climate change initiative

→ SEA SURFACE TEMPERATURE

ATSR Series Validation (with Radiometers)

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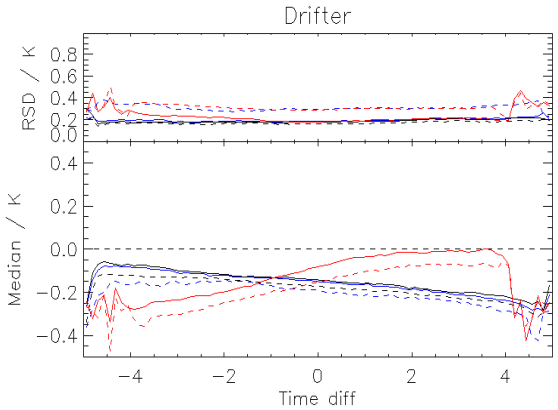
Introduction

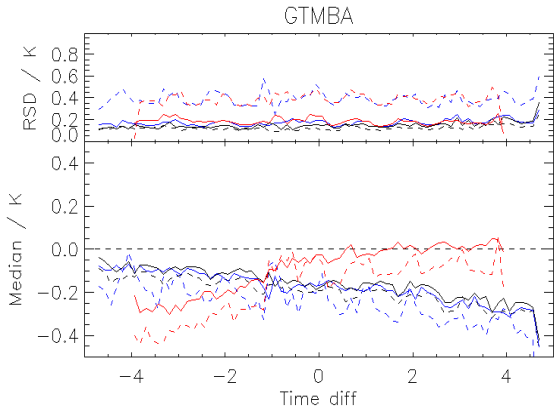
- A key aim of the ESA SST_CCI project is to provide a pixel level standard uncertainty for all products
- A further aim is to validate these product uncertainties using **independent** measurements

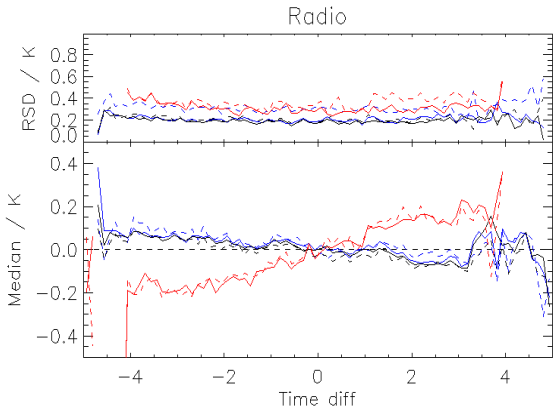
- Ideally we would have a continuous consistent suite of SI-traceable reference measurements through the lifetime of the satellite mission(s)

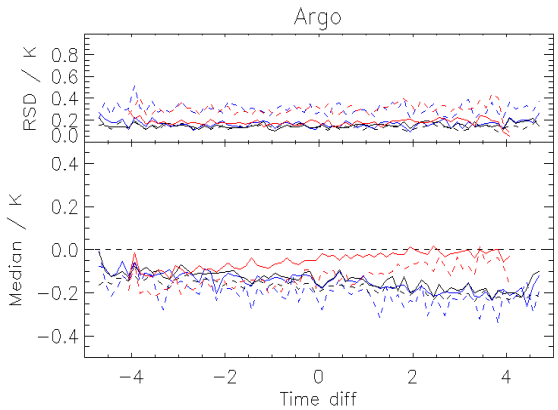
- But we don't…
  - So we need to use a range of reference measurements combined with a skin/diurnal variability model (FKC) to adjust their depth and time to that of ATSR
  - And need to demonstrate traceability to SI

Adjusting for diurnal variability

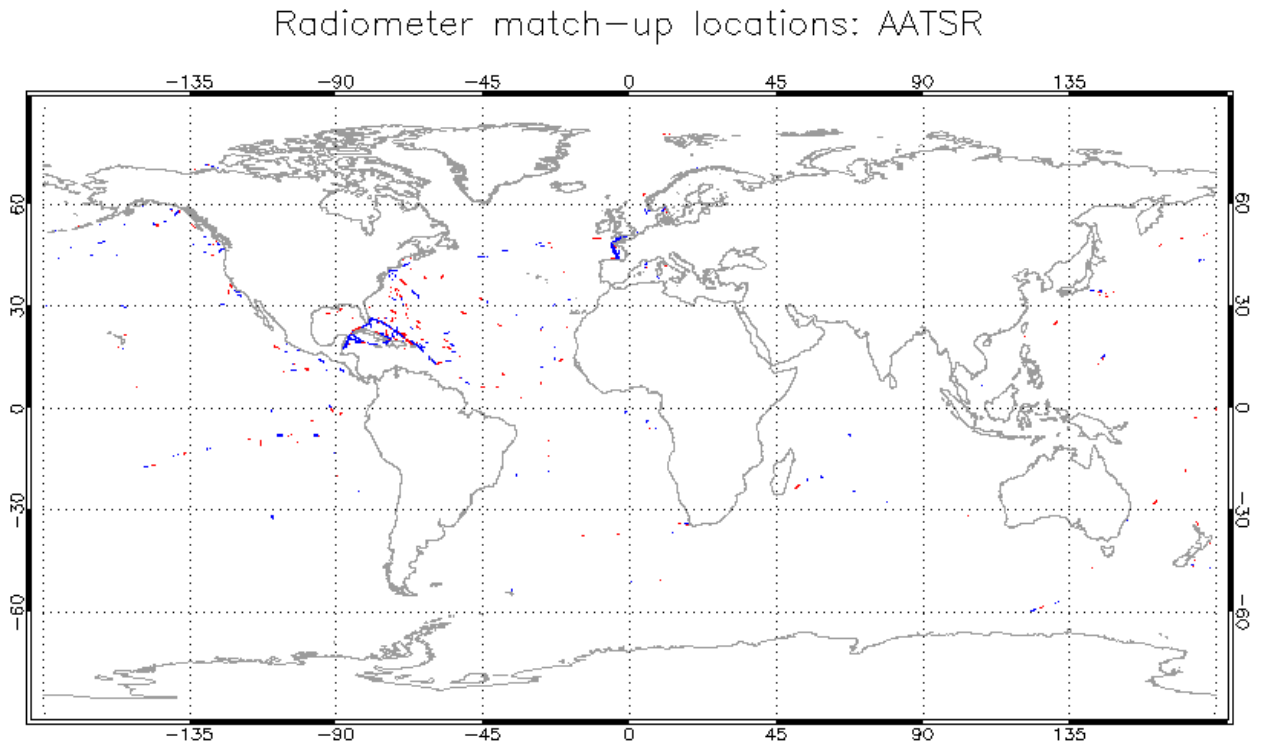








Location of AATSR/radiometer match-ups



Donlon et al. 2002

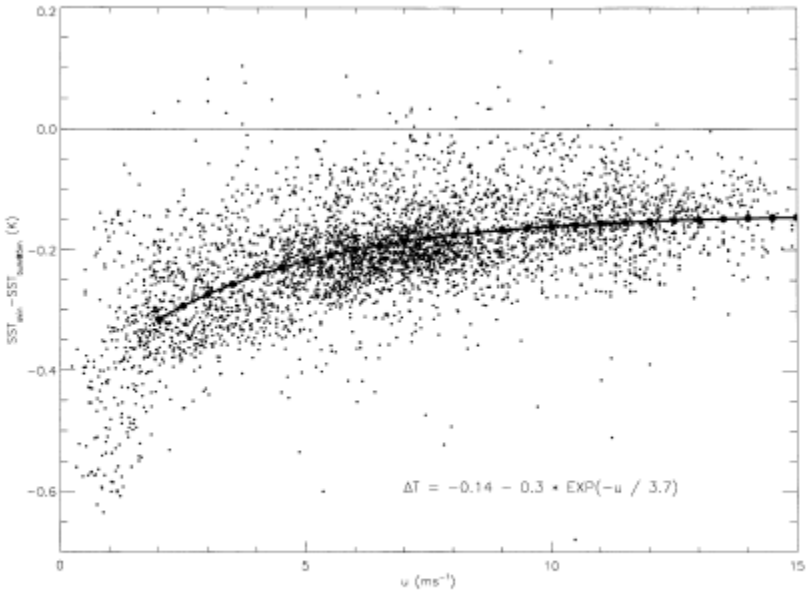
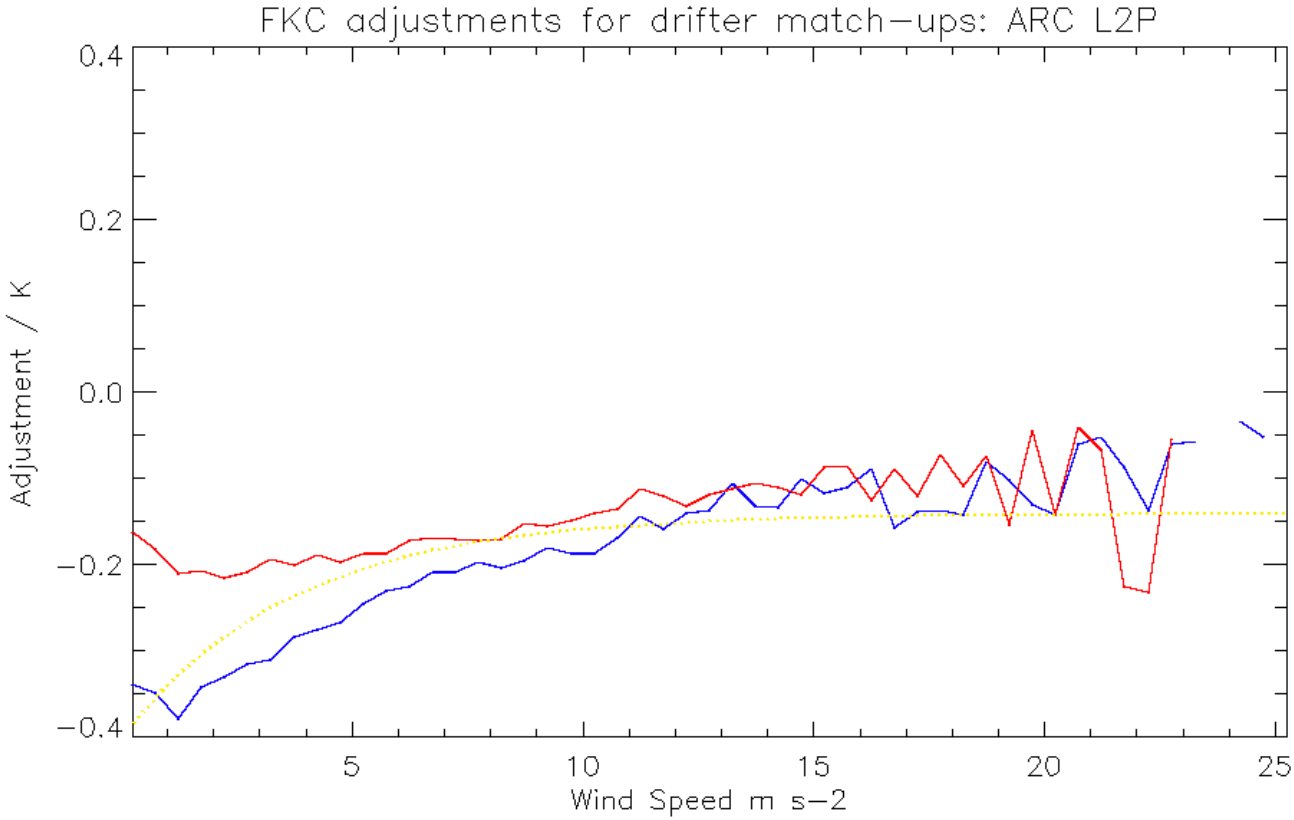


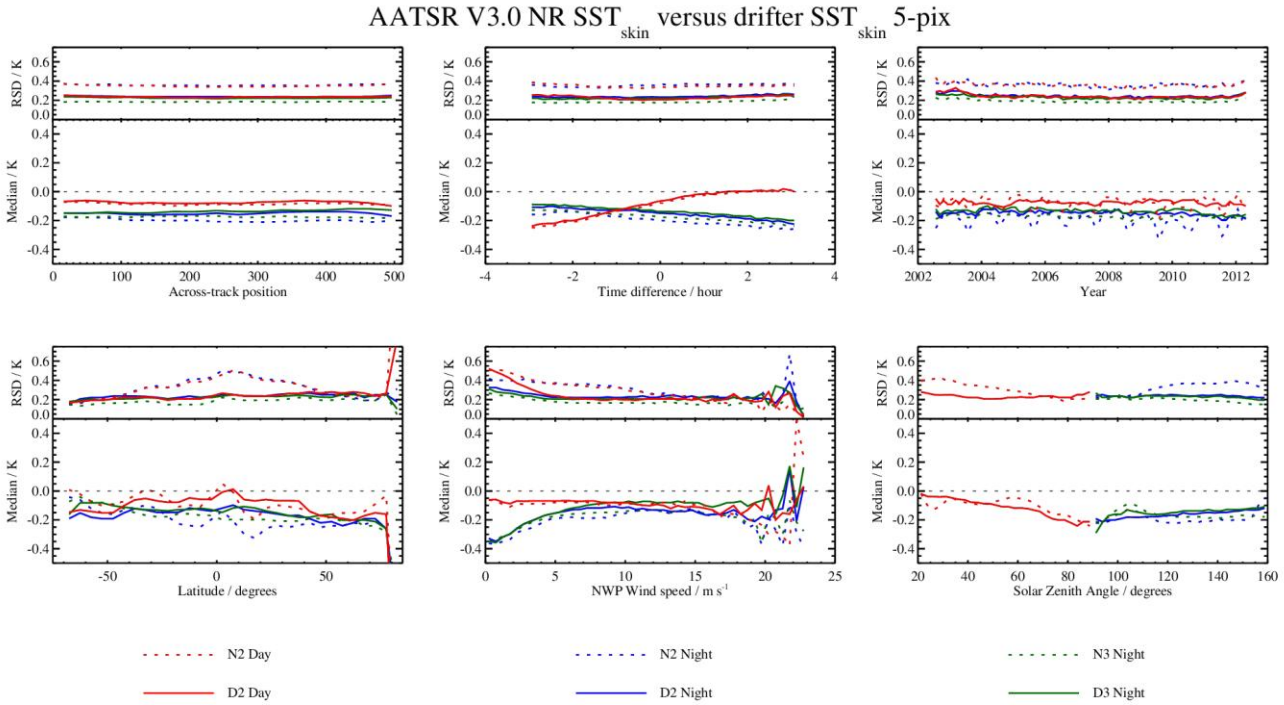
FIG. 5. All nighttime only $\Delta T_{depth\,5\,m}$ data (as shown in Fig. 4) plotted as a function of wind speed.

-0.17 +/- 0.07 K; Depth is quoted as SST 5m (ship measurements)

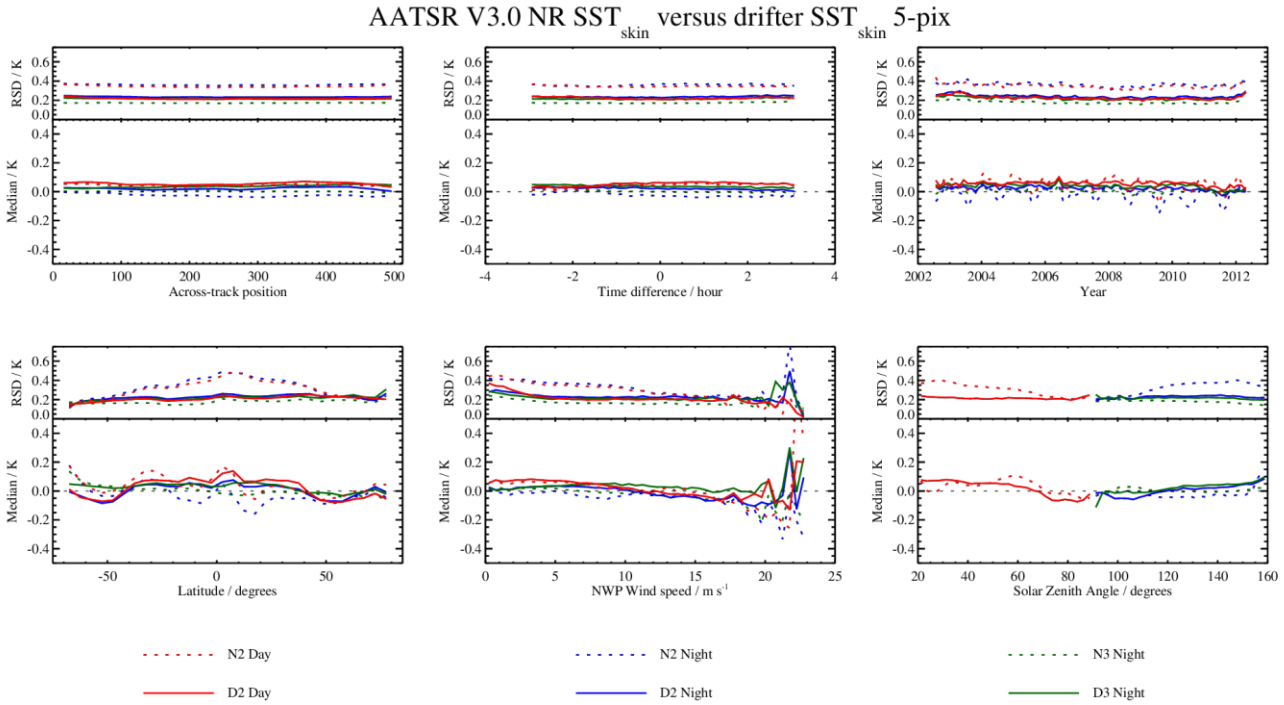
FKC "Correction"



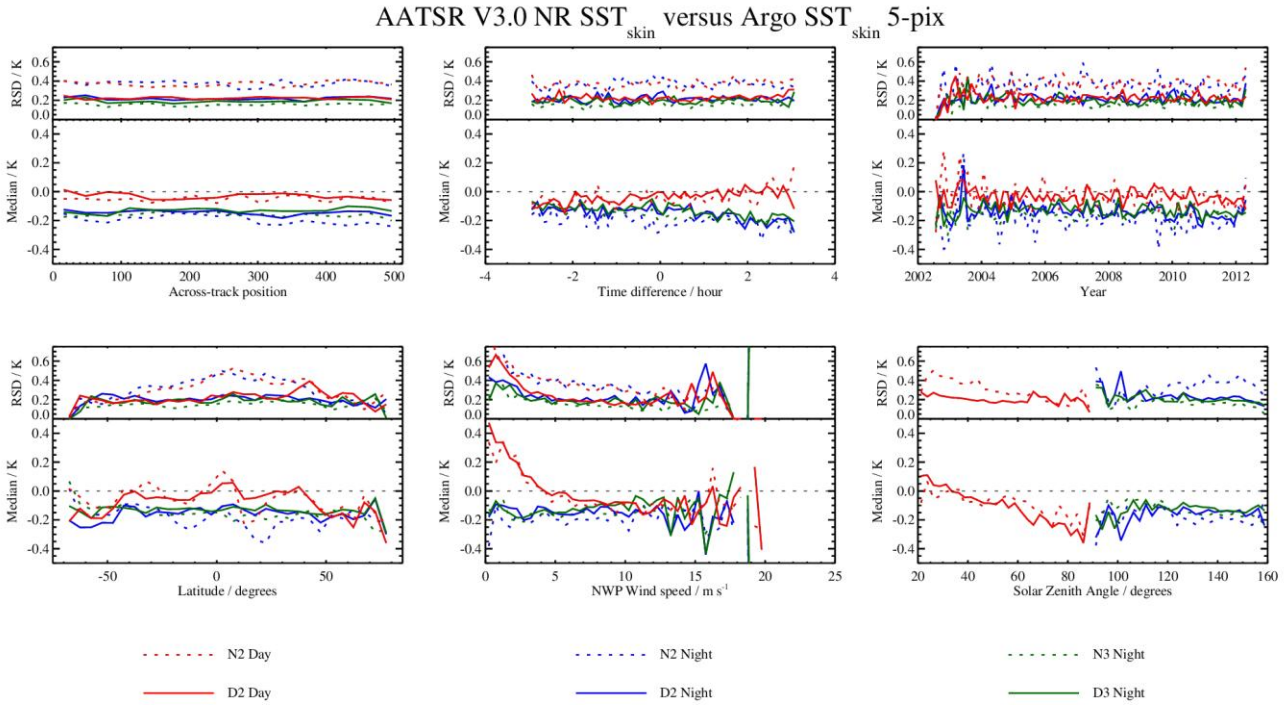
Drifters – raw



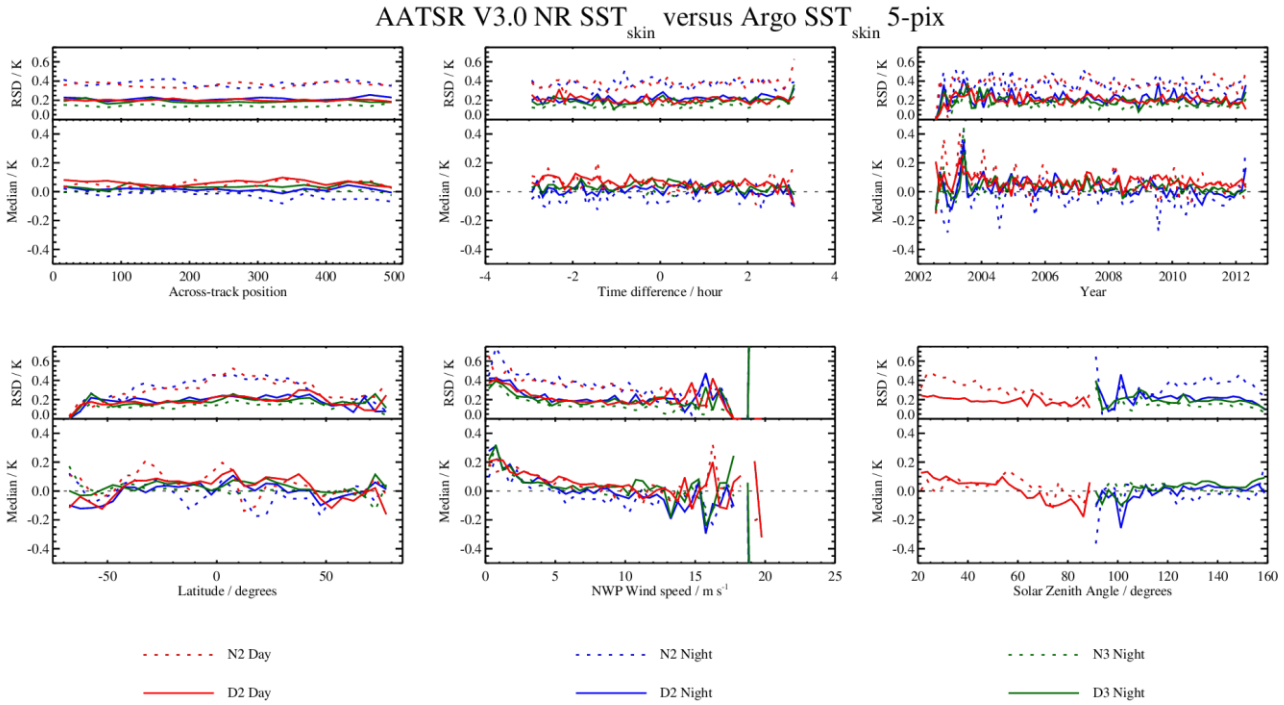
Drifters – with FKC adjustments



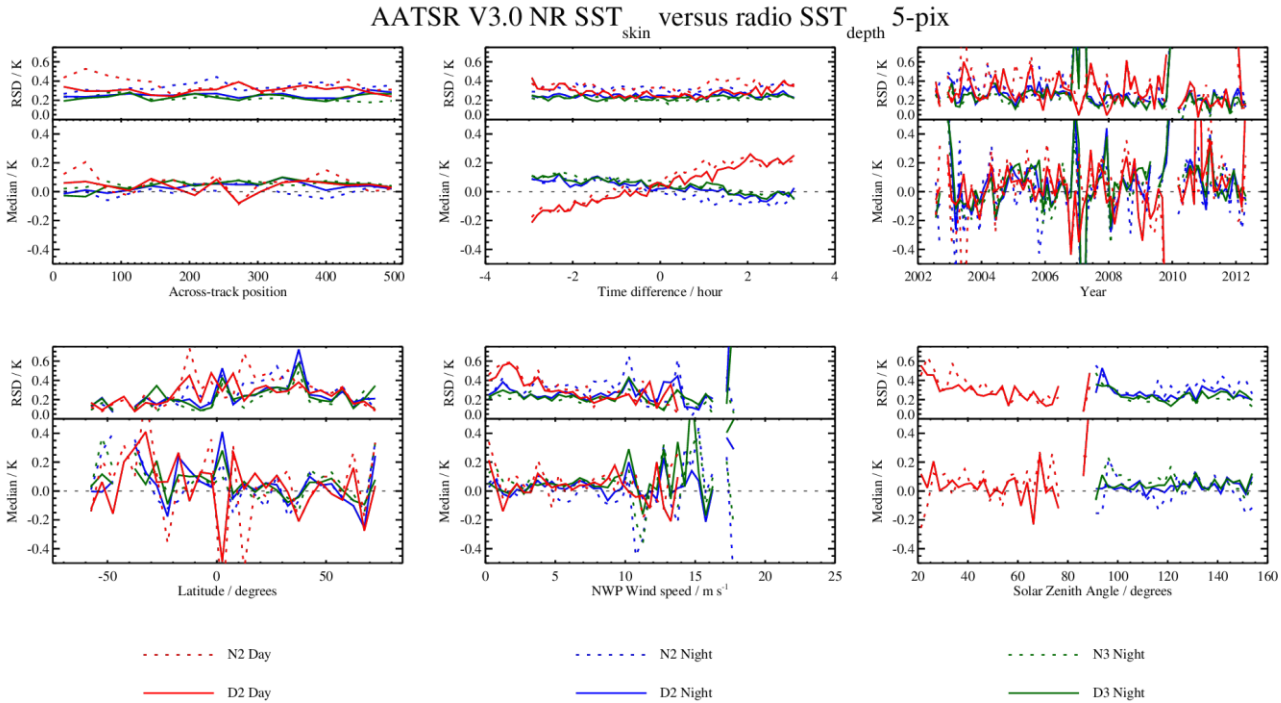
Argo – raw


AATSR V3.0 NR SST skin versus Argo SST skin 5-pix
RSD / K
Median / K
Across-track position
Time difference / hour
Year
Latitude / degrees
NWP Wind speed / m s-1
Solar Zenith Angle / degrees
N2 Day
D2 Day
N2 Night
D2 Night
N3 Night
D3 Night

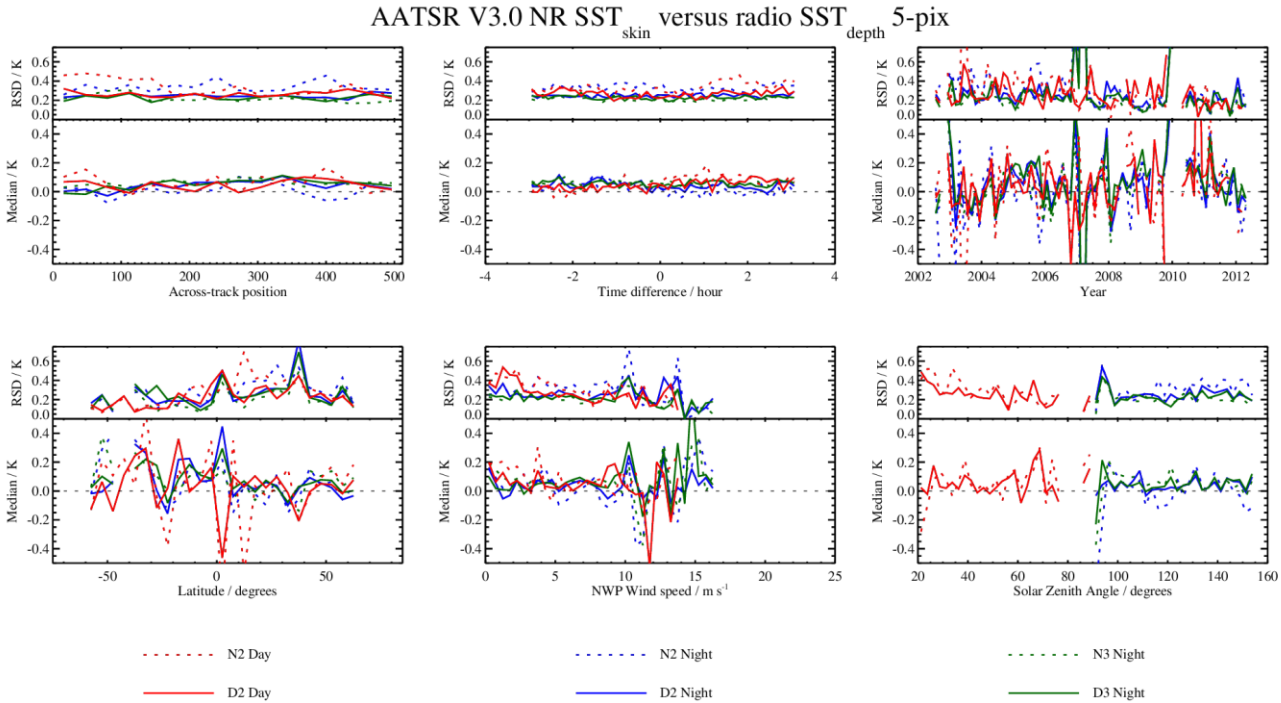
Argo – with FKC adjustments



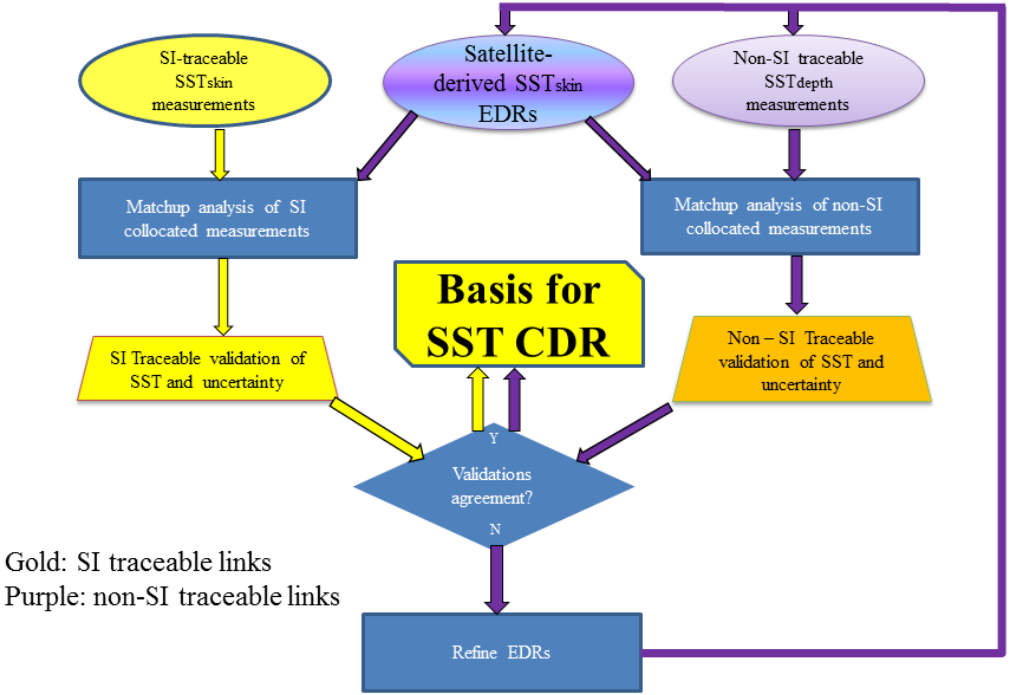
Radiometers – raw



Radiometers – with FKC adjustments



Transfer SI-traceability to satellite retrievals

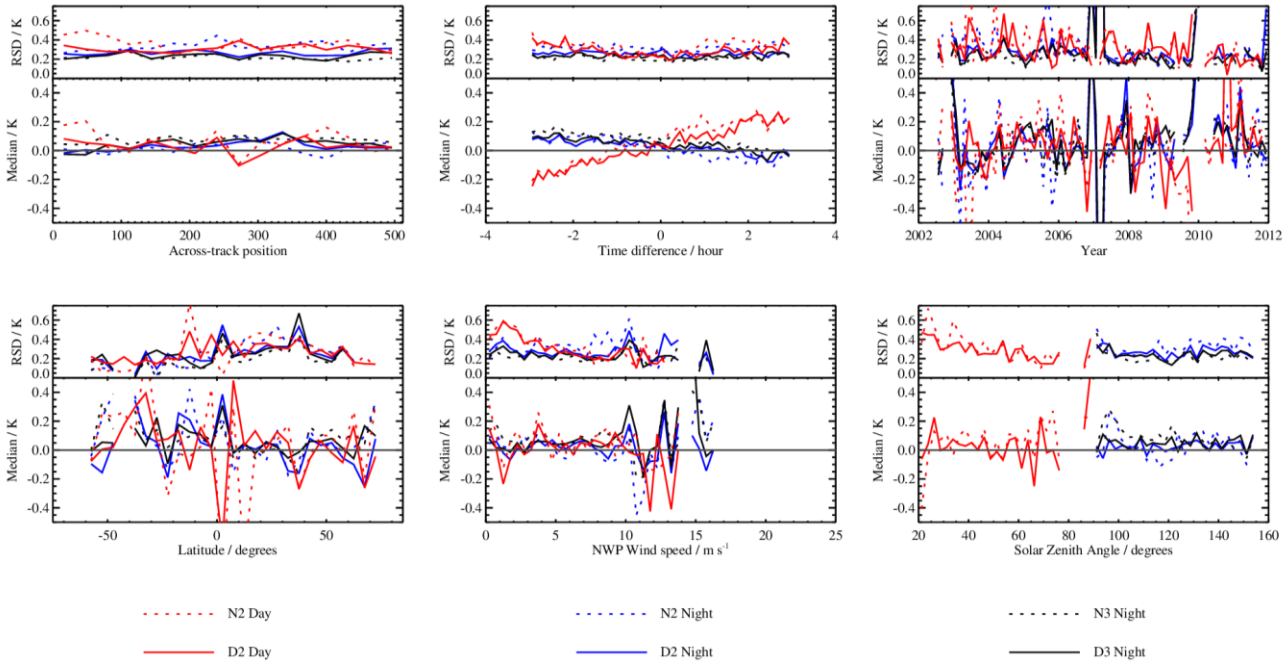


If all conditions satisfied, satellite SST data set suitable for CDAF assessment.

CDAF = GHRSST Climate Data Assessment Framework

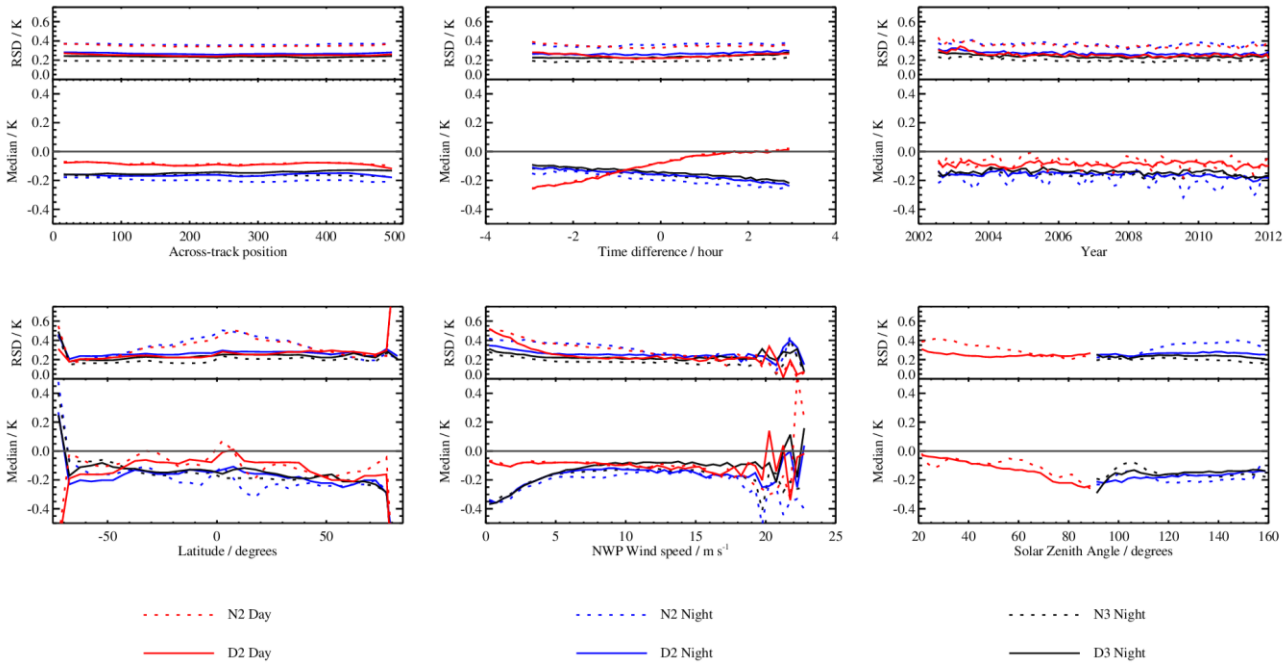
AATSR SI validation

AATSR – ship radiometer



AATSR non-SI validation

AATSR – drifting buoy



Summary

- Validation of long-term satellite data records requires the use of a multitude of different reference datasets
- These dataset can be used together using adjustments from a skin/diurnal variability model
- Radiometers provide a unique reference dataset to validate both the satellite SST and the FKC model adjustments.

- Validation of satellite data requires full coverage of the "validation space"
  - Key dependences of the retrieval algorithm, sensor and orbit
- Radiometers provide SI-traceable validation
  - But must be used in combination with non-SI traceable validation