NOAA Reanalysis Update

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****NOAA/OAR/ESRL - CIRES***

Outline

- NOAA Reanalyses updates:
  - NOAA NCAR
  - NOAA DOE
  - CFSR
  - 20CR
- Current projects
- Future Plans

NOAA Reanalyses

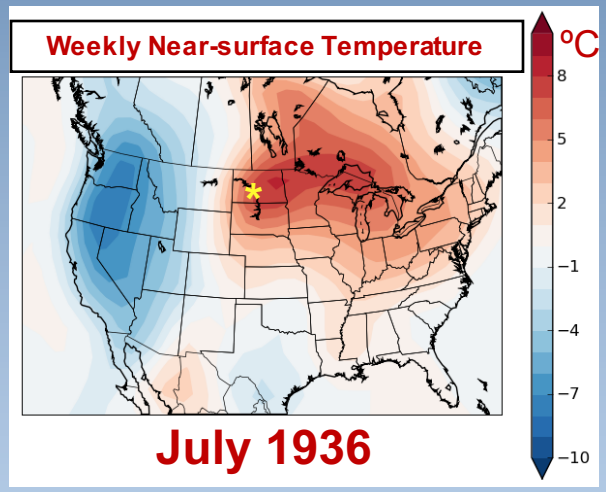
- NCEP NCAR (R-1):
  - Still running
  - Reliant upon NESDIS generating Temp retrievals
- NCEP DOE (R-2):
  - Same as R-1
- CFSR:
  - Running with 2011 changes
  - Might have future changes when GSI changes
- 20CR:
  - Stopped in 2008
  - 20CRv2 is starting

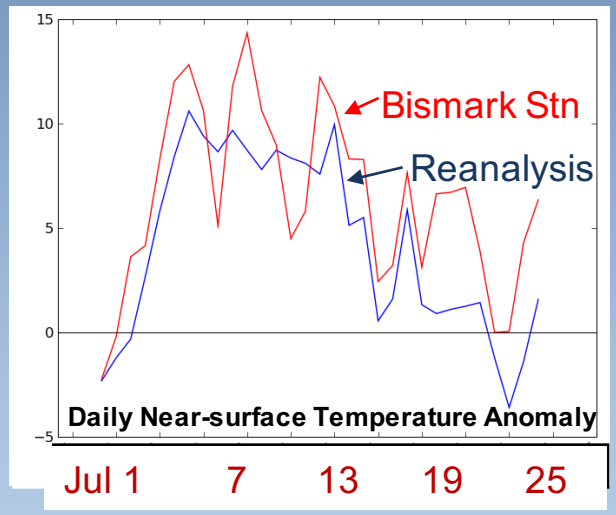
The 20th Century Reanalysis Project version 2c (1851-2011)

Summary: An international project led by NOAA and CIRES to produce *4-dimensional* reanalysis datasets for climate applications extending back to the 19th century using an Ensemble Kalman Filter and *only surface pressure observations.*

Weekly-averaged anomaly during **July 1936** North American Heat Wave (> 2,000 dead during 10-day span)

Daily variations compare well with in-situ data.





The reanalyses provide:

-First-ever estimates of near-surface to tropopause 6-hourly fields extending back to the middle of the 19th century;

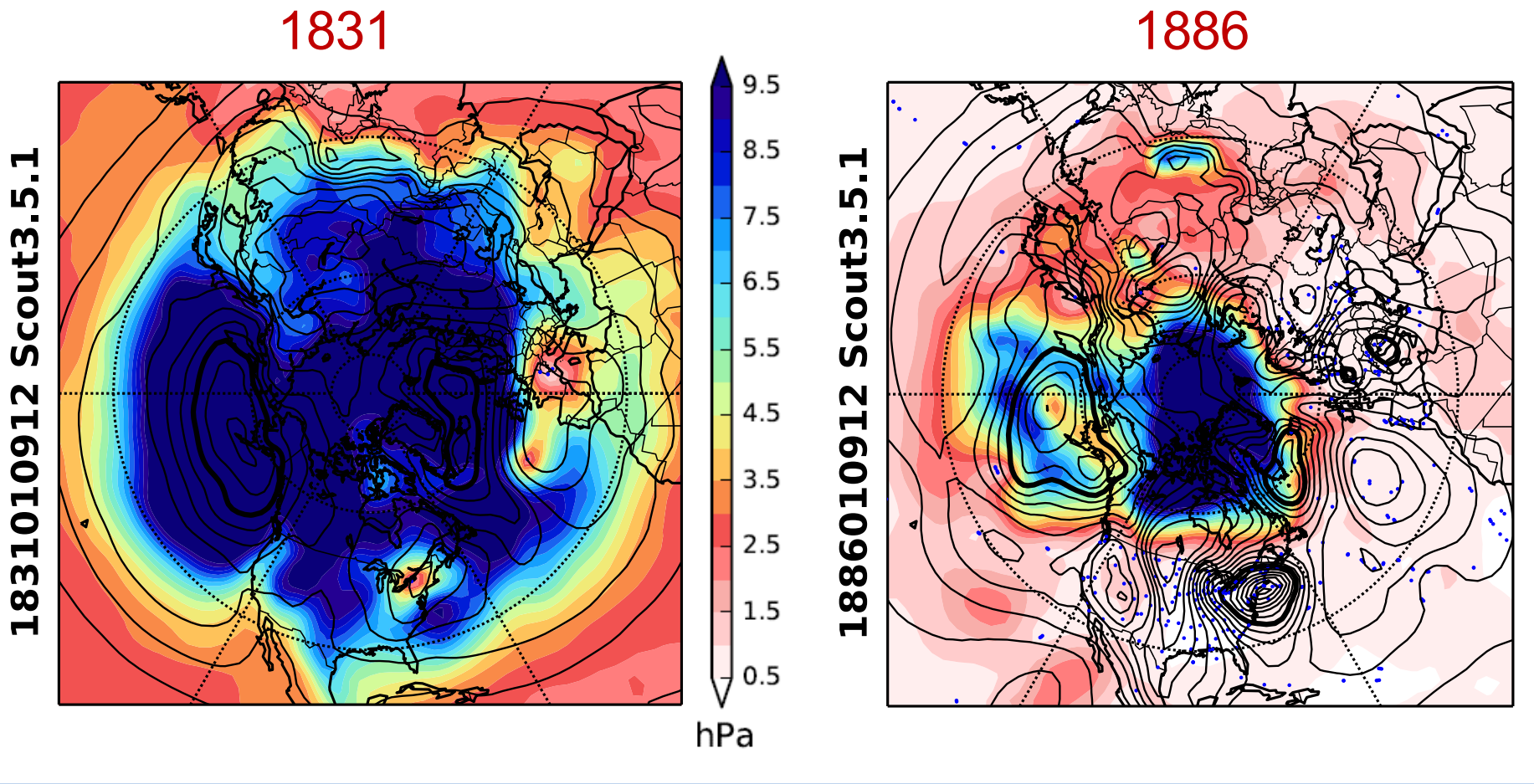
-Estimates of uncertainties in the basic reanalyses and derived quantities (e.g., storm tracks).

Examples of uses:

- Validating climate models.
- Determining storminess and storm track variations over the last 150 years.
- Understanding historical climate variations (e.g., 1930s Dust Bowl, 1920-1940s Arctic warming).
- Estimating risks of extreme events

Compo et al. 2011

20CRv2c Analyses of Sea Level Pressure for selected dates in 1831 and 1886



Contours-ensemble mean (ci: 4 hPa, 1000 hPa thickened)

Shading- blue: more uncertain, white: more certain

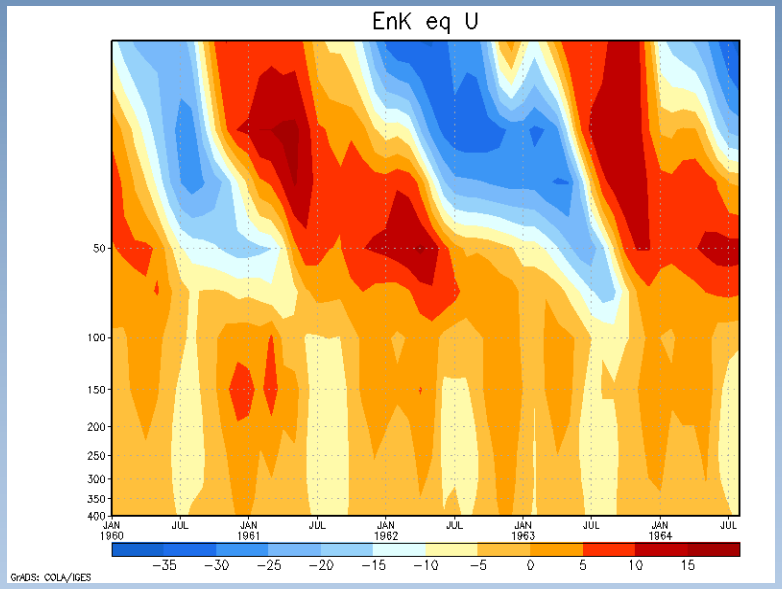
Early analyses need more observations to advance.

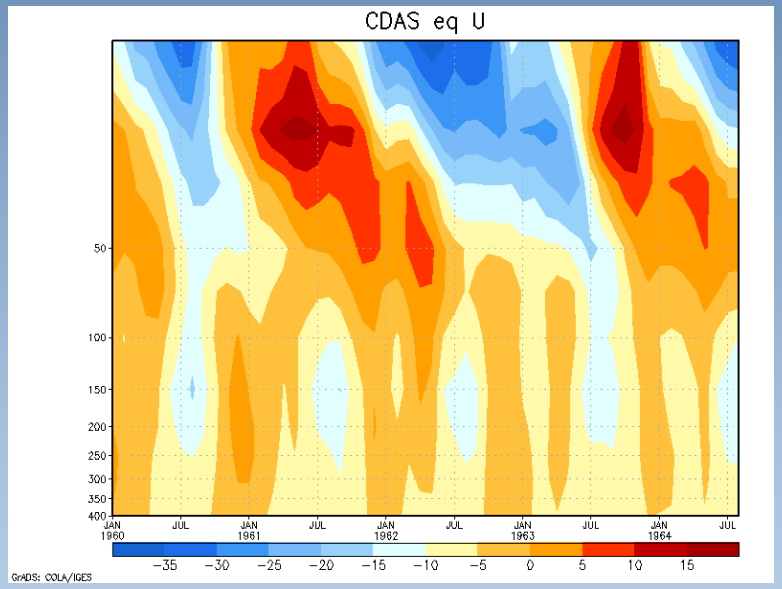
ACRE: These observations exist and need to be recovered!

Current Projects

- Reanalysis using only conventional data is a current project at CPC
  - Using only surface and radiosonde obs
  - Similar to JRA55/JRA55c
  - 1940's-present

Initial Results



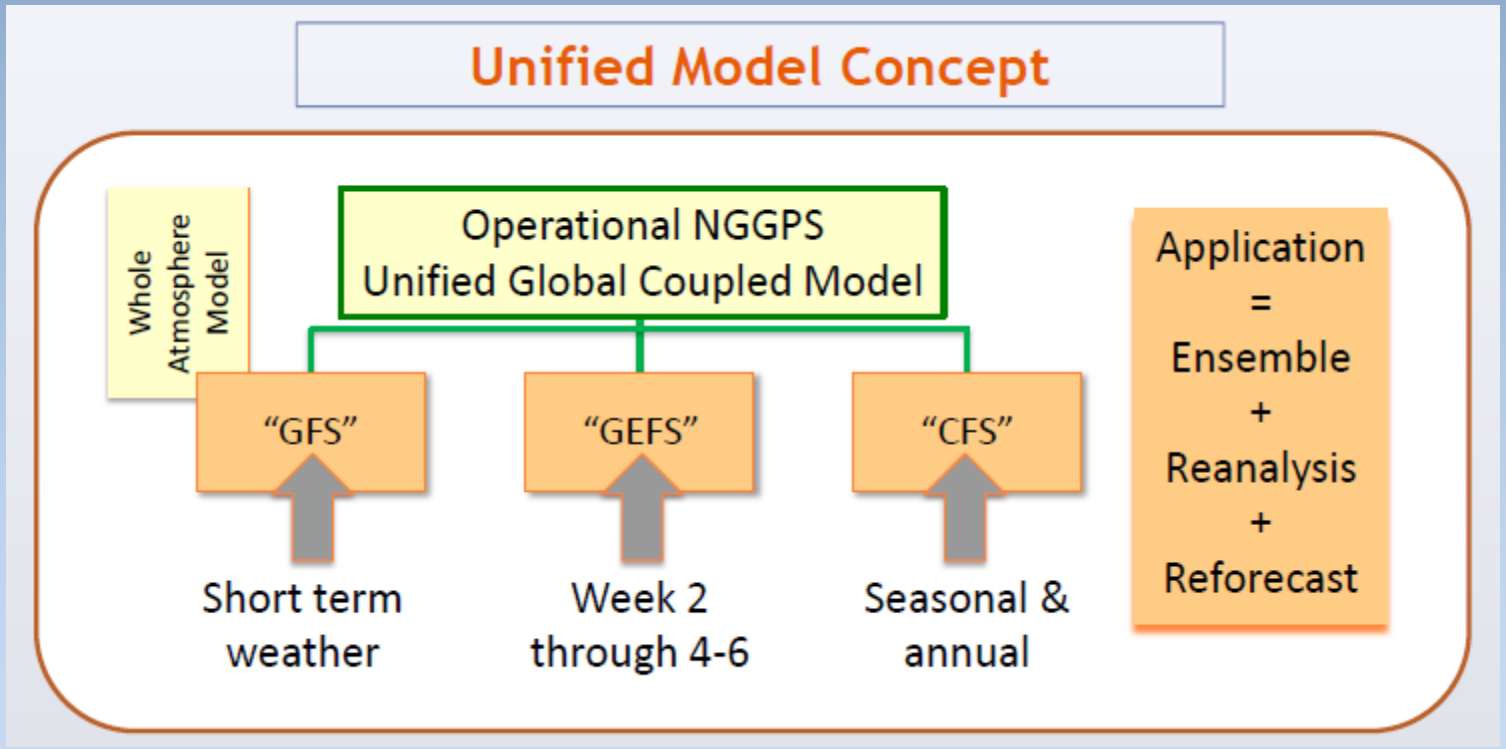


-EK's propagates further towards tropopause with a strong secondary +ve maximum at 50 mb.

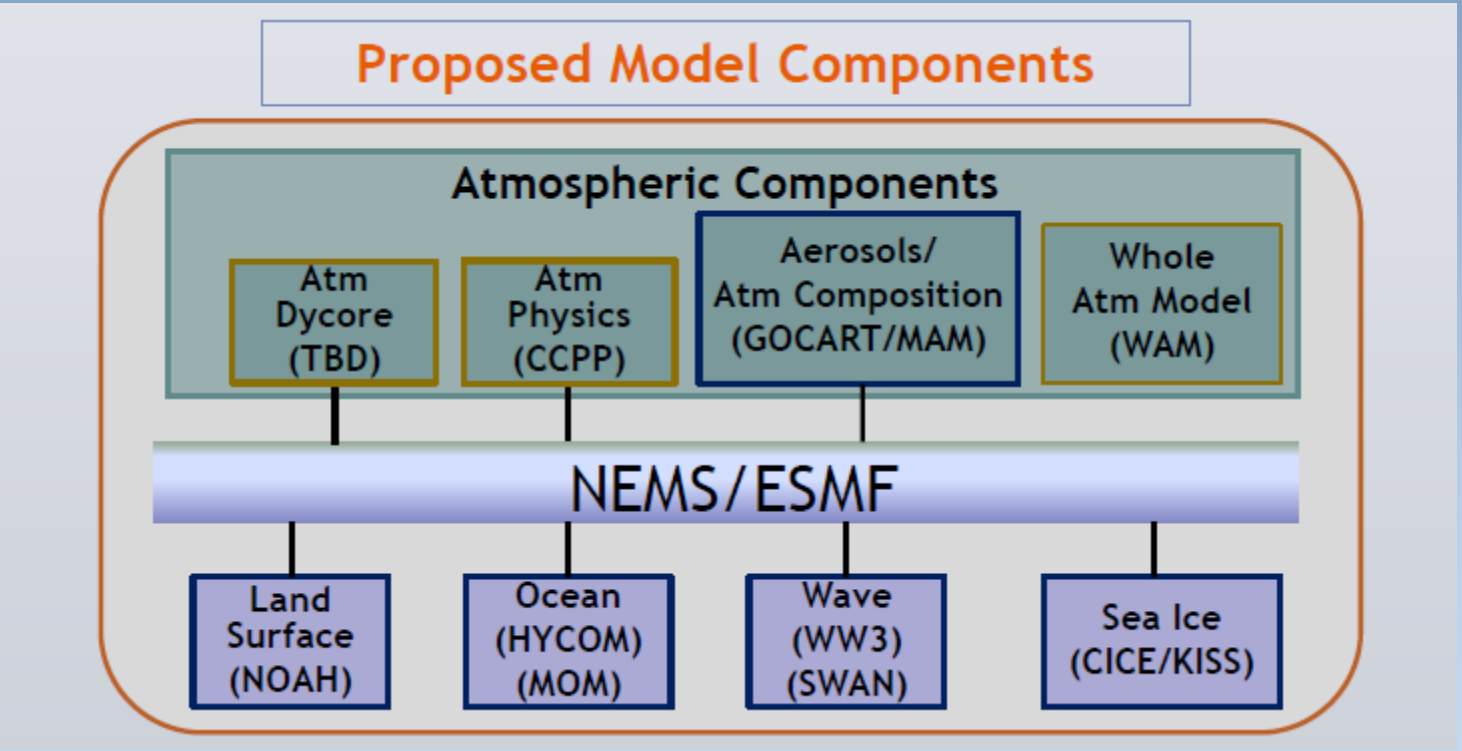
-Consistent with modern analyses with satellite data.

Future at NOAA

- Next Generation Global Prediction System (NGGPS)



NOAA Environmental Modeling System Earth System Modeling Framework



Building the NCEP/EMC Unified Global Coupled Modeling System (UGCMS)

- Part I:

  Basic UGCMS development and long term CFS development.

  Part II:

  CFSv3 → focus on model development only, not on data assimilation,.

  CFSv4 → ***"The Whole Enchilada" !!!***
  A fully coupled reanalysis (1979-present) and attendant model reforecasts.

  Model and data assimilation upgrades, including 4D-Hybrid EnVAR, model physics/dynamics improvements with higher-resolution in both time and space, post processing, ensembles, downscaling, other downstream models, products & dependencies.