



NASA GMAO

INTEGRATED **E**ARTH **S**YSTEM **A**NALYSIS

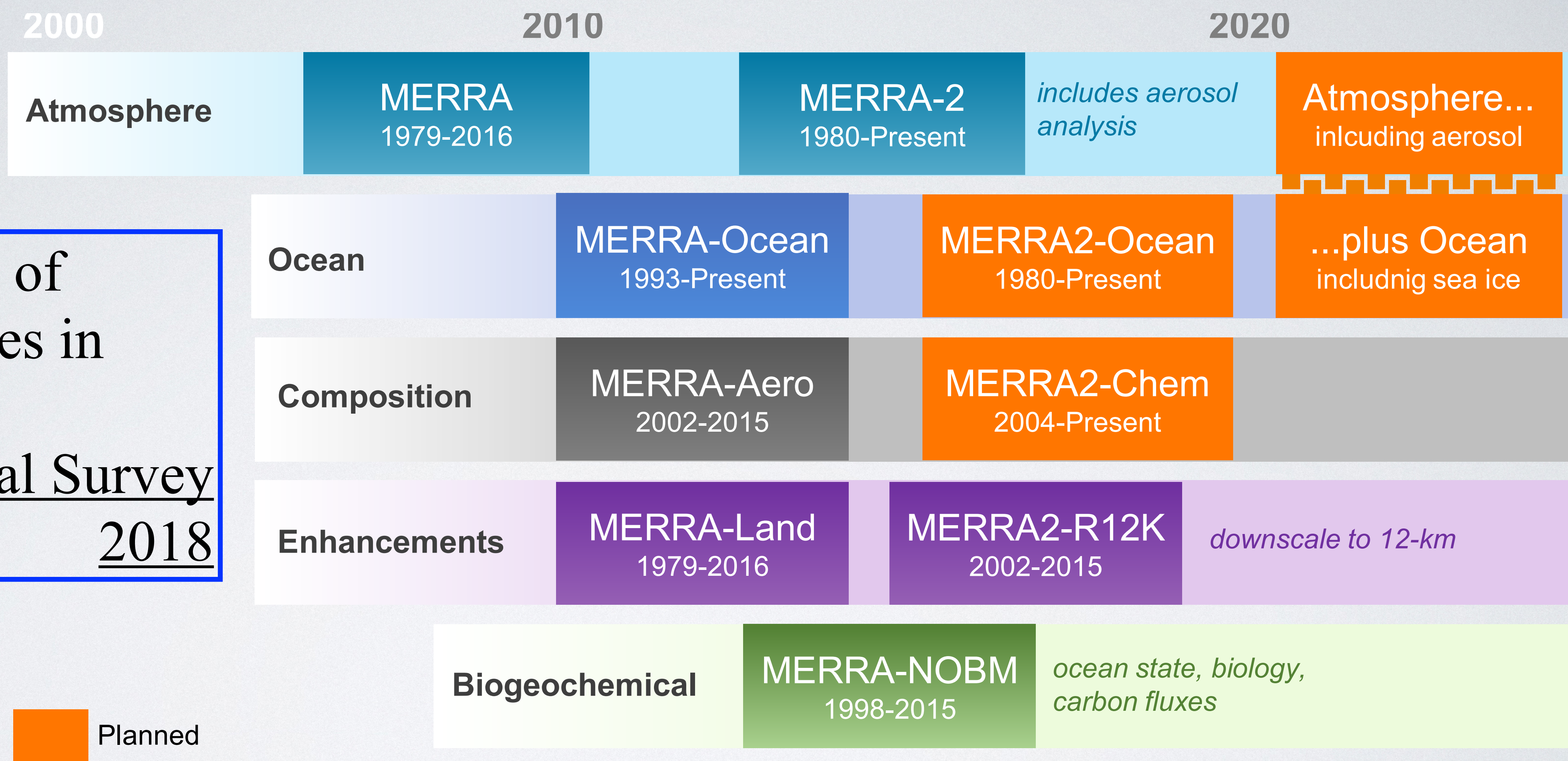
Santha Akella

With Thanks to many at the GMAO

Global Modeling & Assimilation Office
NASA



GMAO IESA/REANALYSIS ROADMAP



“The future of reanalysis lies in IESA”
 - Decadal Survey
2018

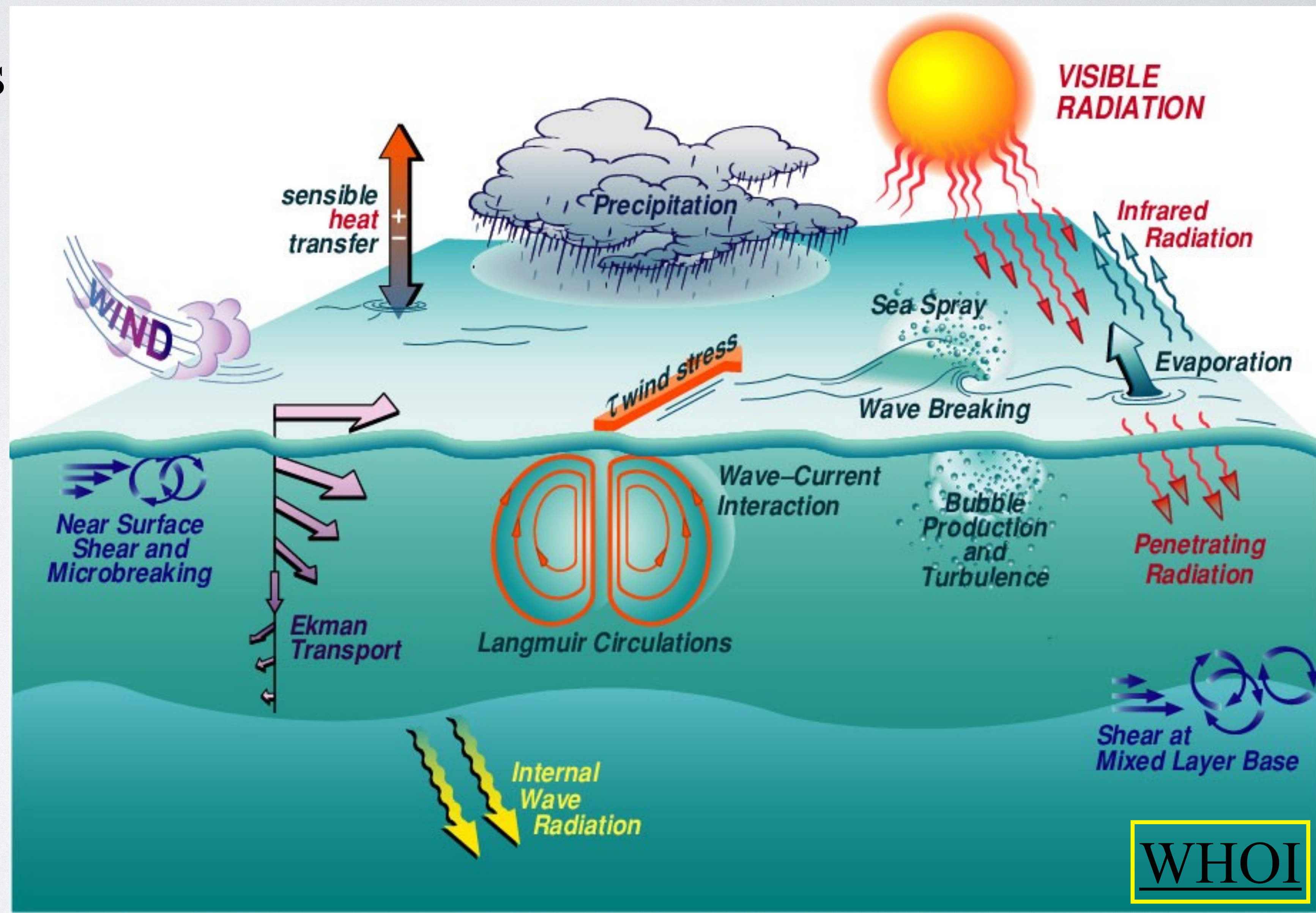
 Planned

[Gelaro et al, 2017](#)

GMAO IESA: ATMOSPHERE-OCEAN

We would like to:

- resolve all these processes
- predict up to 2 weeks-seasonal time-scales

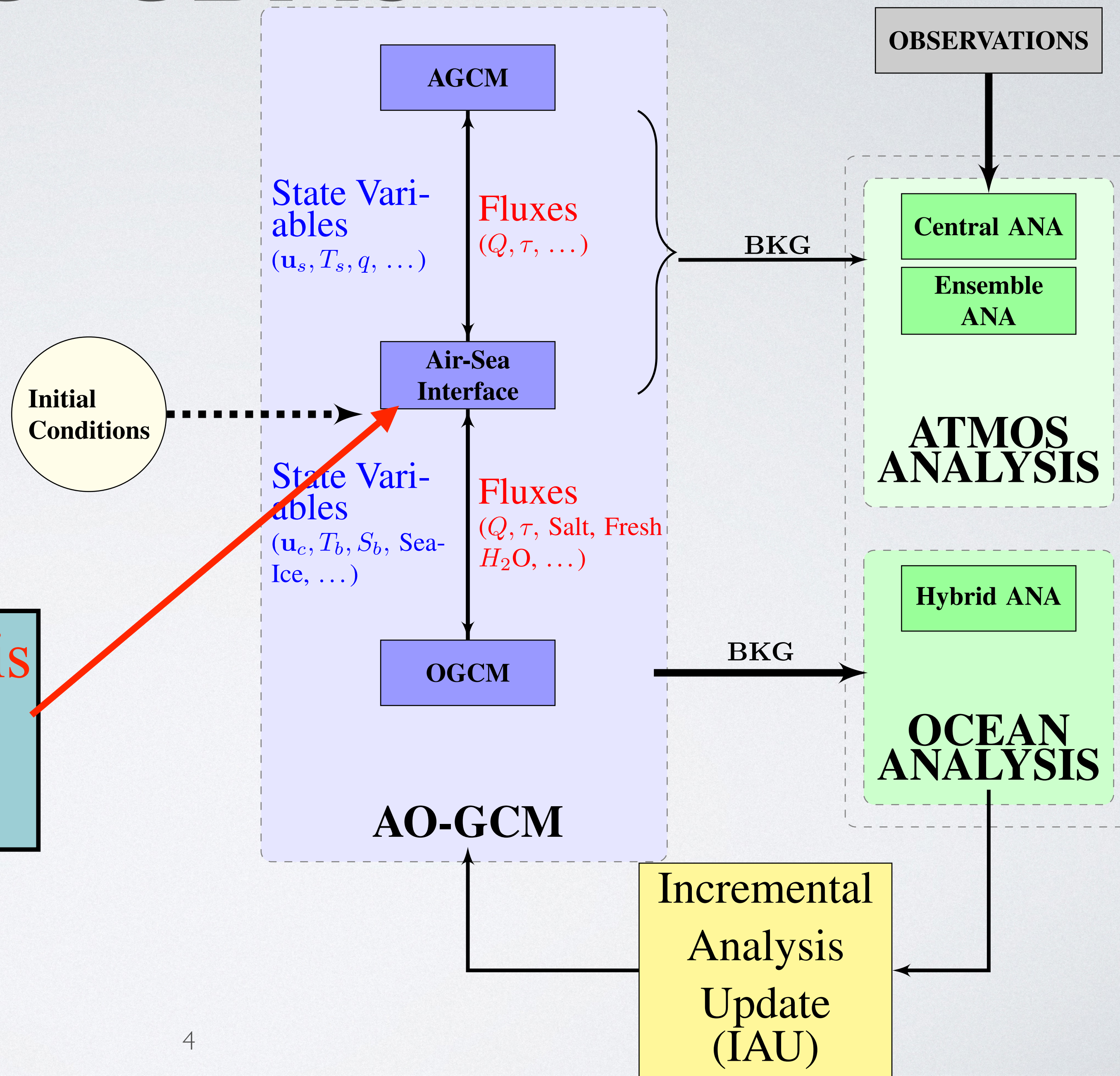


GMAO IESA: AO-CDAS

Using:

- a coupled model (AO-GCM)
- coupled analysis
- initialization procedure

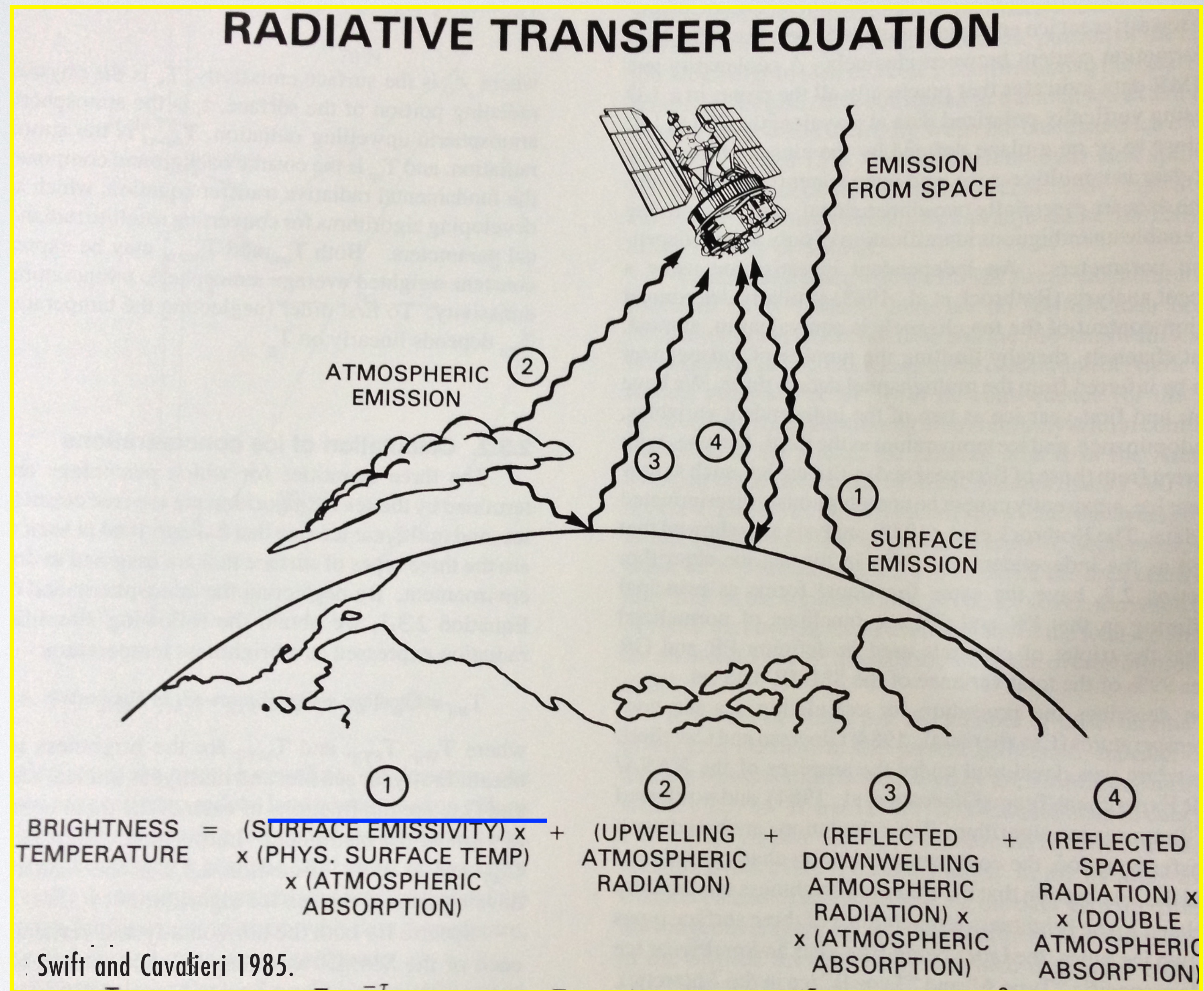
With a "tightly-coupled" analysis for the interface variables (SST, SSS, Sea-ice, etc)



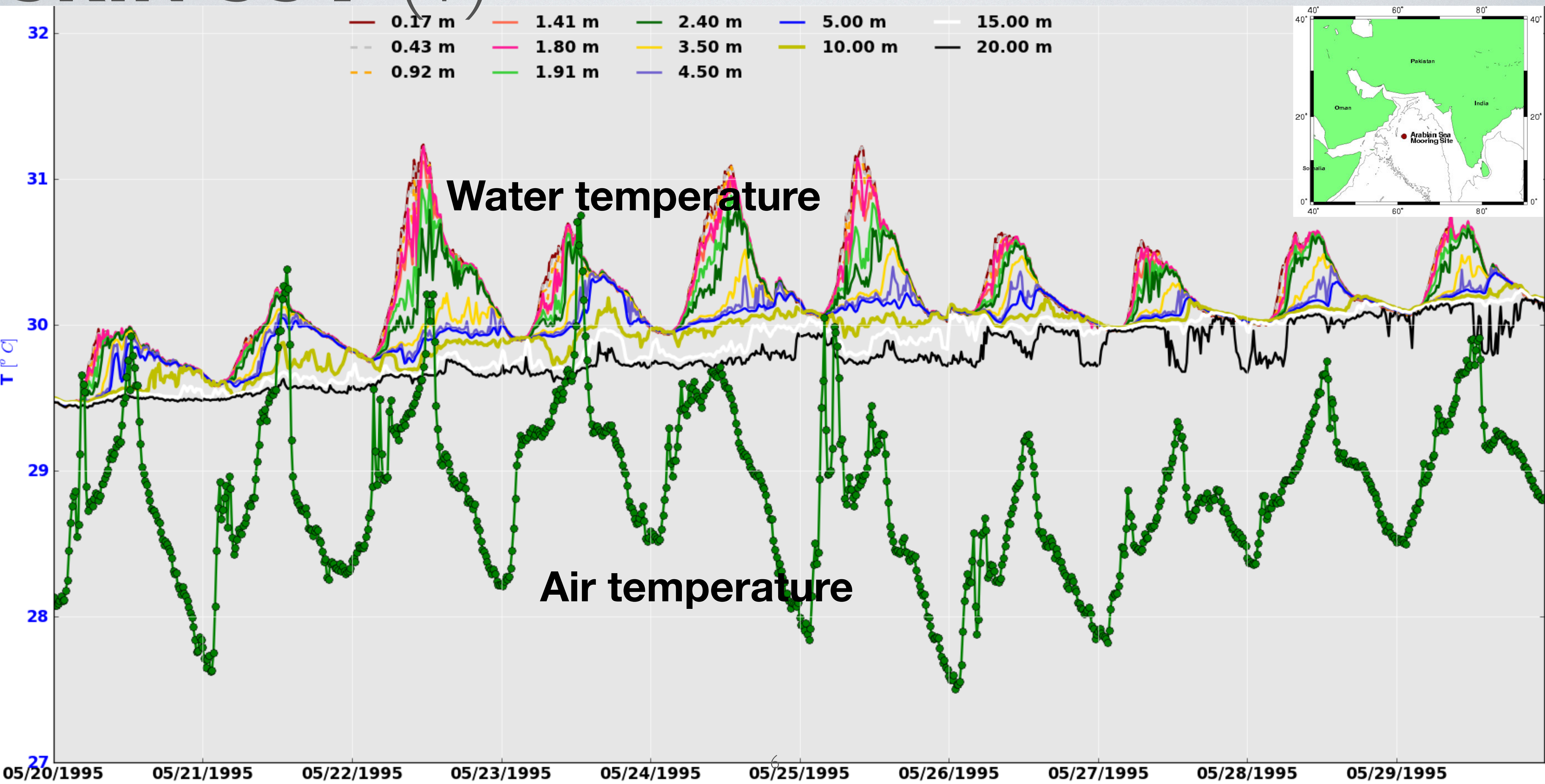
CONSIDER SST (OR, **SKIN-SST**)

Needed for:

- **Satellite retrievals** (sea-ice, water vapor, ...)
- **Data Assimilation** of Satellite radiance observations
- **Air-sea** heat and momentum exchange
- **Gas exchange** : $p\text{CO}_2$, ...

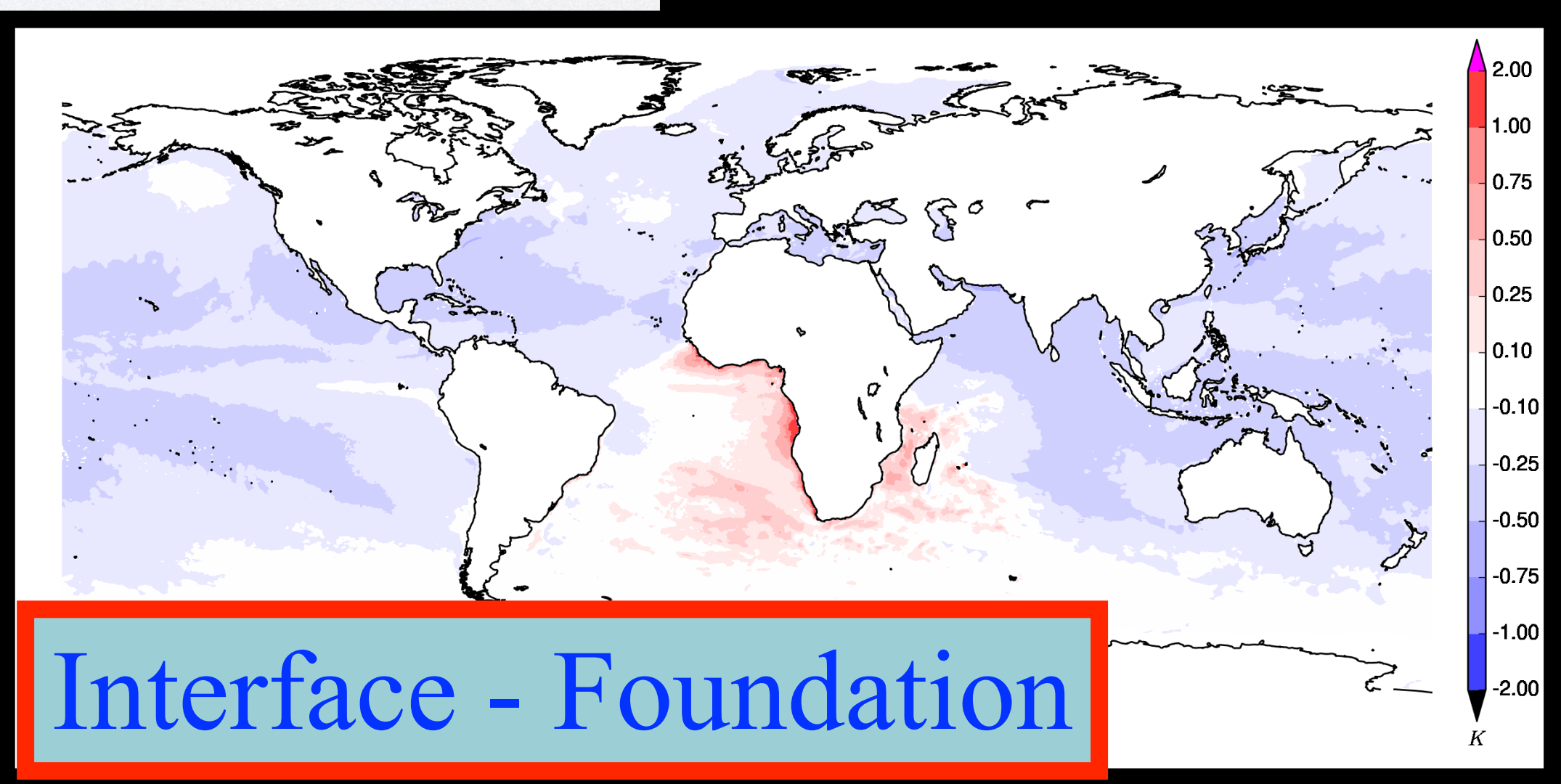
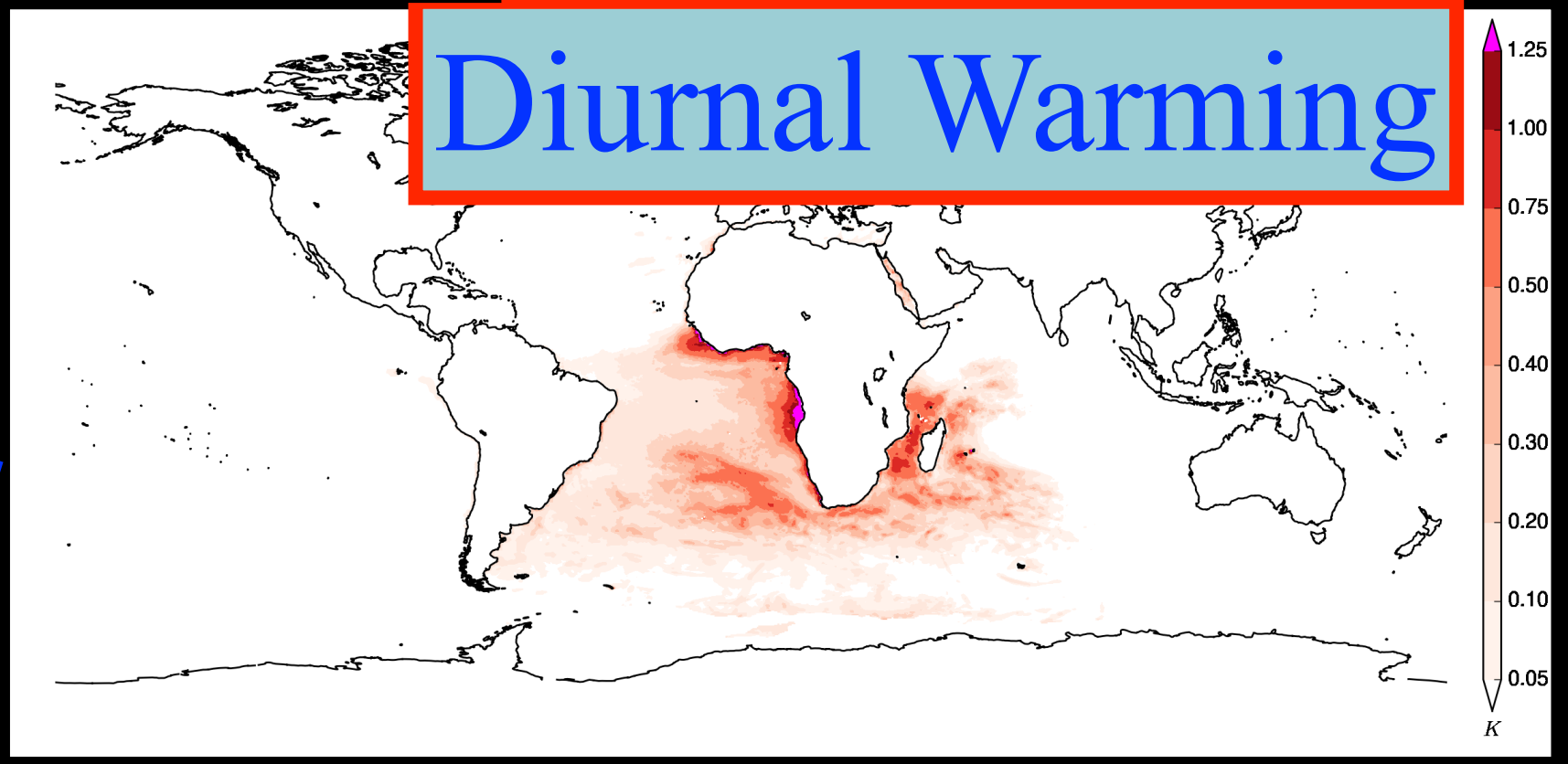
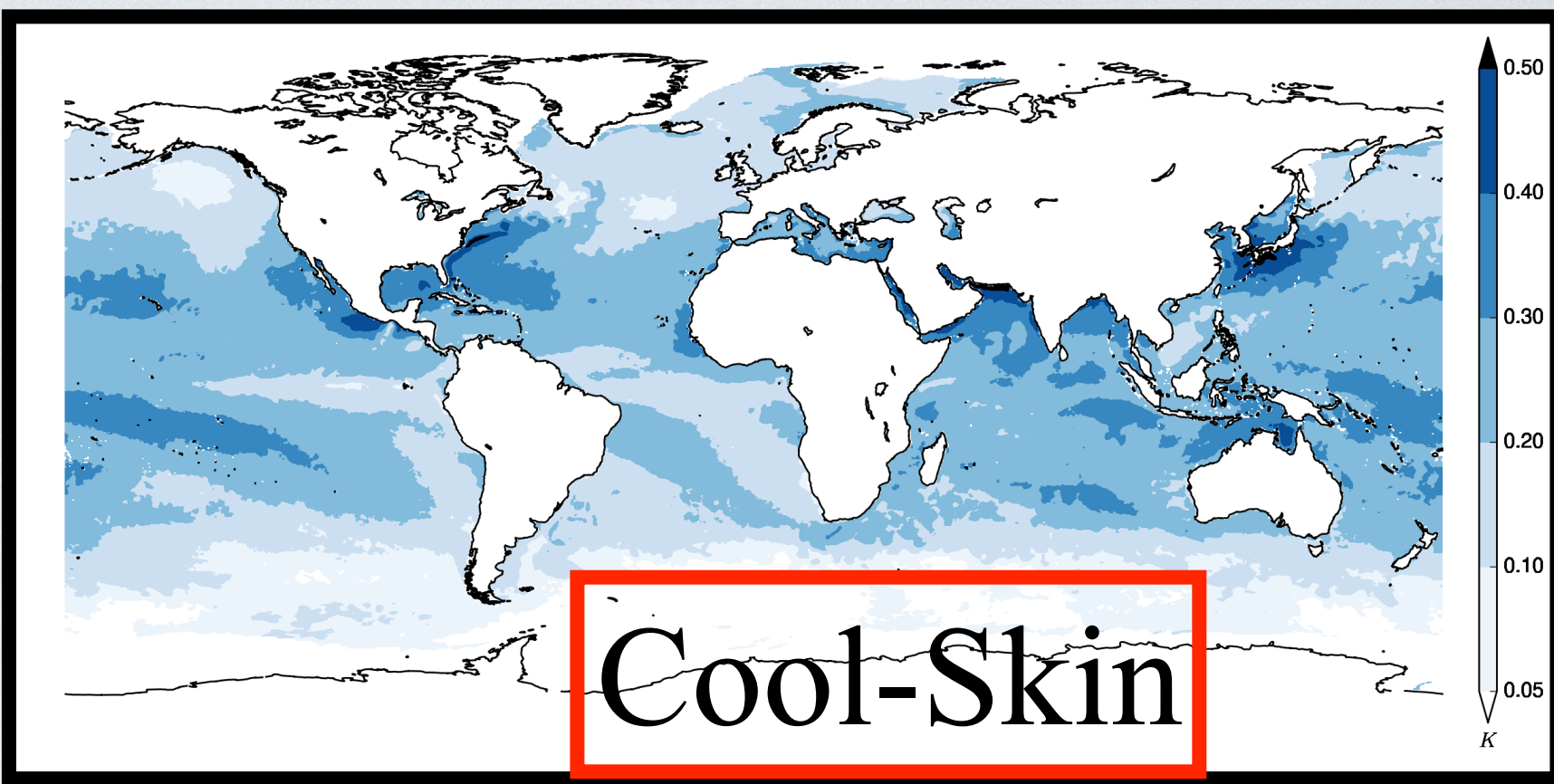
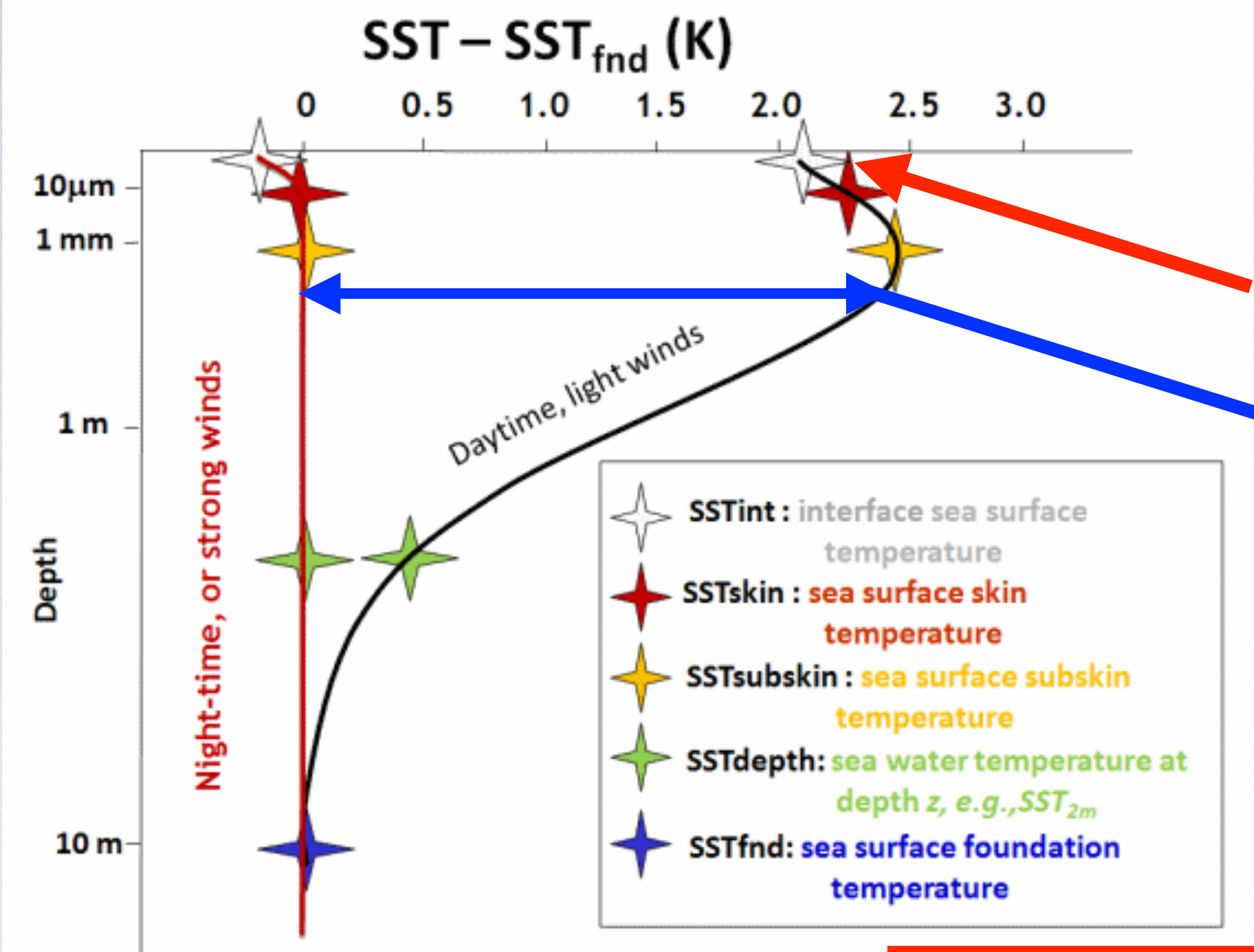


SKIN SST (I)





SKIN SST (2)



GHRSSST



SKIN SST (3)

Further details...

- Akella et al., 2017, “Assimilation for skin SST in the NASA GEOS atmospheric data assimilation system”. Q.J.R. Meteorol. Soc. doi:10.1002/qj.2988
- C Gentleman and S Akella, 2017, “Comparison of NASA GEOS-ADAS diurnal warming to SEVIRI and AMSR2 retrievals”. JGR Oceans. doi: 10.1002/2017JC013186
- GMAO Tech Memo., Vol.44: <https://gmao.gsfc.nasa.gov/pubs/docs/Akella873.pdf>



SUMMARY AND CURRENT WORK

- GEOS DAS assimilates Skin SST using radiance observations
- Transitioning from *Atmosphere+Skin SST* to a *AO- CDAS*
 - * Coupled AO-GCM
 - * Coupled atmosphere and ocean analyses