



Sea Ice in the NCEP Forecast System

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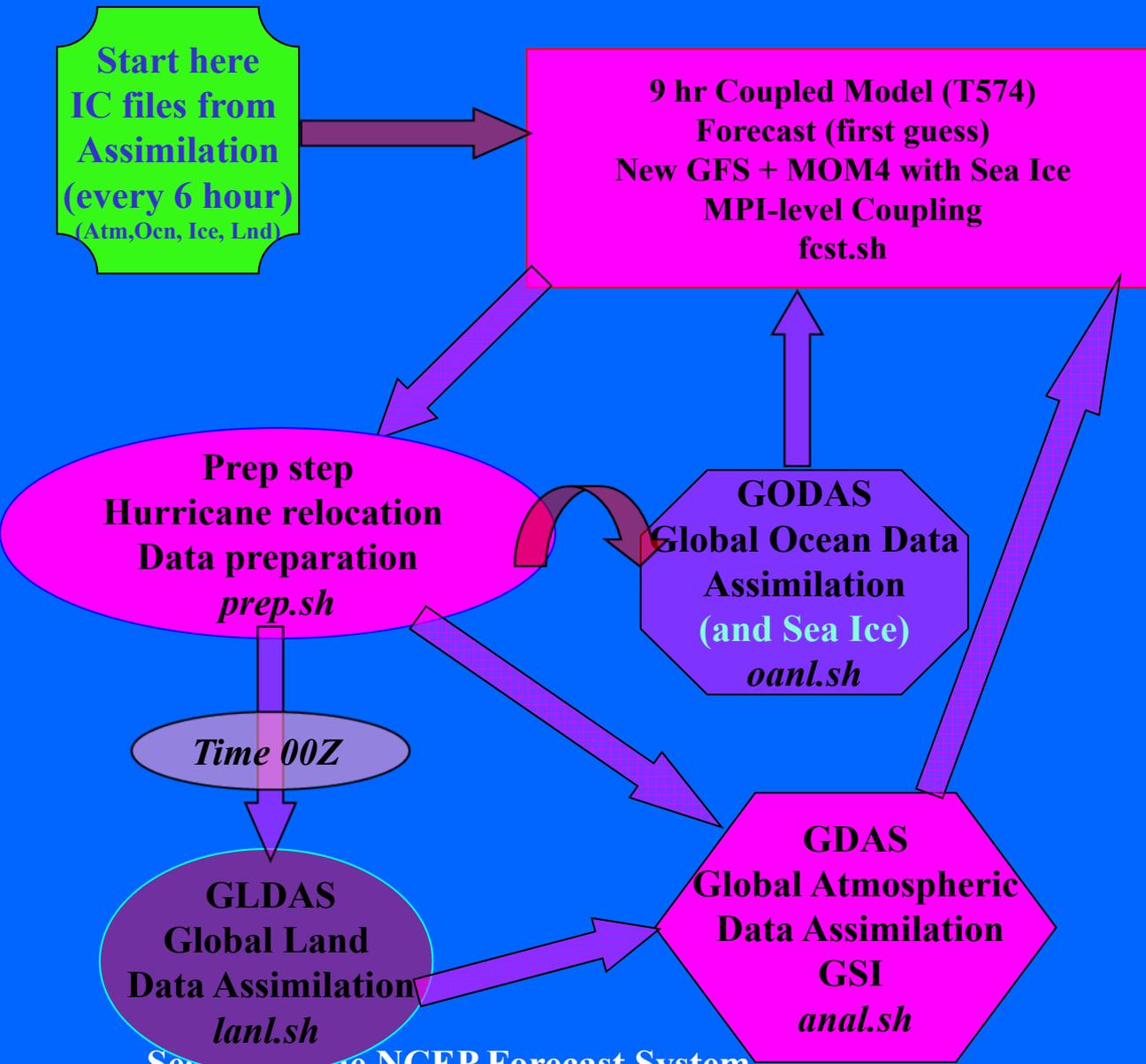
**Contributions to Sea Ice Prediction at NCEP:
Wanqiu Wang (CPC) and Ming Ji (OPC)**

Sea Ice in the NCEP Forecast System

(3 different sea ice models)

- Sea Ice in the NCEP Climate Forecast System (CFS)
Dynamic-thermodynamic sea ice model
(from March 2011)
- Sea Ice in the NCEP Global Forecast System (GFS)
Thermodynamic sea ice model
(from May 2005)
- Drift model
Sea Ice Drift Model
(from 1993)

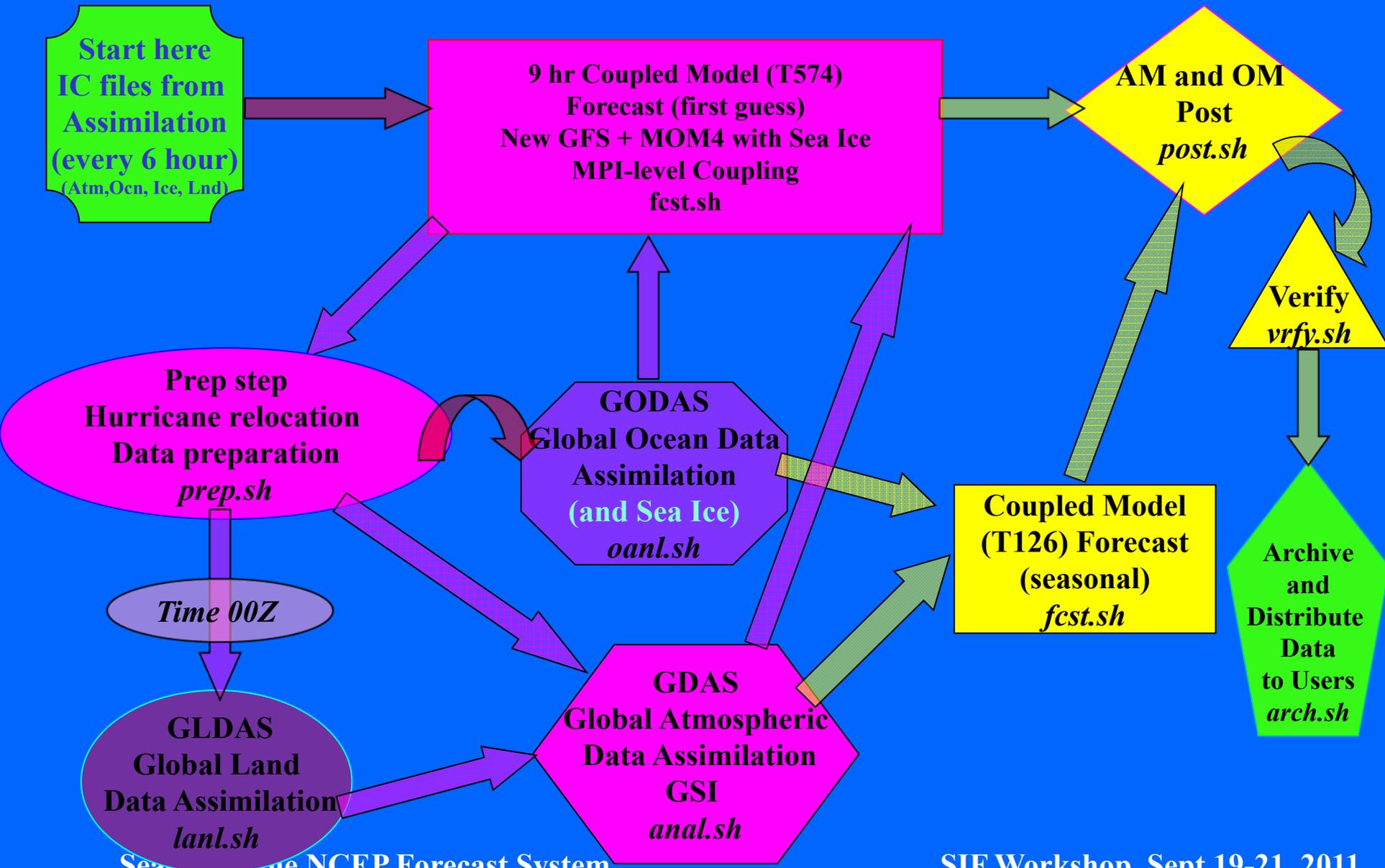
CFS (Assimilation and Forecast)



Sea Ice “Assimilation” (Merging)

- When sea-ice concentration is greater than (or equal to) 15% from observation, sea-ice concentration is reset to the observed value in the guess field. New ice can occur in this case.
- In summer, the melt pond effect on ice albedo is considered in the Arctic.
- When sea-ice concentration is less than 15% from observation, sea-ice in the guess field will be removed (treated to melt).
- Quality control has been used to prevent sea-ice from the warmer water. (Ice analysis and SST analysis feedback)

CFS (Assimilation and Forecast)



Two essential components were done before current CFS implementation:

- ✓ A new Reanalysis of the atmosphere, ocean, sea ice and land over the 32-year period (1979-2010) is done to provide consistent initial conditions for:
- ✓ A complete Reforecast of the CFS over the 29-year period (1982-2010), in order to provide stable calibration and skill estimates of the new system, for operational seasonal prediction at NCEP

CFS Reanalysis data:

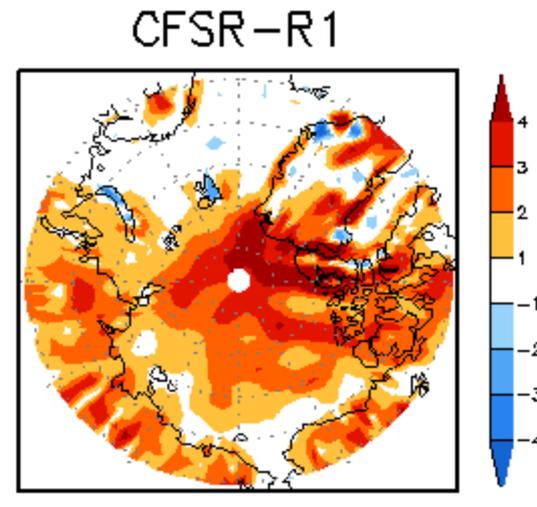
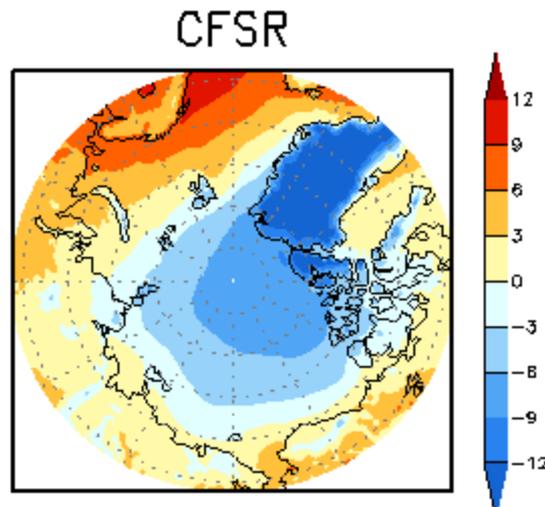
<http://nomads.ncdc.noaa.gov/NOAAREanalysis/cfsrr>

CFS Reforecast data:

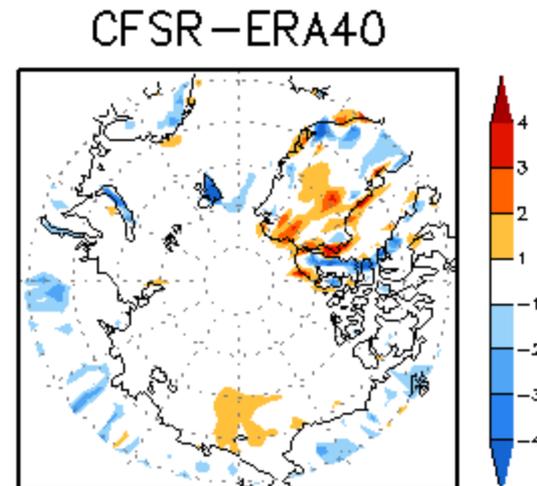
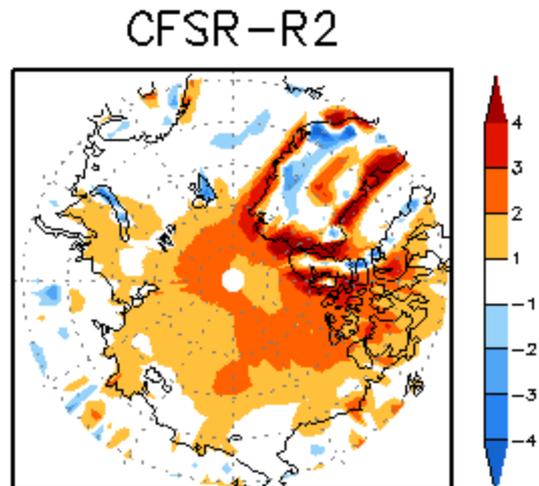
<http://cfs.ncep.noaa.gov/pub/raid0/cfsv2>

Surface air temperature from CFSR (Sept) and the difference amongst CFSR, R1, R2 and ERA40

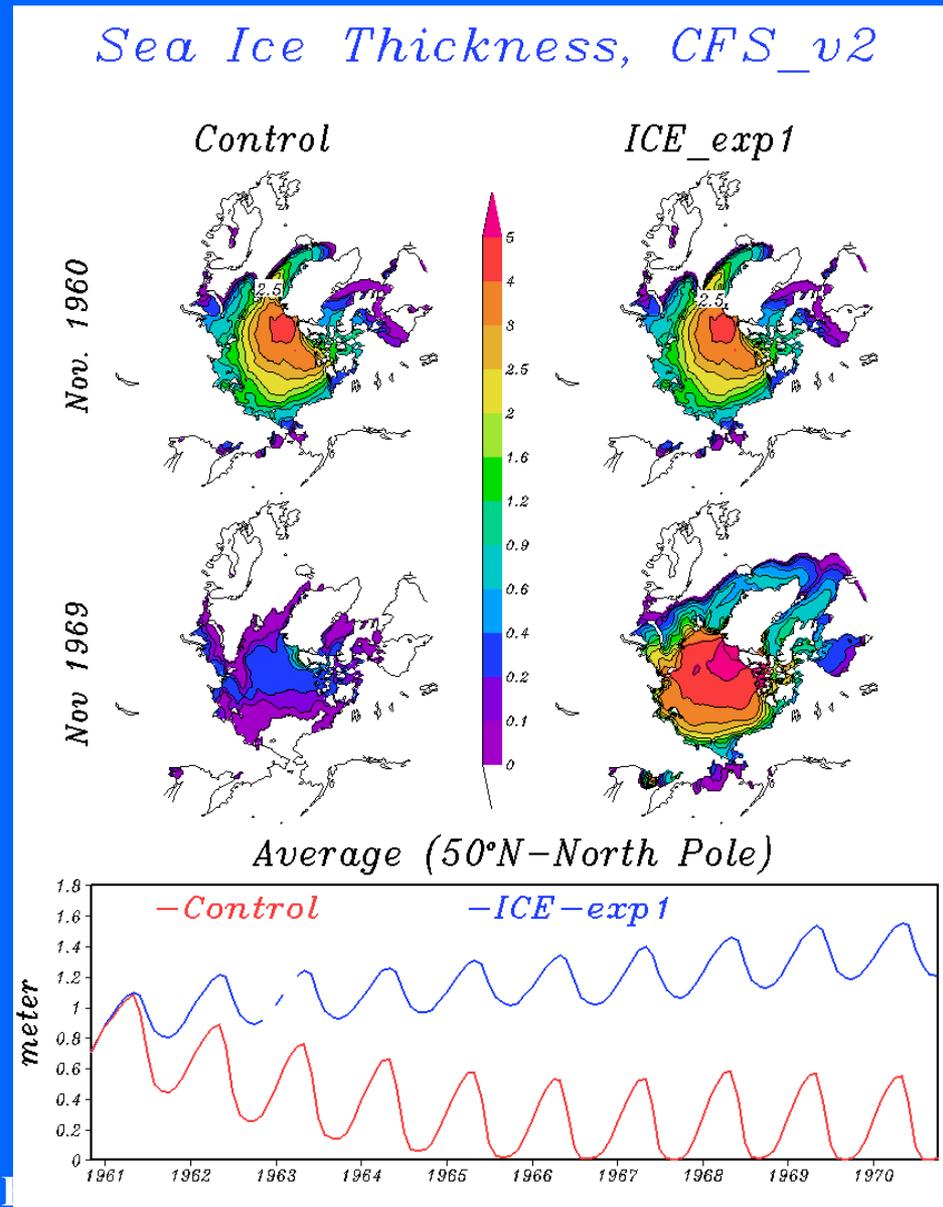
**Cold bias
in R1:
1.7K
than obs**



**CFSR is:
1.8K
Warmer
than R1**



Sea Ice thickness from CFS Decadal test runs (only change in ice albedos)



Summary

- The new NCEP CFS that includes a dynamic thermodynamic sea ice model has been used in CFS Reanalysis and Reforecast and became operational in March 2011.
- Reasonable sea ice distribution has been produced in CFSR that helped improve many aspects of CFSR in the polar region such as the reduction of surface air temperature bias over the Arctic in September.
- Improvements are needed for sea ice in the next version of CFS (CFSv3) for both model and data assimilation, especially for the sea ice thickness.



Thank you!

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CFS data:

<http://cfs.ncep.noaa.gov>

CFS Reanalysis data:

<http://nomads.ncdc.noaa.gov/NOAAReanalysis/cfsrr>