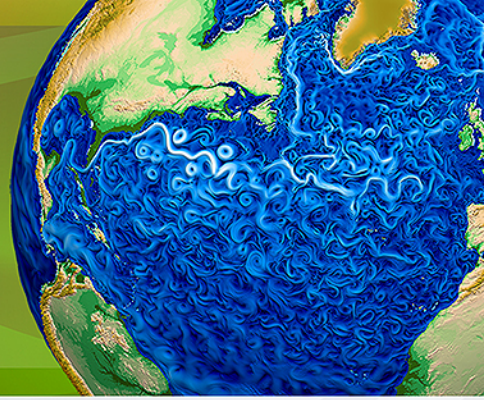
ACME
Accelerated Climate Modeling for Energy



Status of ACME v1

Chris Golaz
on behalf od the entire Coupled Task

U.S. DEPARTMENT OF ENERGY

Deliverables: 1 July 2017 (from EC)

Low-res (DECK)

- PI control (500 years)
- 1%/year CO2 increase to doubling (150 years)
- Abrupt 4xCO2 (150 years)
- CMIP6 - Historical simulation using CMIP6 forcings (1850-2014; 165 years x 3 members)
- AMIP simulation (165 years)
- CORE-II IAF Ocean/Ice simulation (100 years)
- **Total: 1560 years**

Deliverables: 1 July 2017 (from EC)

NEW **Low-res** (water-cycle)

- **LR PI control-A**: simulation initialized from CORE-II MPAS low resolution ocean/ice run with 1850 climatological forcing for 100 years (this is different from LR PI control in the DECK experiments)
- **LR transient with all forcings-A**: initialize using LR PI control-A on year 1950 with all forcings for 100 years (1950 – 2050) (3 ensemble members) - first 20 years used as adjustment
- **LR transient with GHG-only forcing**: initialize using LR PI control-A on year 1950 with GHG-only forcing for 100 years (1950-2050) (3 ensemble members) - first 20 years used as adjustment
- **LR transient with GHG+aerosols only forcing**: initialize using LR control-A on year 1950 with GHG+aerosols only forcing for 100 years (1950-2050) (3 ensemble members) - first 20 years used as adjustment
- **LR transient with all forcings-B**: initialize using CORE-II MPAS low resolution ocean/ice run with historical atmospheric forcing for 100 years (1950-2050, first 20 years used as spinup)
- **LR transient with all forcings-C**: extend LR historical (from DECK) for 2015-2050
- **Total: 1135 years**

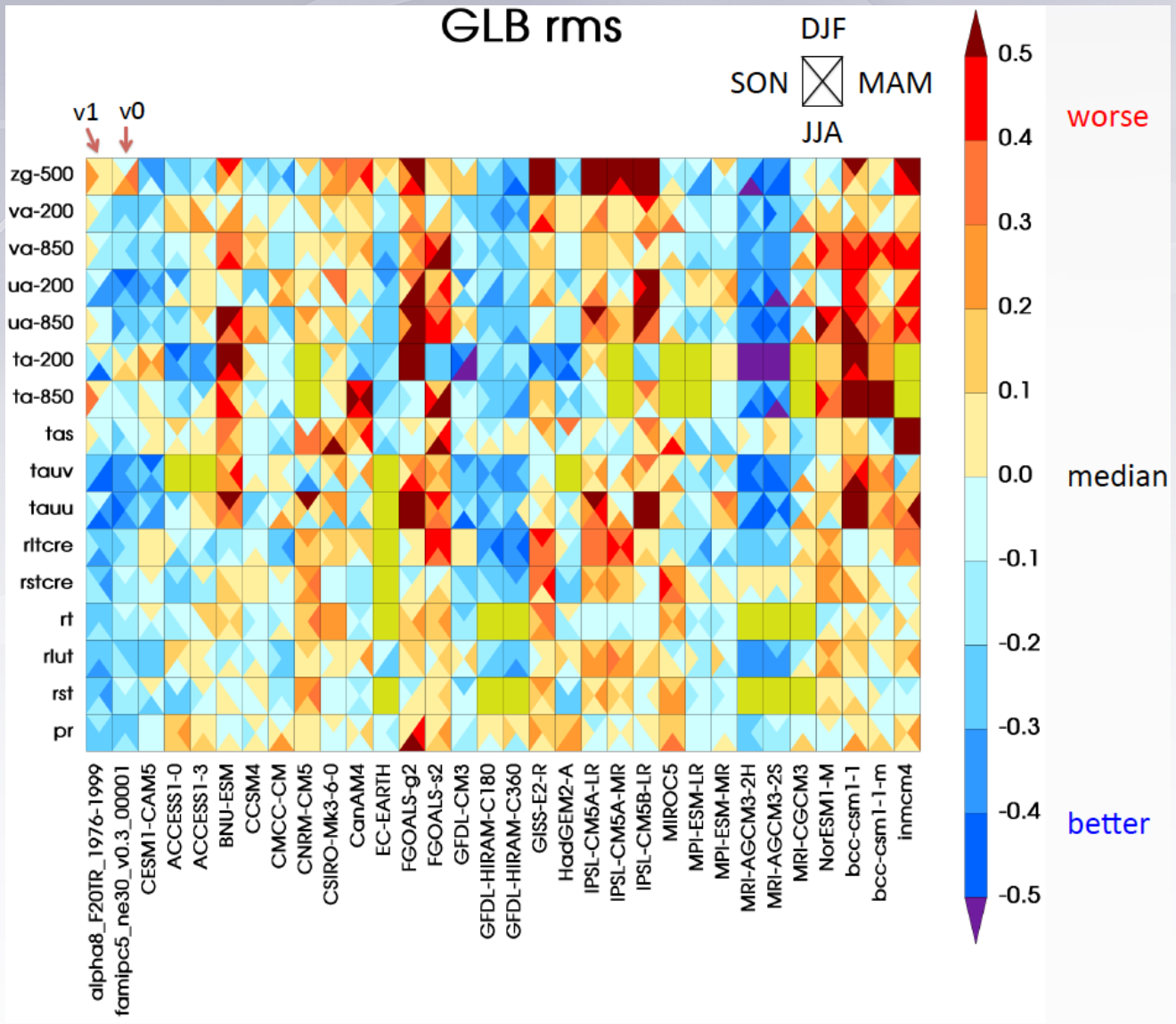
Deliverables: 1 July 2017 (from EC)

High-res (water-cycle)

- **HR PI control-A**: simulation initialized from CORE-II MPAS high resolution ocean/ice run with 1850 climatological forcing for 100 years
- **HR transient with all forcings-A**: initialize using HR PI control-A on year 1950 with all forcings for 100 years (1950-2050) (1 member) - first 20 years used as adjustment
- **HR transient with all forcings-B**: initialize using CORE-II MPAS high resolution ocean/ice run with historical atmospheric forcing for 100 years (1950-2050, first 20 years used as spinup)
- **Total: 300 years**
- Note: INCITE 2017 award only permits PI Control

Most recent configuration

ACME atmospheres (v0, prototype v1) compared to CMIP

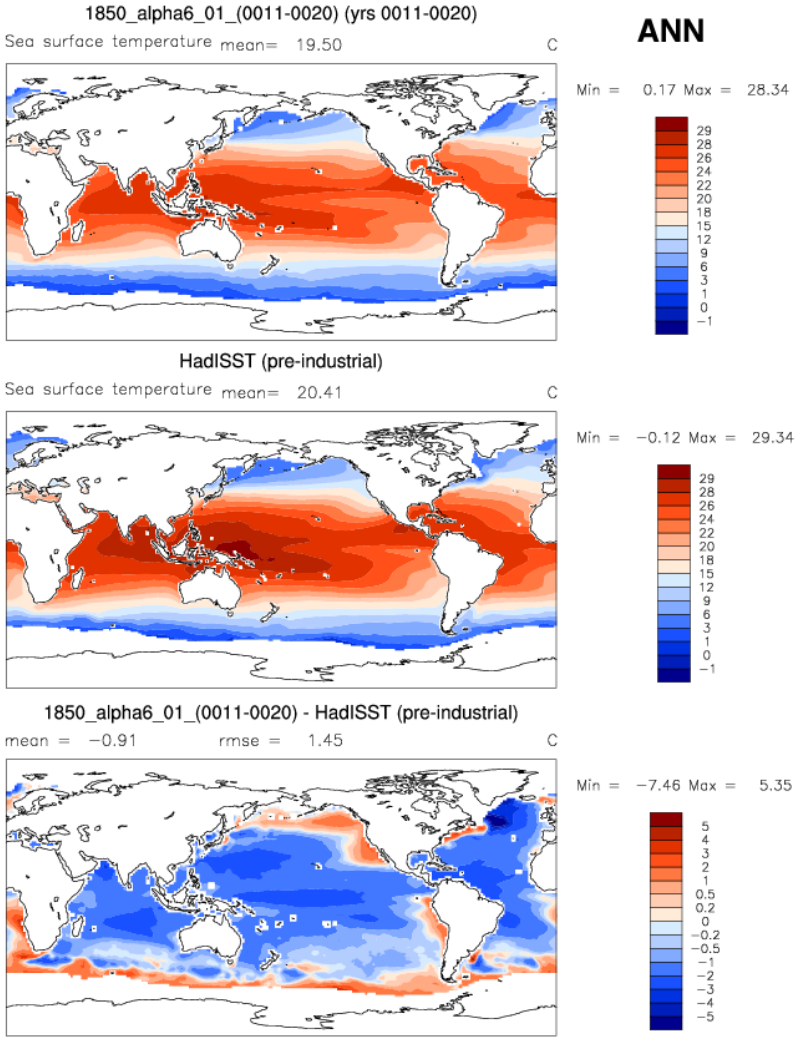


Note: some bugs were discovered in prototype v1 atmosphere (AV1C-04P).

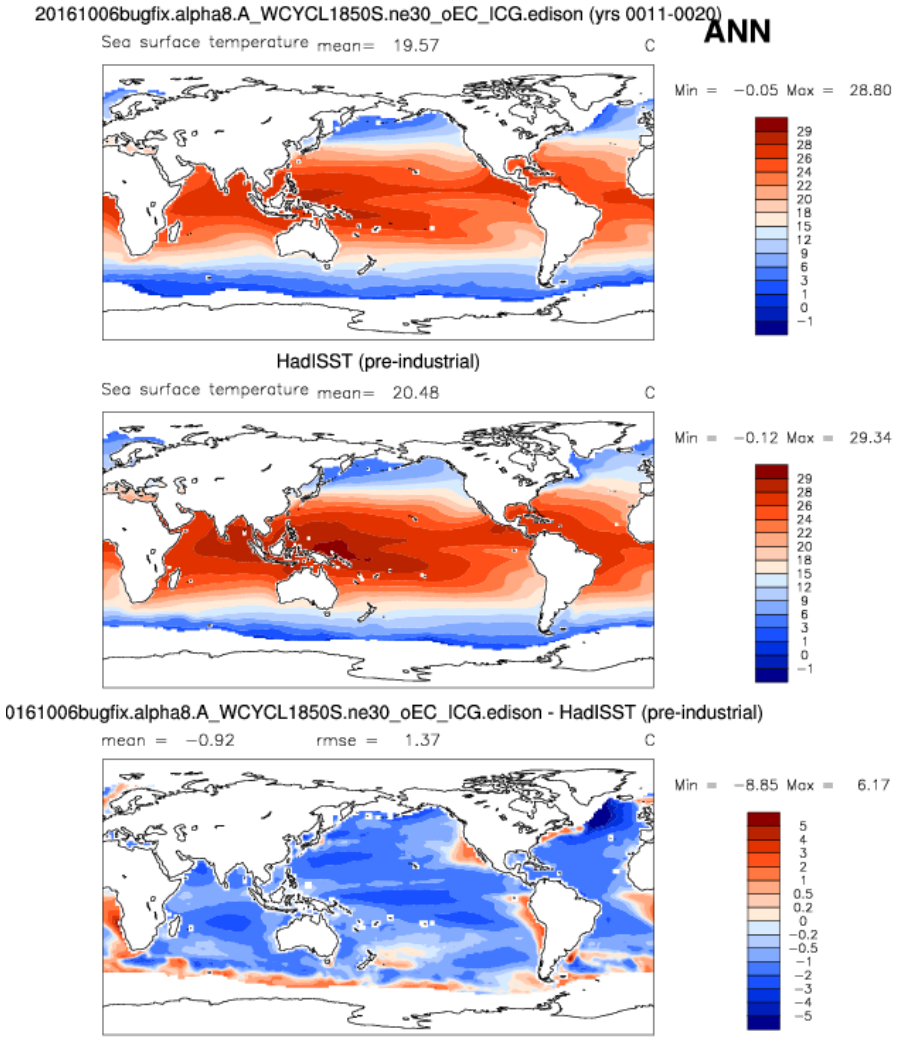
Checkout Qi Tang's poster

SST pre-industrial

alpha6



alpha8



Precipitation ANN

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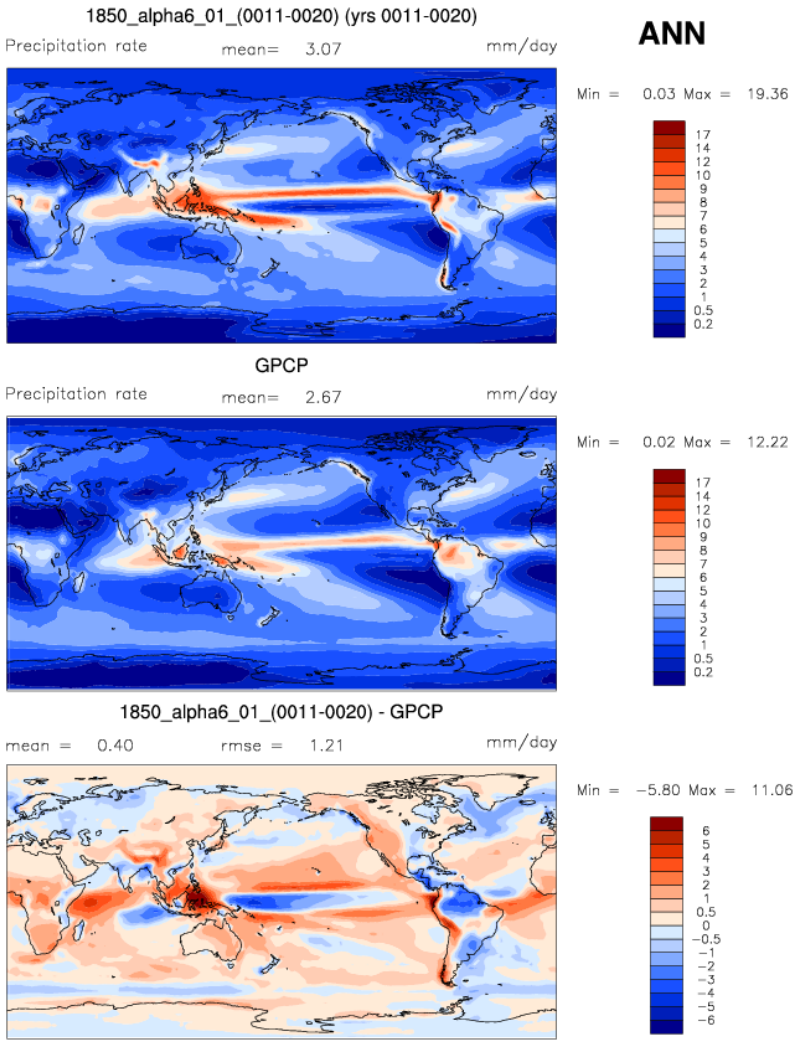

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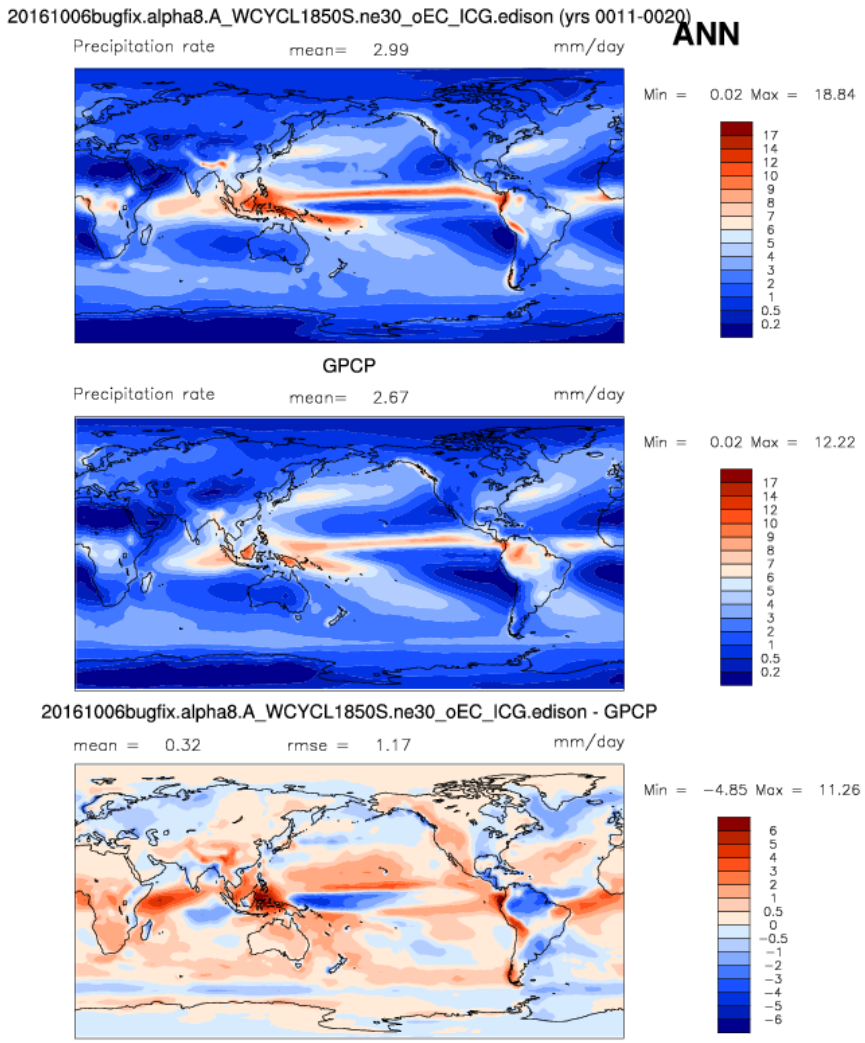

TOA SW CRE ANN

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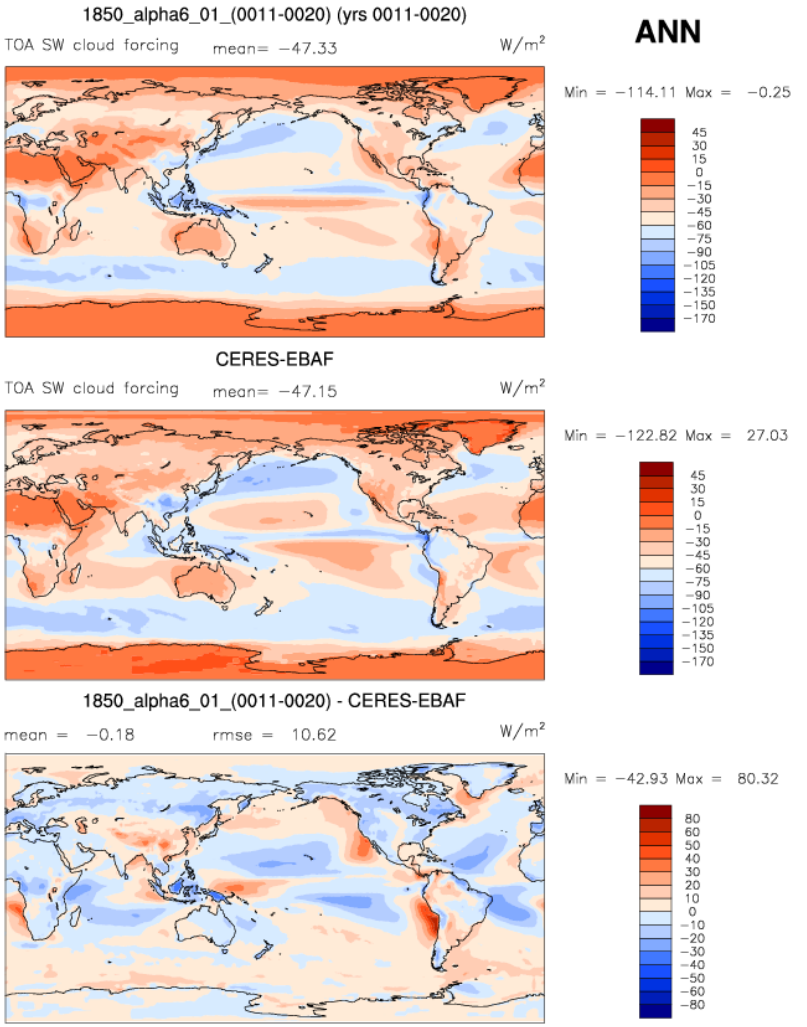

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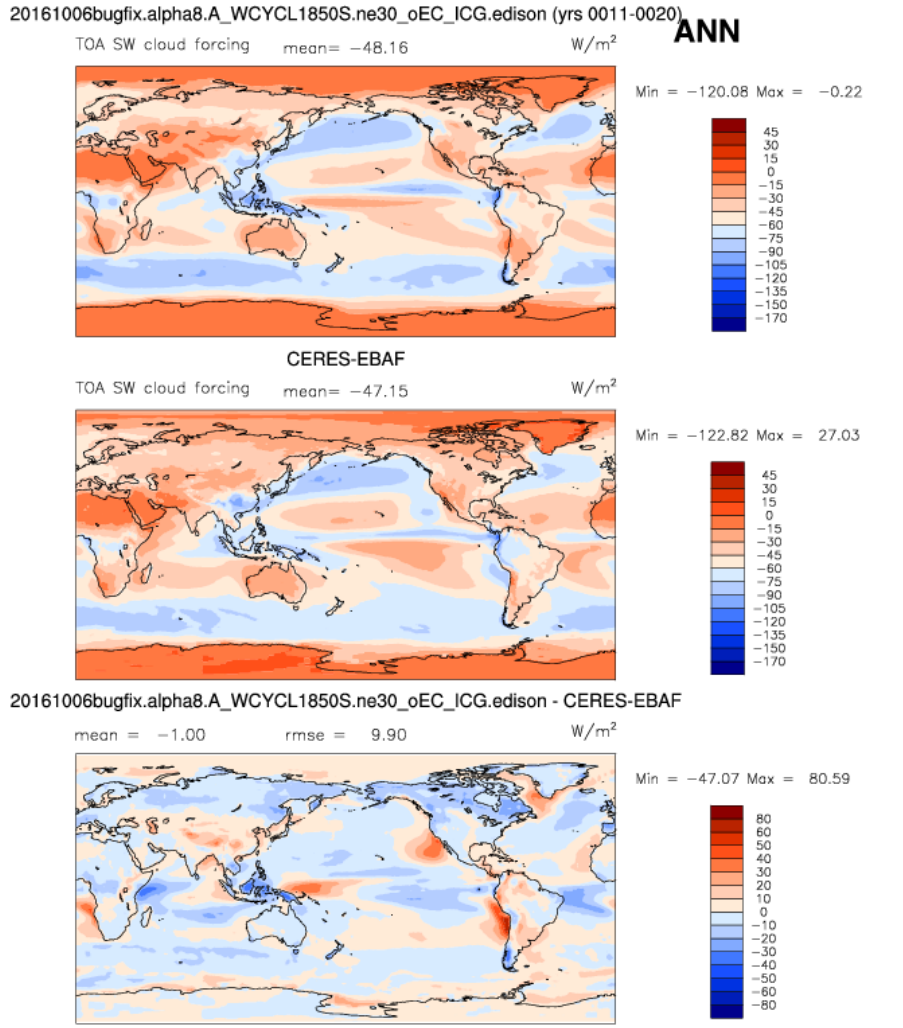

TOA LW CRE ANN

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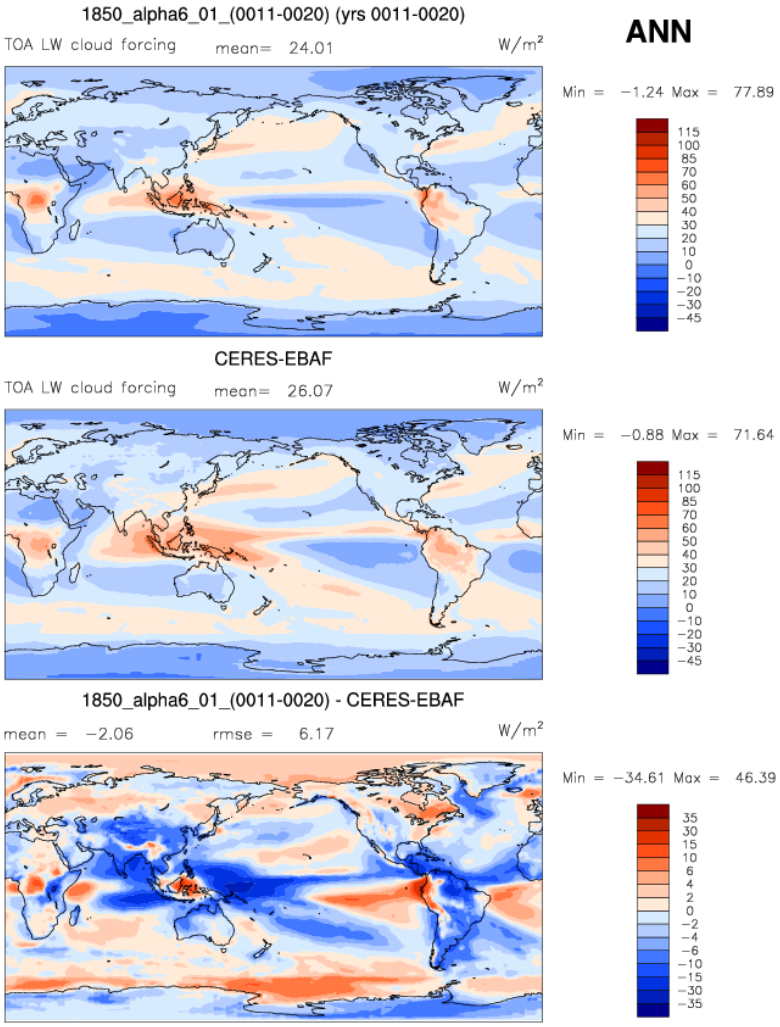

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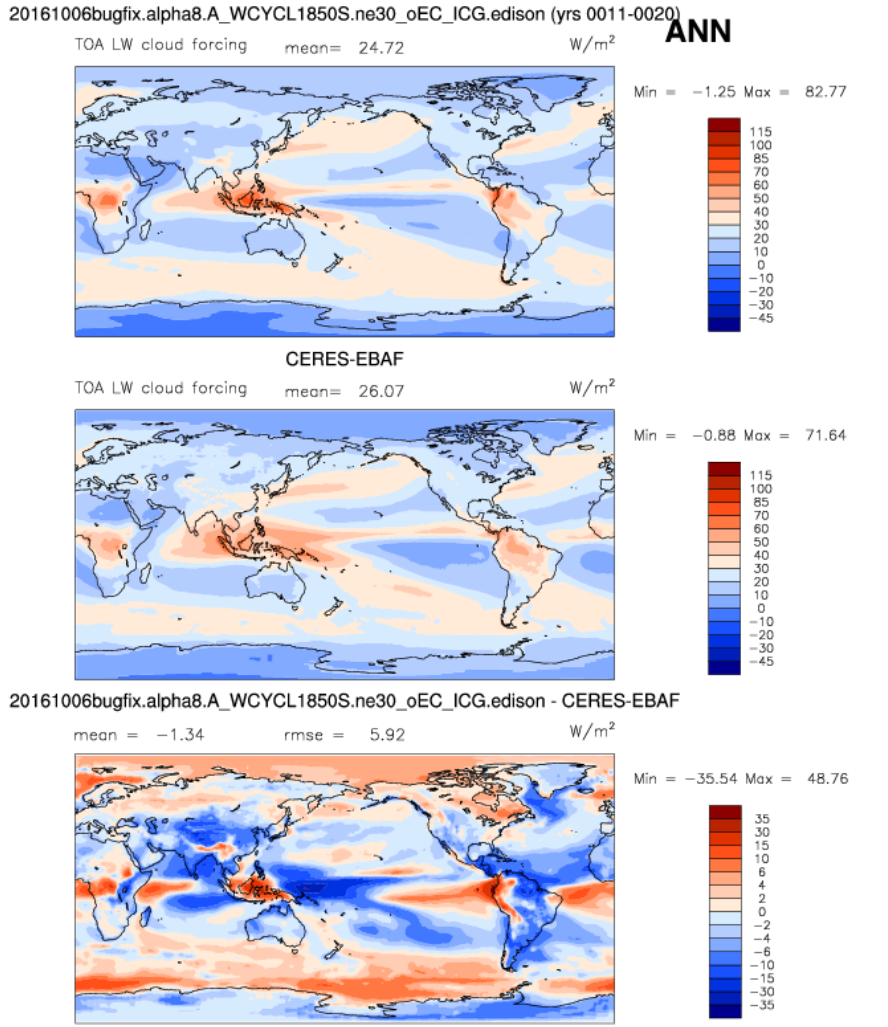
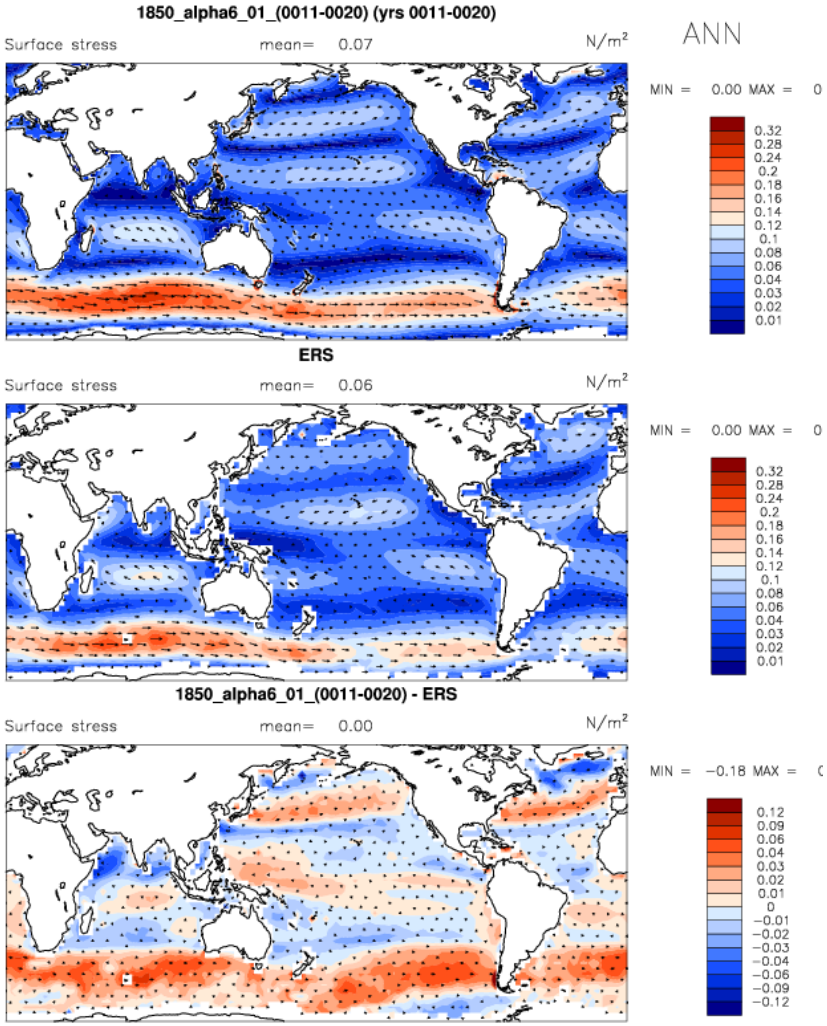


Surface wind stress (ocean) ANN

alpha6



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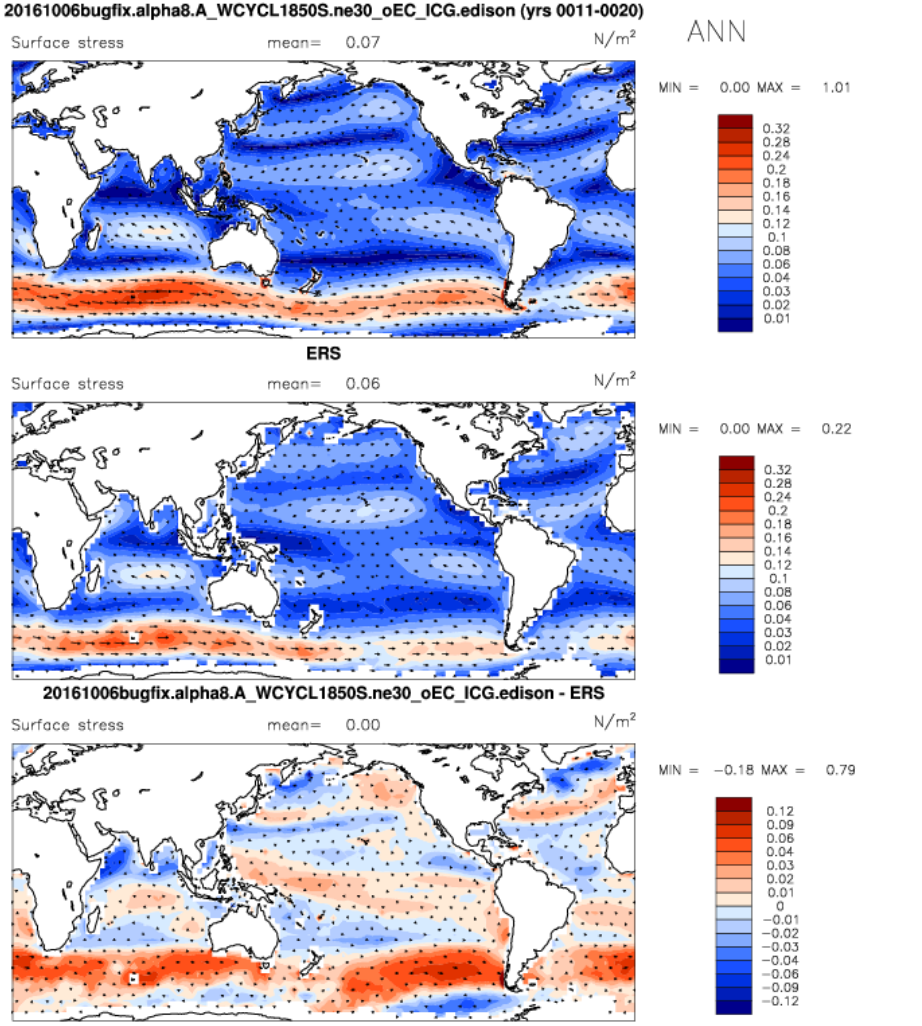
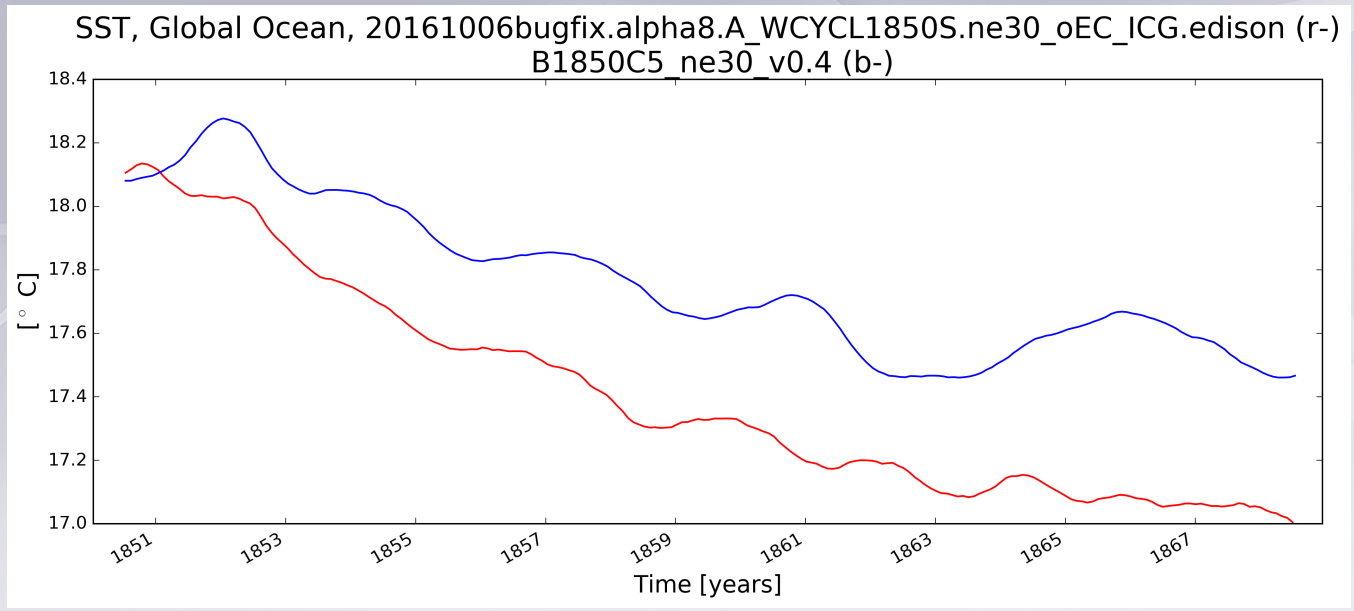
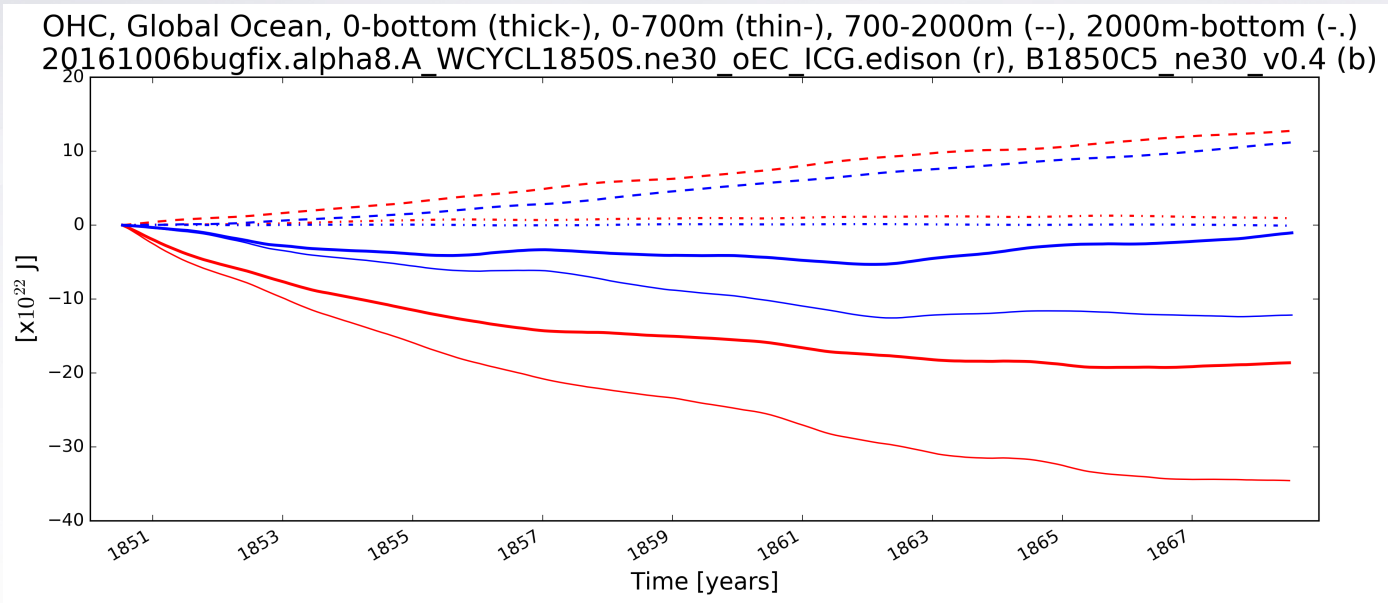


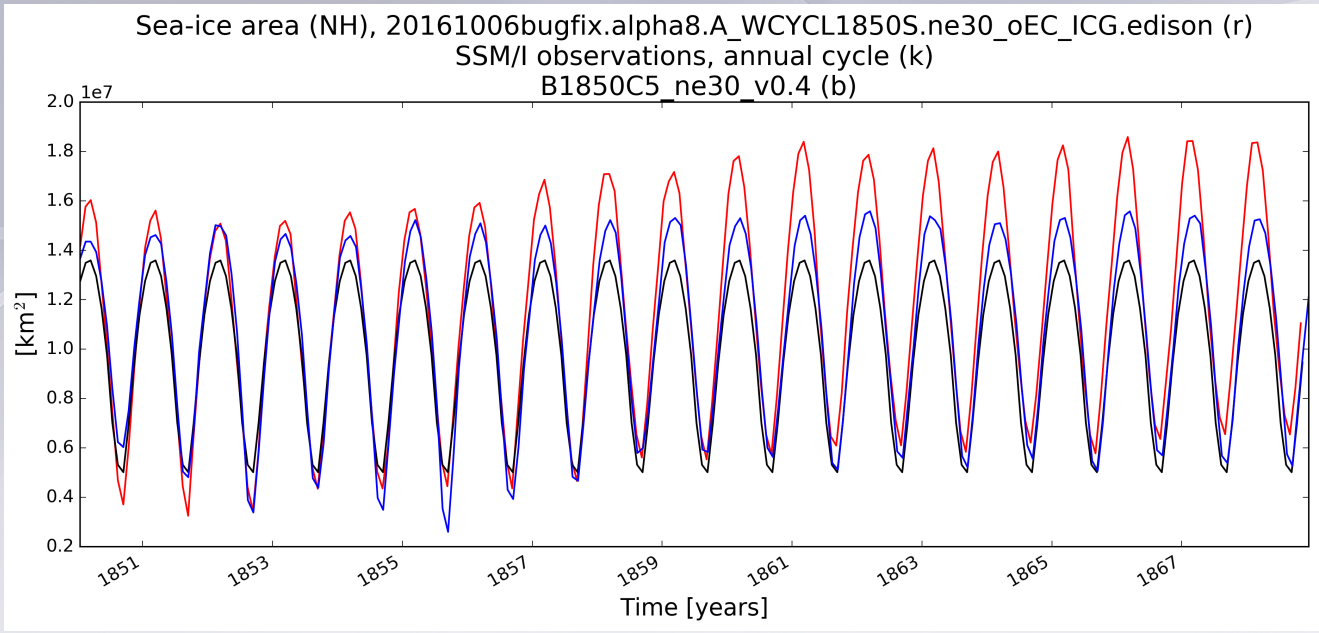


ACME v0

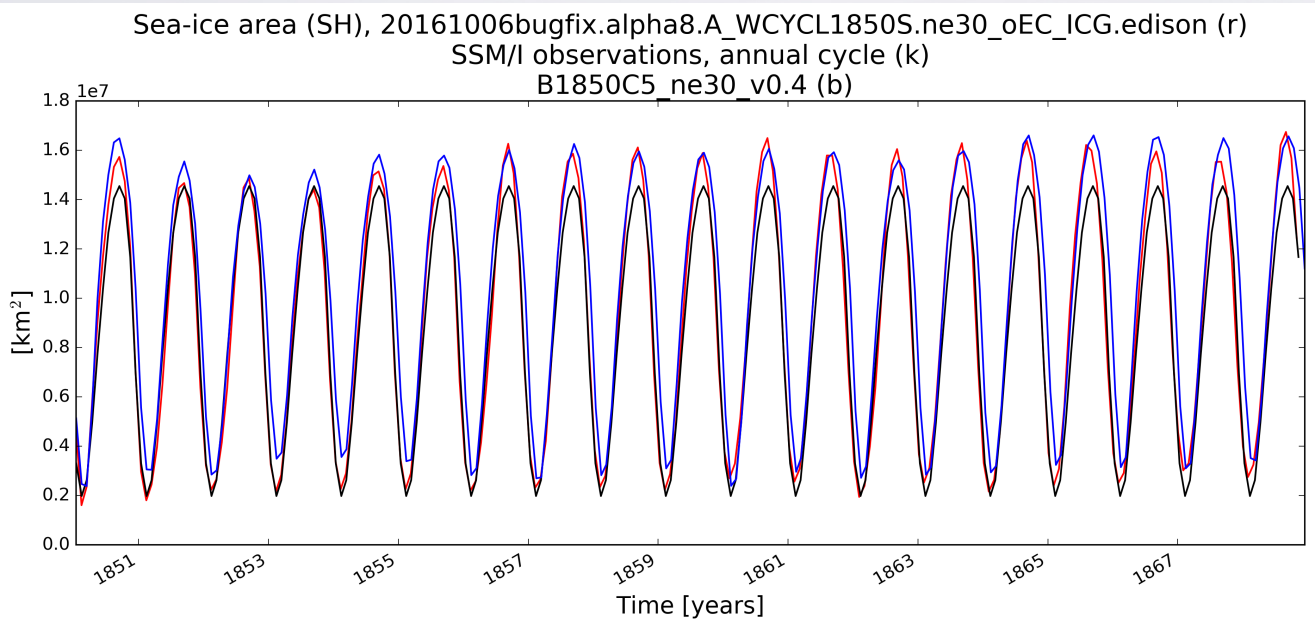
ACME v1 alpha8



NH



SH



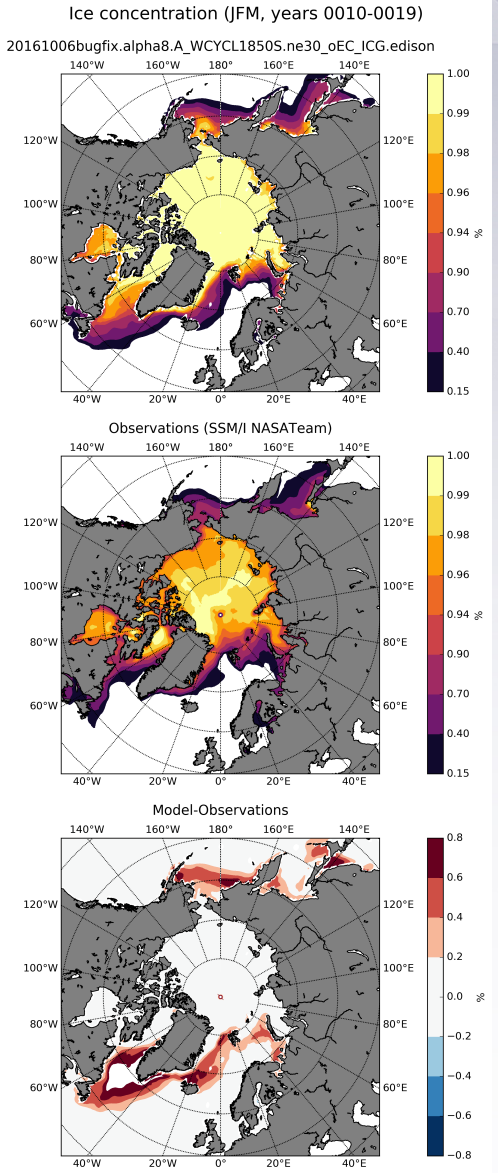
ACME v1 alpha8

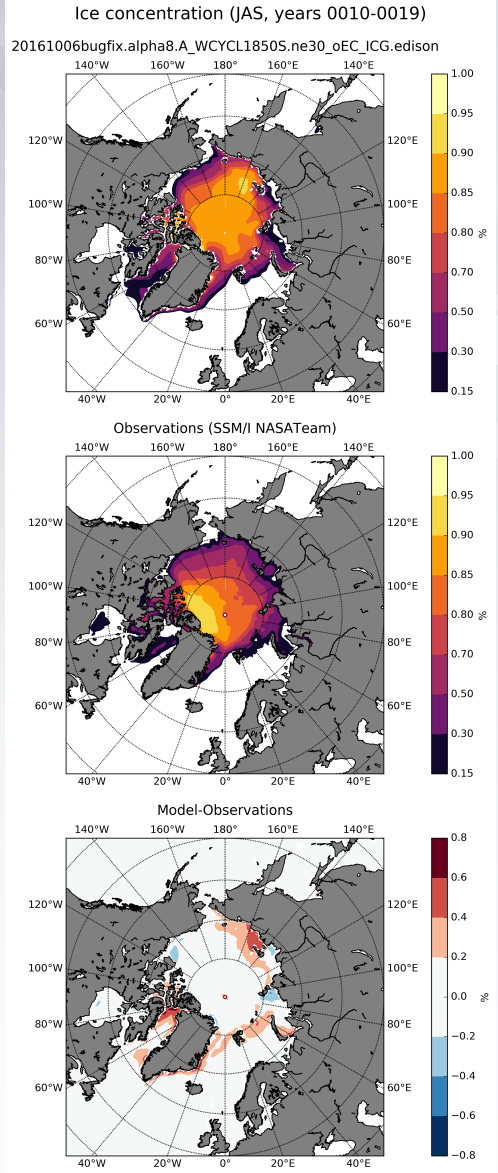
ACME v0

PD climatology

NH ice concentration

JFM





JAS

Looking ahead: what we need

- **A well performing model…**
- **Computational resources**
  - compute hours, post-processing machines, disk, HPSS, …
- **Compsets**
- **Output** variables and frequency
  - what to save, what to publish
  - satisfy CMIP requirements for output
  - reconcile against available resources
- **Tools** to help run and monitor simulations
- **Post-processing**
  - time series and climatology files, regridding
  - CMORization
  - publishing
  - data archiving
- **Diagnostic suites**