Using surface observations to evaluate land surface energy and water fluxes ~~and snow~~ simulated by CLM5SP: Initial results

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Motivation

- Complement the evaluations that the CLM5 development team are doing by using the observational data that we've accumulated:
  - ▷ Global datasets like CERES surface radiation
  - ▷ FLUXNET flux tower observations

- Establish a baseline for the performance of CLM5 in simulating interface conditions.
  - ▷ SP 1990-2010
  - ▷ By comparing to surface observations
  - ▷ By placing model output into reanalysis spread: MERRA, ERA-Interim, CFSR
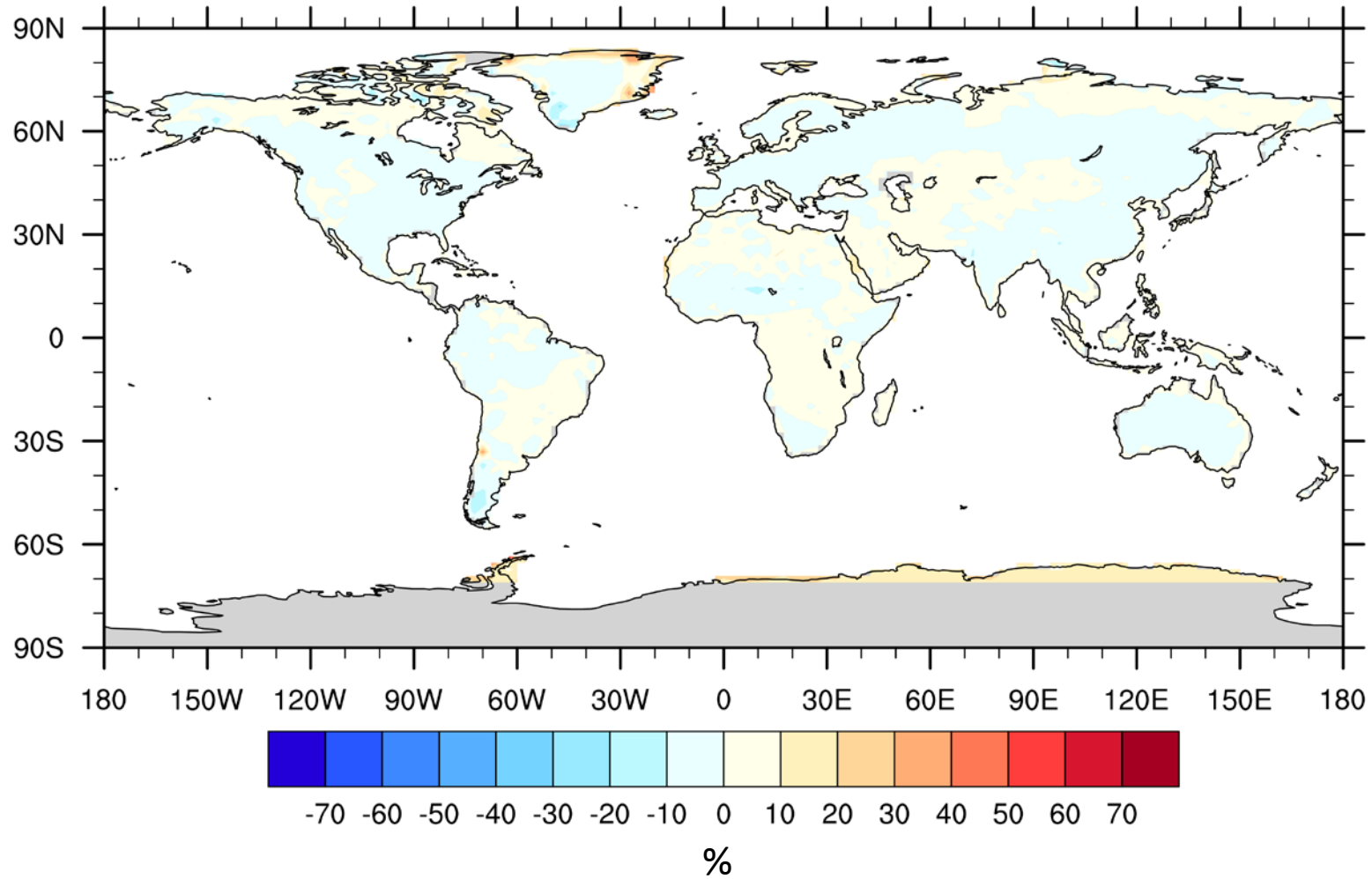
COMPARISON TO CERES SURFACE RADIATION

EBAF-Surface: 2000-2015 monthly, 1^O x 1^O
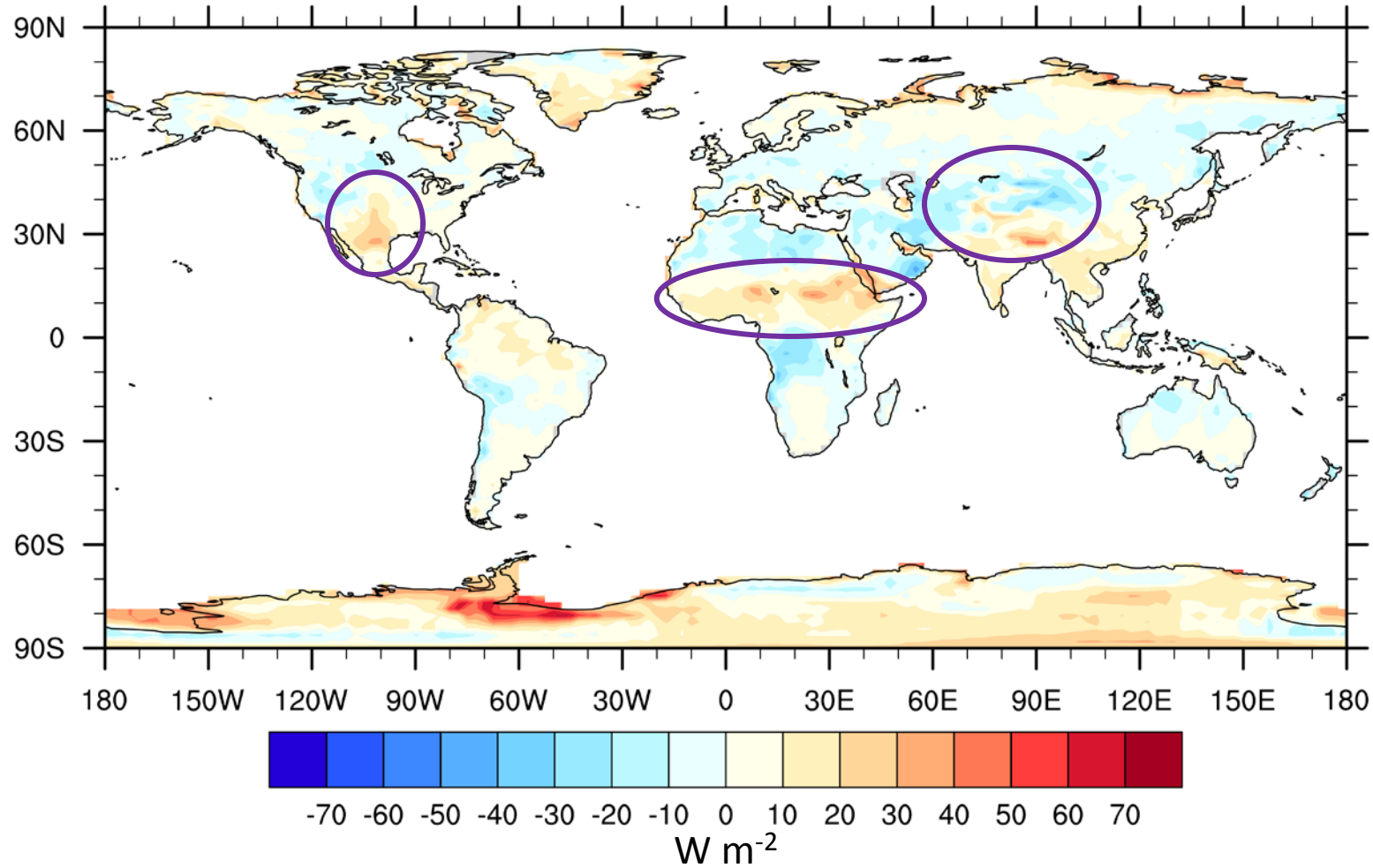
Regridded to CLM resolution

CLM5 – CERES upward SW radiation (July)
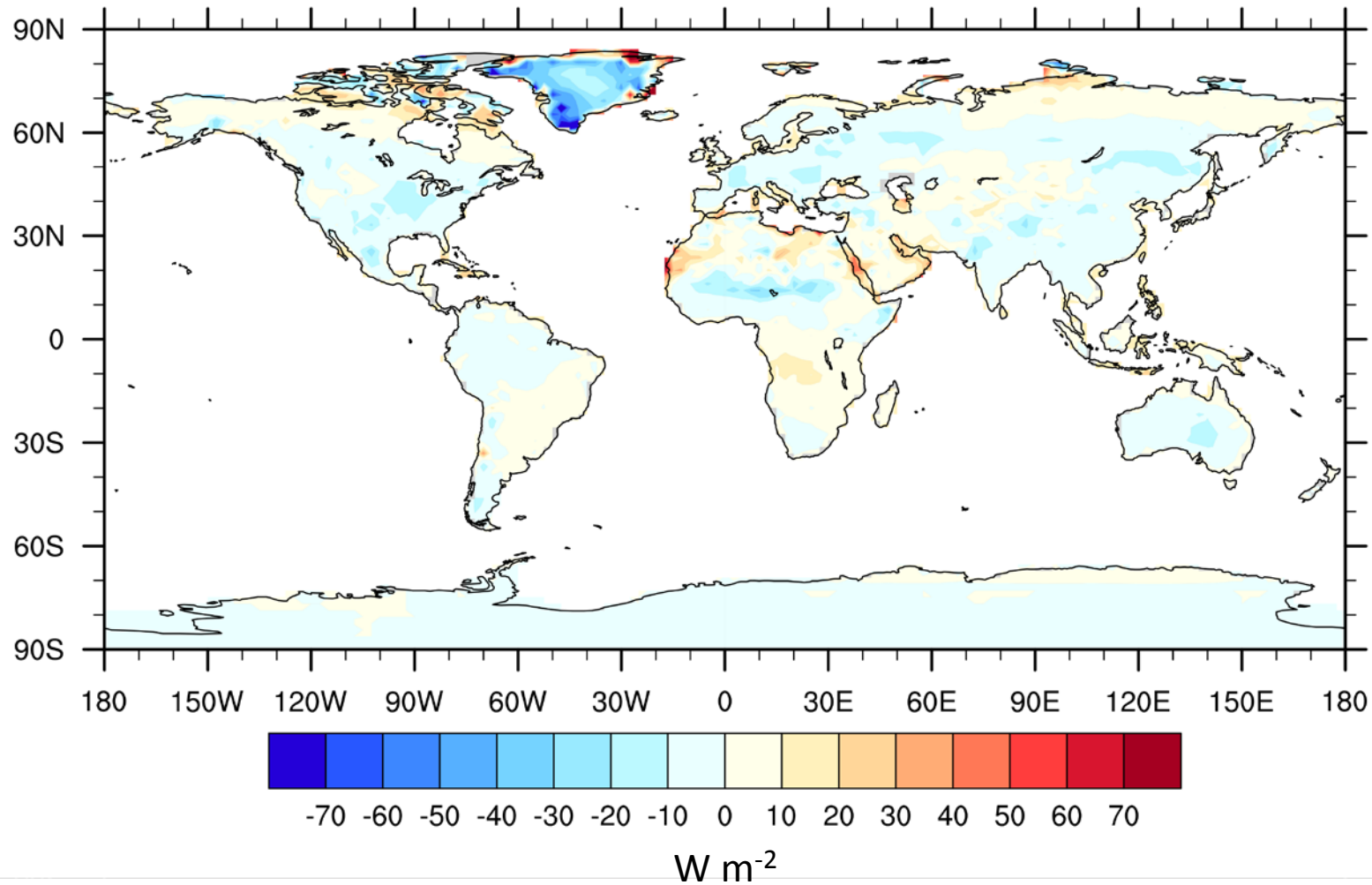
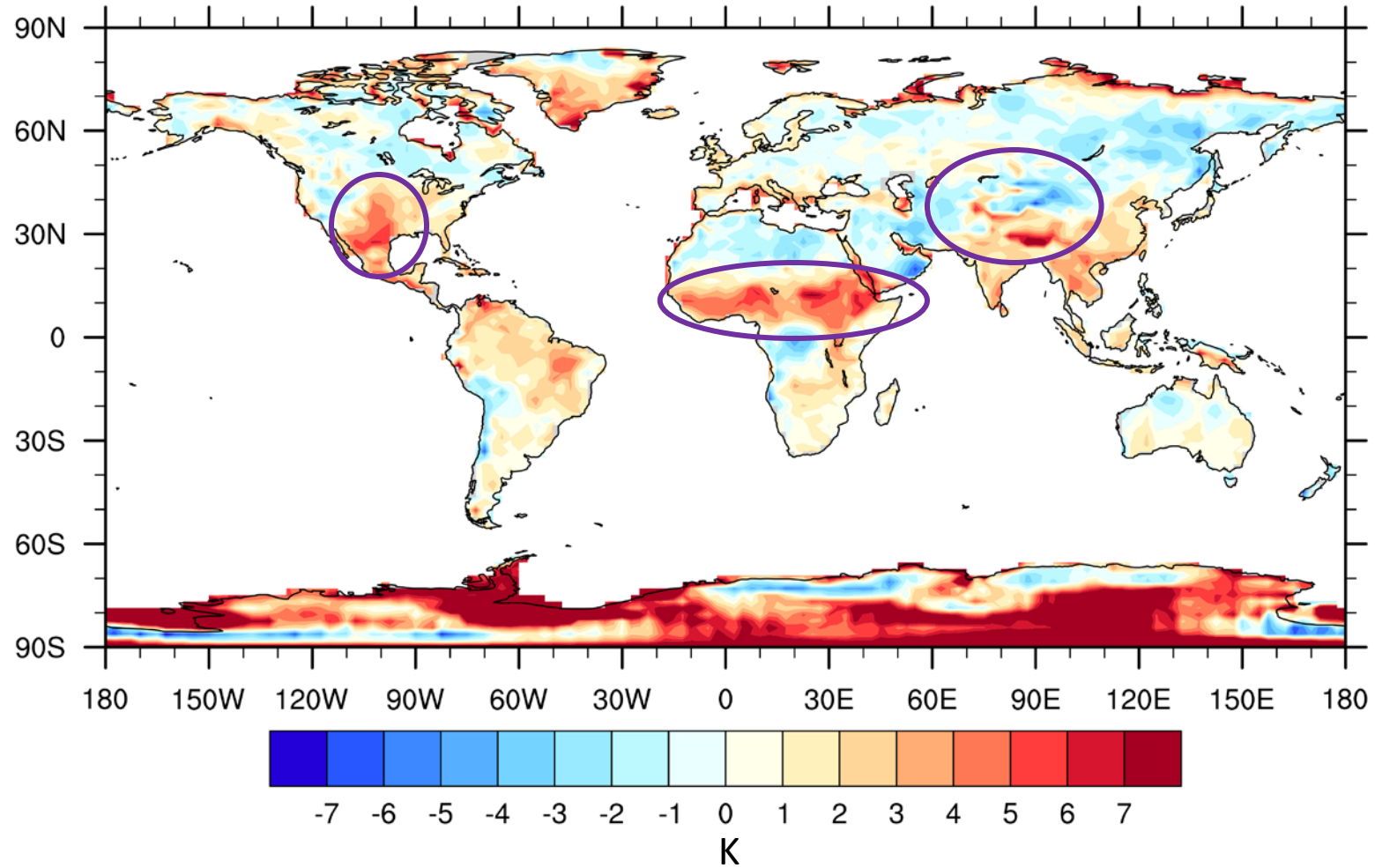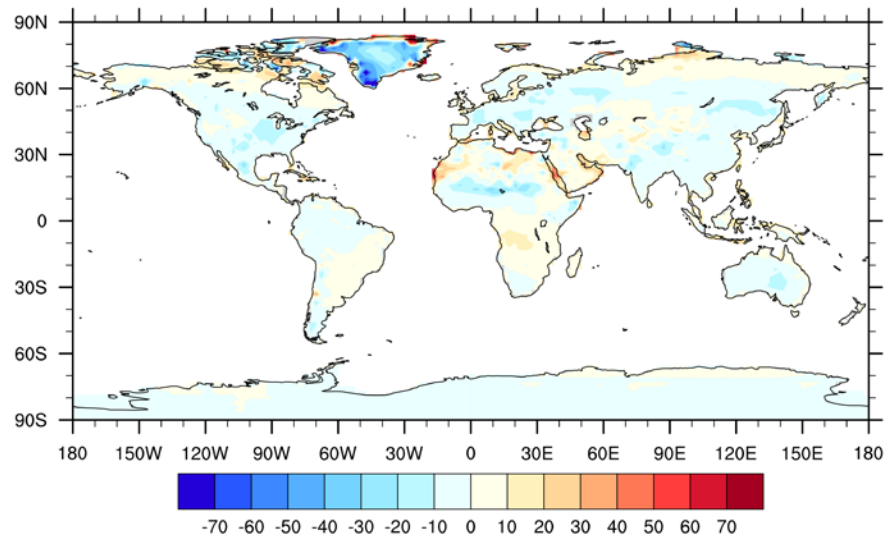# CLM5 – CERES albedo (July)

CLM5 – CERES upward LW radiation (July)
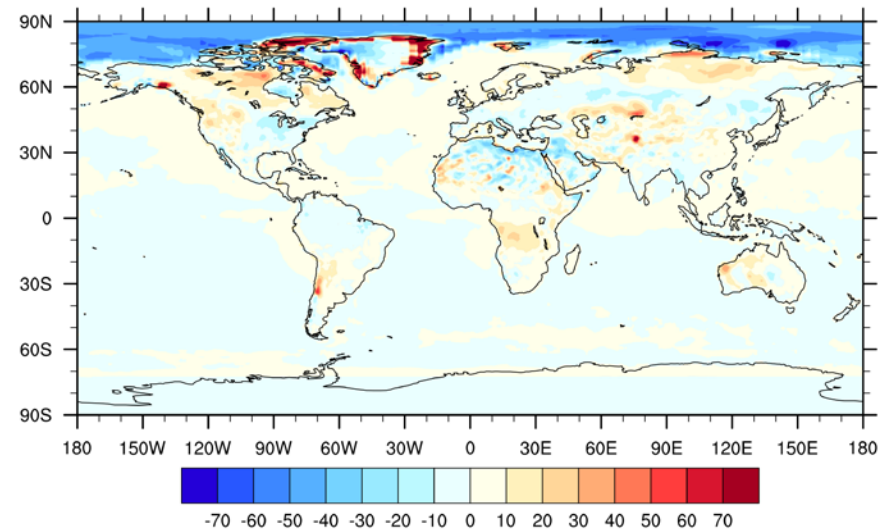
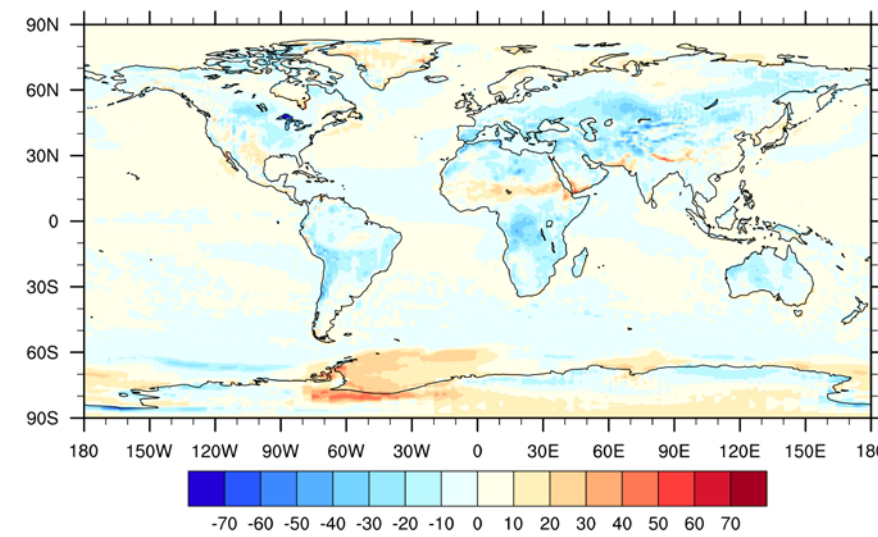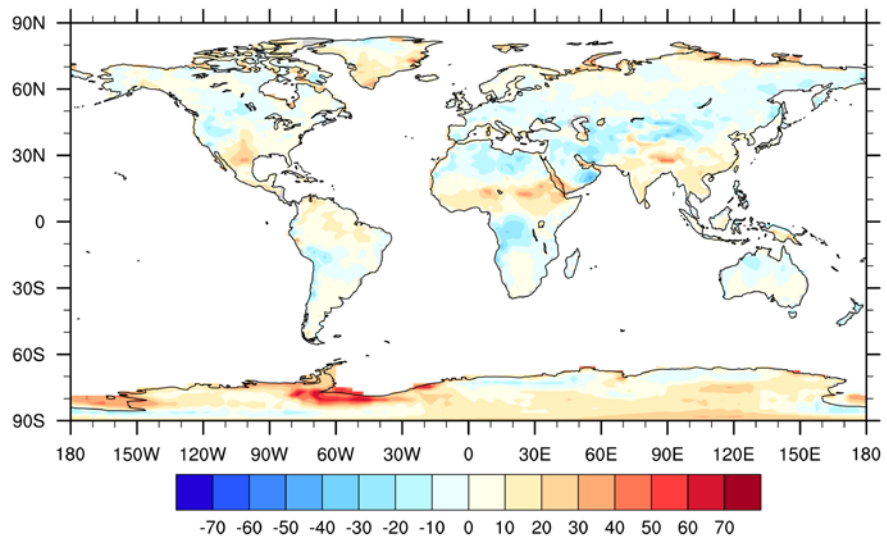# CLM5 – CERES surface temperature (July)

CLM5 **ERA-Interim**

Upward SW radiation

Upward LW radiation

EXAMPLES OF COMPARISONS TO FLUXNET TOWERS

33 sites spanning various vegetation covers across the globe

Comparing with fluxes from the grid cell containing the flux tower

ARM Southern Great Plains tower

- ▶ Use reanalysis spread and observations to evaluate model performance.

- ▶ Net radiation and upward LW radiation are particularly well simulated.

- ▶ Surface turbulent fluxes are less well simulated.
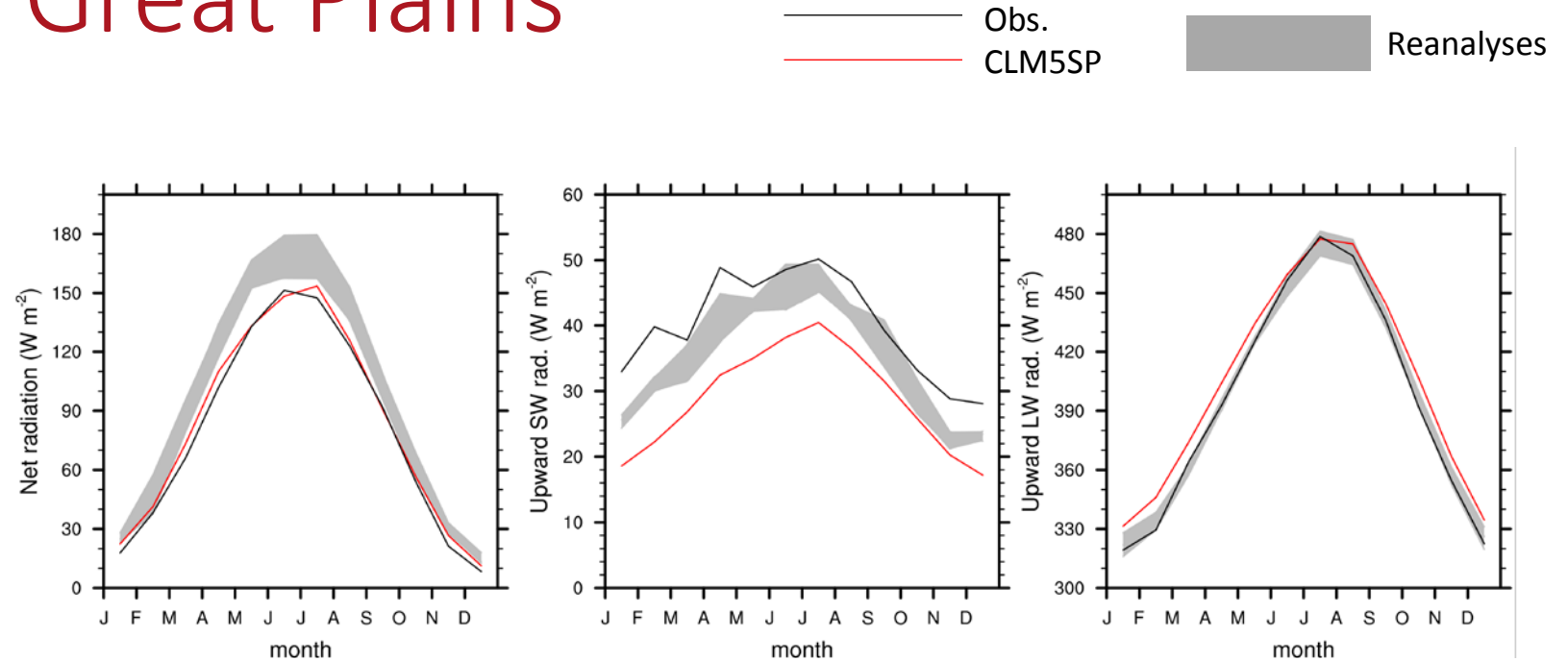
Man + NS1-7 towers

Site	Veg cover
Man	ENF
NS1	ENF
NS2	ENF
NS3	ENF
NS4	ENF
NS5	ENF
NS6	Open shrub
NS7	Open shrub

Obs. mean
Obs. spread
CLM5SP
Reanalyses
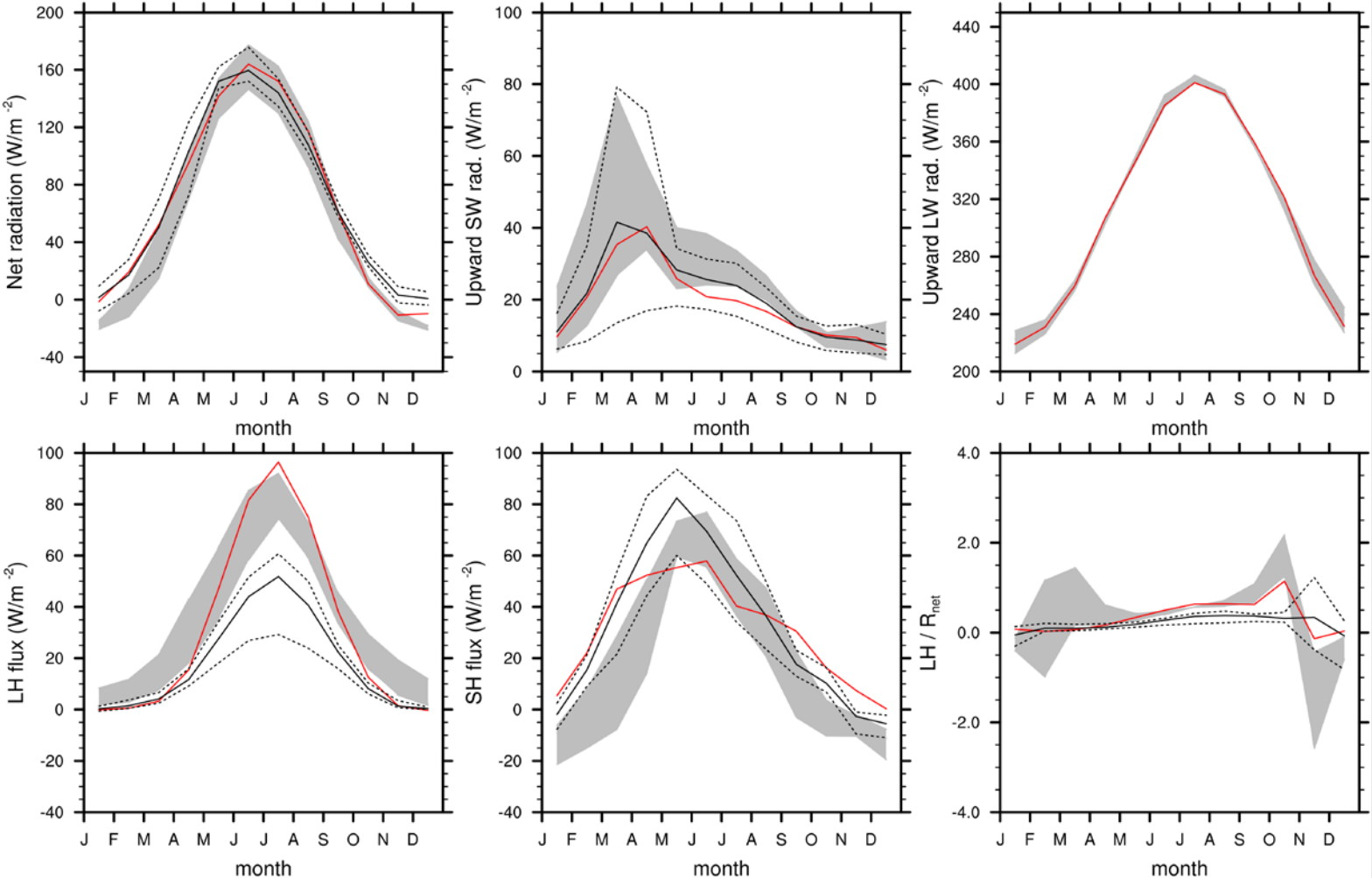
Initial conclusions + future work

- Surface radiation well simulated in CLM5: close to surface observations and within reanalysis spread.
  - ▷ Shortwave radiation is better simulated than longwave radiation.
- Latent and sensible heat fluxes are less well constrained depending on location.
- Future work
  - ▷ Connect surface fluxes to below-surface conditions
  - ▷ Compare mean diurnal cycles to flux tower observations.
  - ▷ Regional evaluation of snow cover compared to upscaled SNOTEL/COOP observations