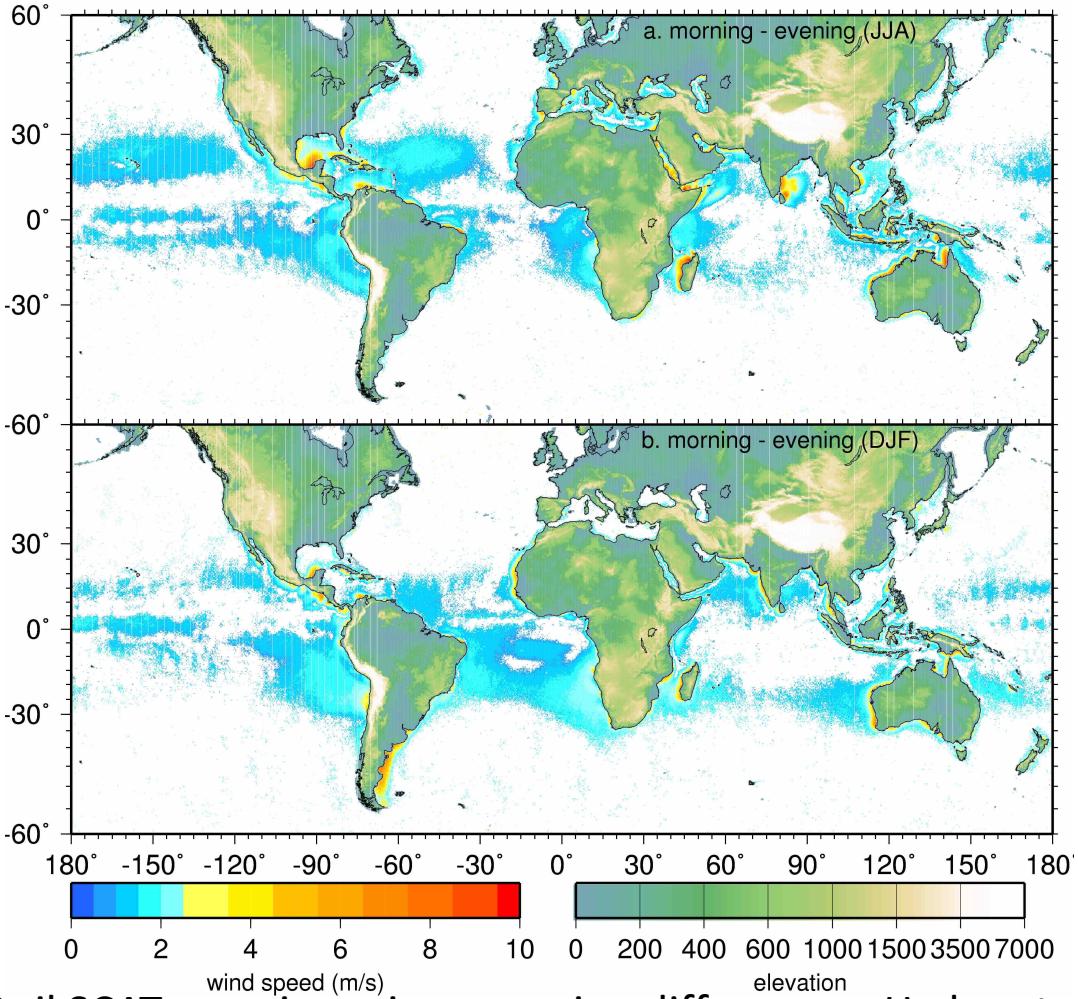


QuikSCAT morning minus evening differences; Hyder et al (2011)

Diurnal and high-frequency winds

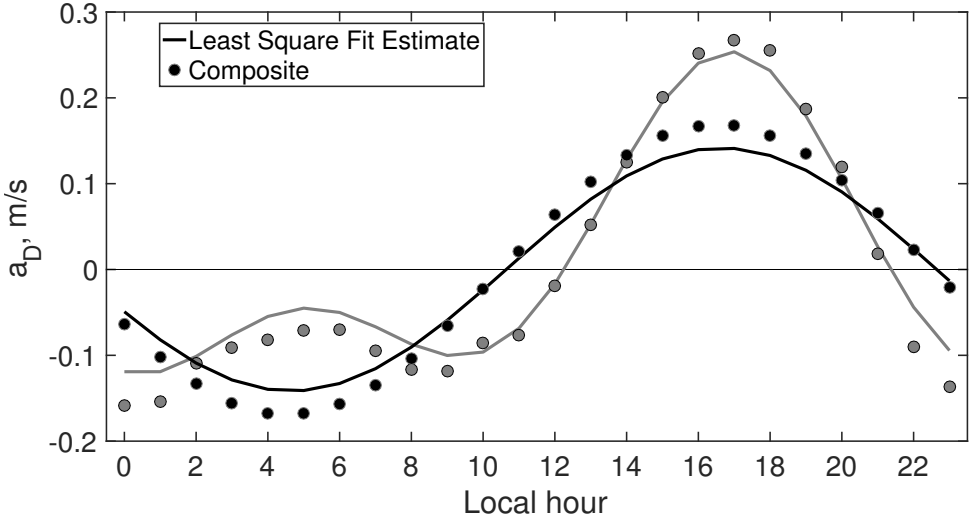
Sarah Gille

Scripps Institution of Oceanography, UCSD

IOVWST 19

Why does diurnal variability matter?

- Ubiquitous throughout tropics
- Time of sampling influences mean wind and satellite cross-calibration (particularly because of semi-diurnal cycle)
- Possibility of non-linear interactions with radiative forcing imply net impact on mixed-layer depth, atmospheric convection

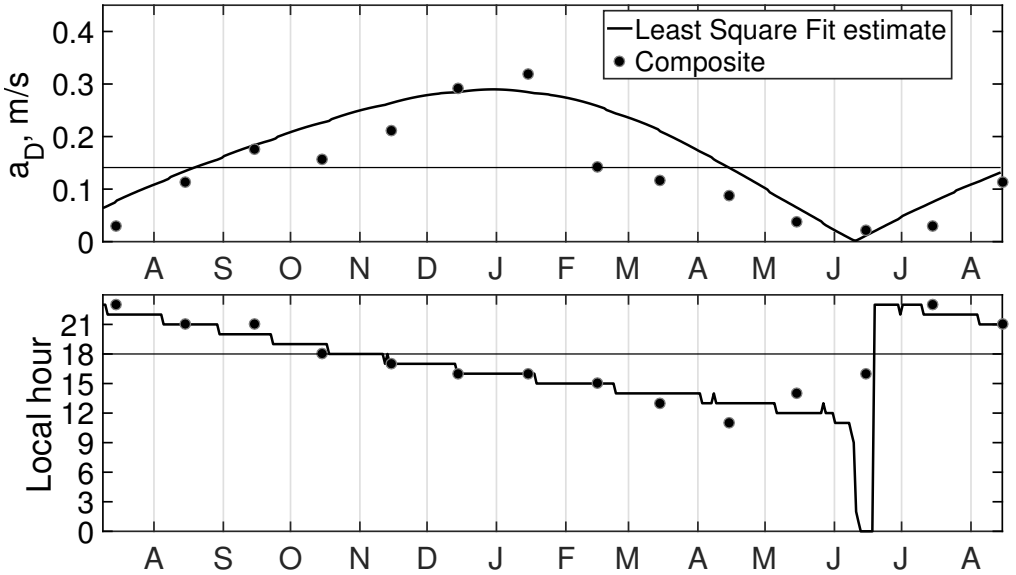


- 10S, 10W buoy winds fitted diurnal/semi-diurnal
- Strong semi-diurnal cycle

(Giglio et al, in prep)

Annual modulation of diurnal cycle

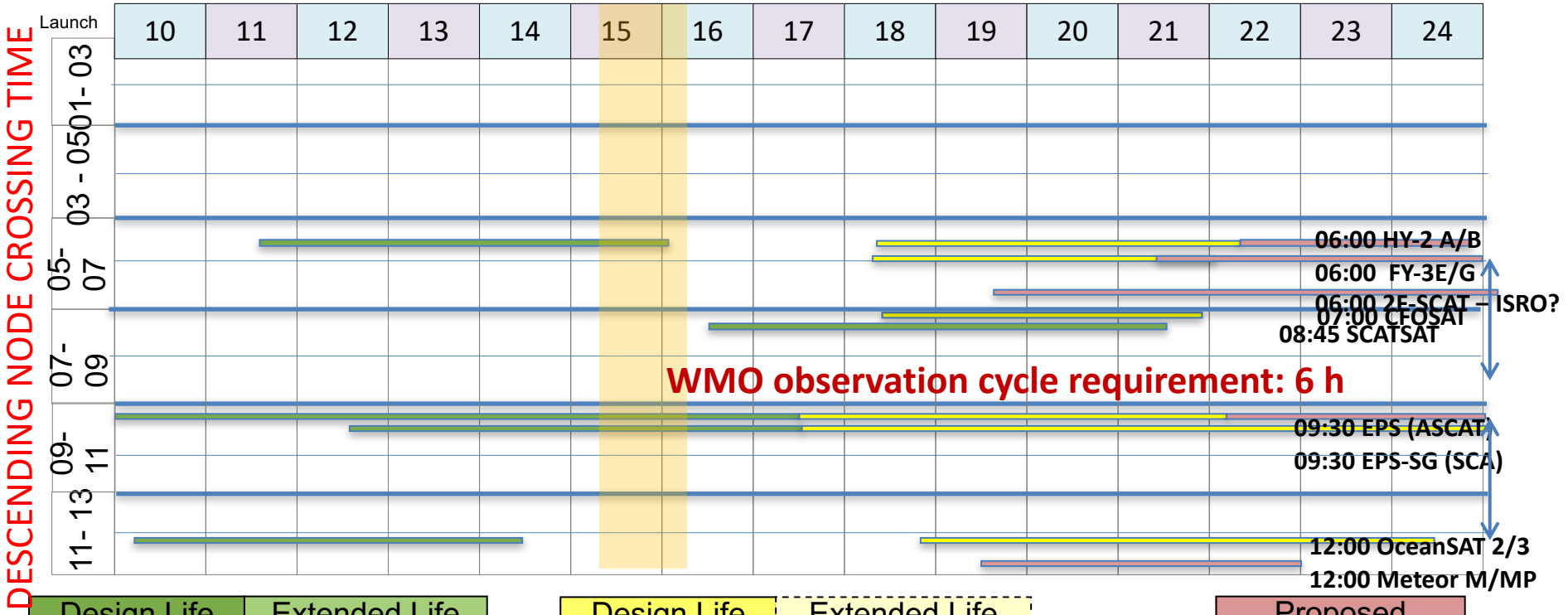
- Can’t measure once and then use look-up table to correct wind fields to time of day



- 10S, 10W buoy winds seasonal cycle of diurnal amplitude

(Giglio et al, in prep)

Ocean Vector Surface Winds Constellation
Local time coverage assessment (ground track) - NRT data access



Source: WMO OSCAR database and direct interactions with agencies

Paul Chang, IOVWST 2018

Committee on Earth Observation Satellites

Requirements

- Detecting semi-diurnal cycle requires fitting at least 5 unknowns (mean, cosine/sine amplitudes for diurnal, cosine/sine amplitudes for semi-diurnal), which implies need for measurements at 6 or more times of day.
- Air-sea interaction often “event-driven”: one big storm or one big gust deepens the mixed layer and cools SST, so capturing statistics of wind events is valuable.
- CEOS recommendations
  - At least 3 scatterometers in orbits designed to roughly meet WMO requirements (observations every 6 hours)
  - One instrument in a non-sun-synchronous orbit for sampling the diurnal cycle, better mid-latitude sampling and provide inter-calibration