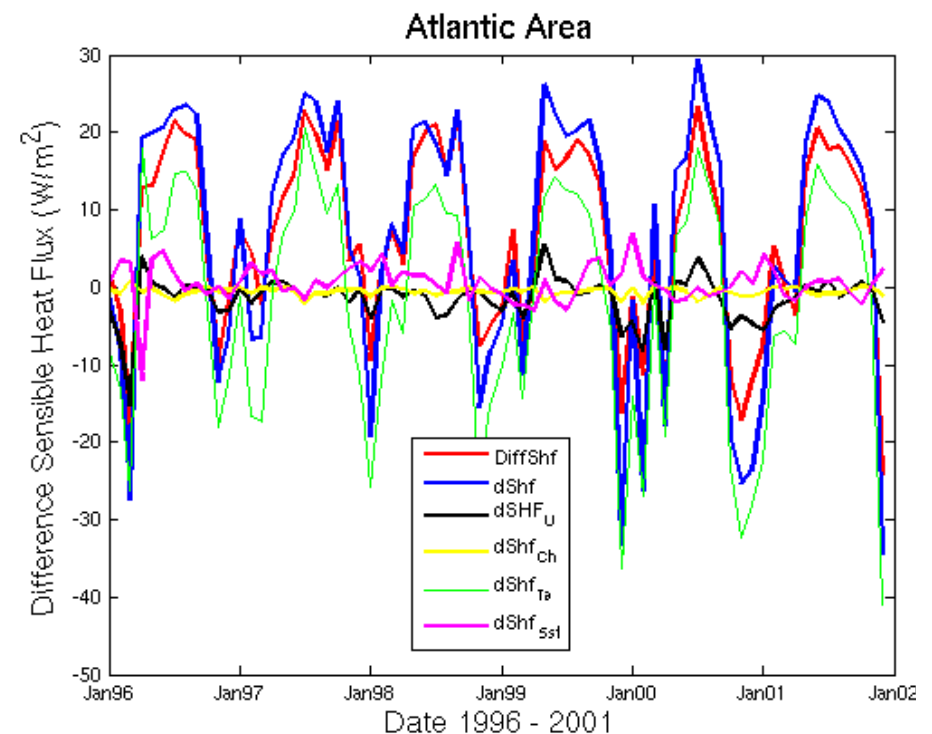
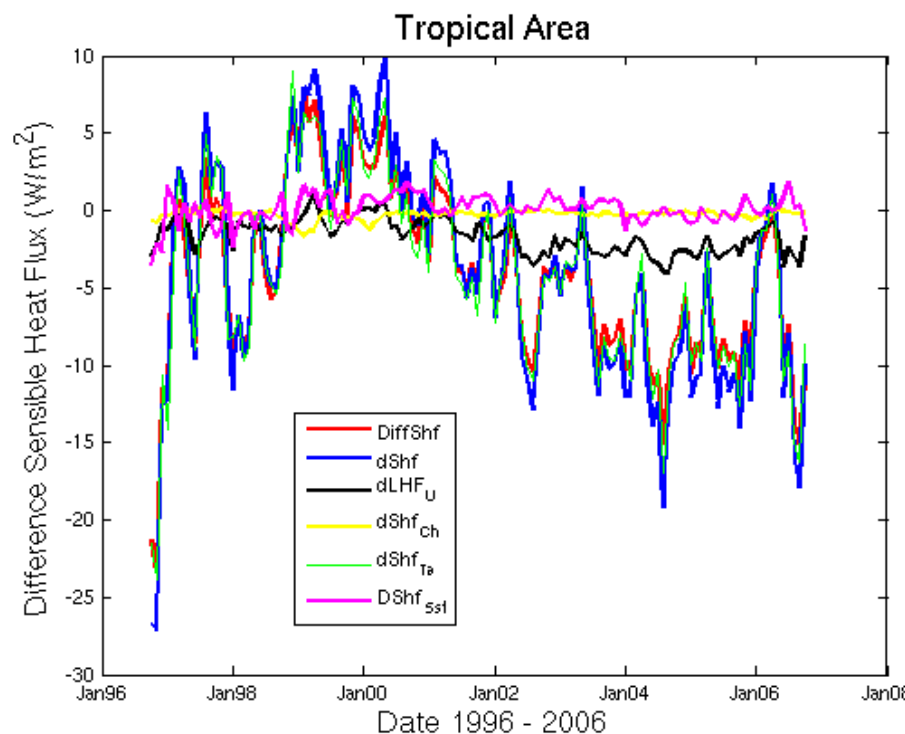
Impact of Basic Variables

$$dShf = (\partial Lhf / \partial U) dU + (\partial Lhf / \partial Ch) dCh + (\partial Lhf / \partial Ta) dTa + (\partial Lhf / \partial Sst) dSst$$

$$= dLHF_U + dLHF_{Ch} + dLHF_{Ta} + dLHF_{Sst}$$

$$Shf = \rho \times CP \times U \times (Sst - Ta)$$

$$dU = U_{buoy} - U_{satellite}; dCh = Ch_{buoy} - Ch_{satellite}; dTa = Ta_{buoy} - Ta_{satellite}; dSst = Qsst_{buoy} - Qsst_{satellite}$$



Accuracy Review

➤ Brunke et al, 2011 (*J. Climate*)

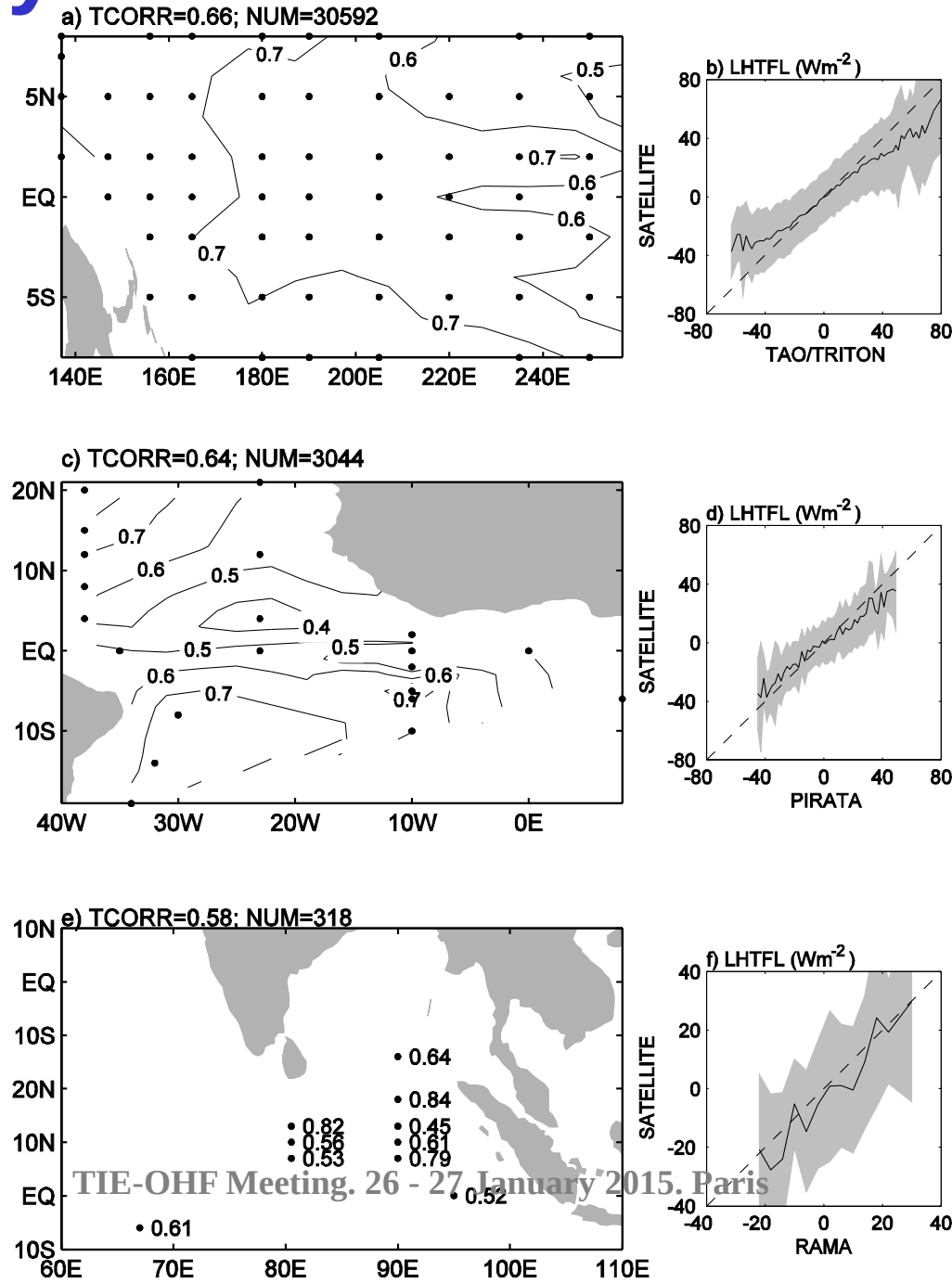
- **Products:** LHF and SHF from MERRA, ERA-40, ERA Interim, NCEP-NCAR, NCEP-DOE, CFSR, GSSTF2, GSST2b, J-OFURO2, HOAPS, OAFlux
- **Method:** Comparisons Vs Campaigns
- **Results :**

LHF Statistics (W/m ²)				
	$F_{\text{prod}} - F_{\text{obs}}$	$F_{\text{prod}} - F_{\text{algo}}$	$F_{\text{algo}} - F_{\text{obs}}$	SDE
ERA I	16.7	3.3	13.8	34.7
CFSR	19.3	8.2	11.0	44.6
J-OFURO2	-3	-10.6	7.3	45.4
HOAPS	1.7	-5.9	7.3	50.3
OAFlux	11.6	4.2	7.3	41.0

Accuracy Review

➤ Grodsky et al, 2009 (*J. Climate*)

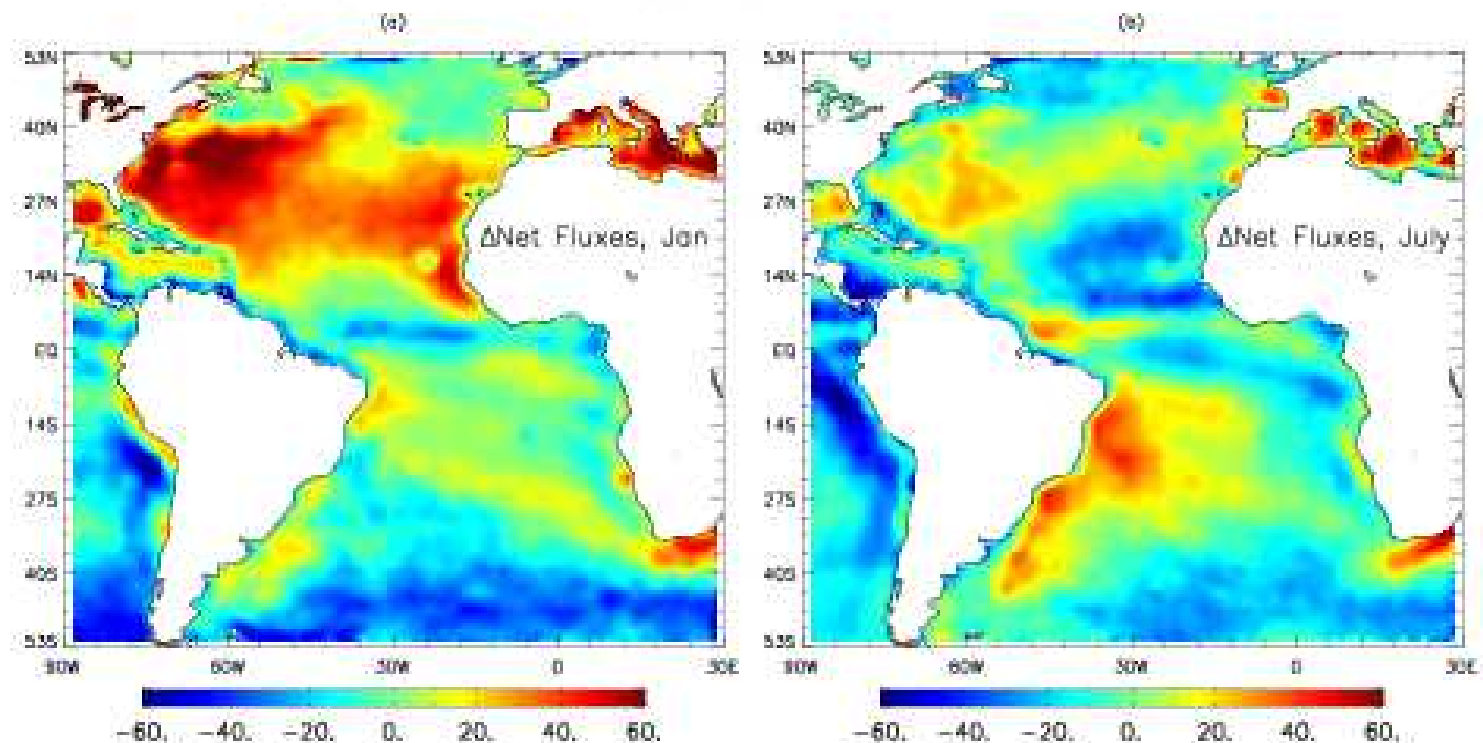
- **Products:** LHF IFREMER
- **Method:** Intraseasonal Analysis
- **Results :**
 - ✓ These comparisons suggest that the LHF retrieval should be rectified in the ITCZ area.



Accuracy Review

➤ **Pinker et al, 2014 (JGR)**

- **Products:** LHF and SHF from IFREMER and OAFlux
SW and LW from UMD and OAFlux (ISCCP)
- **Method:** Comparisons of Net Flux
- **Results :** Difficulties in comparing flux due to inconsistencies in methodology and data input.



Accuracy Review

➤ Bruch *et al*, 2014 (Ifremer report)

- **Products:** LHF from IFREMER, OAFlux, SeaFlux, Era Interim
- **Method:** Comparisons and inter-comparisons
- **Results :** Dependency on Bulk variables and Sampling

