

On the impact of Land Data on Mesoscale Numerical Weather Prediction

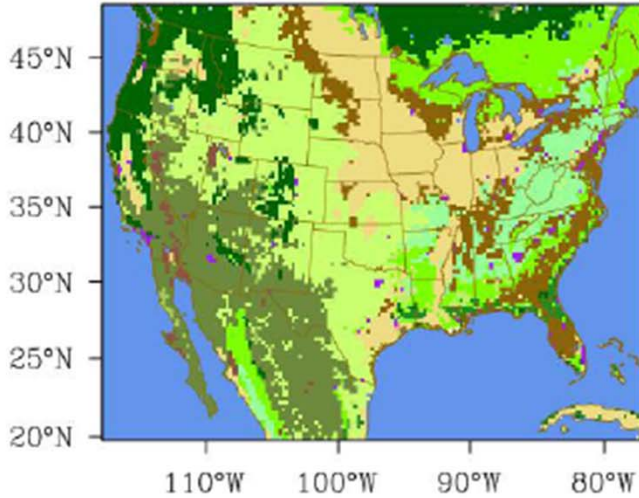
Vince Wong & Michael Ek

EMC/NCEP/NOAA

1. Implementation of MODIS-IGBP Vegetation Data
2. Implementation of MODIS Albedo Data
3. Implementation of AVHRR Green Vegetation Fraction data

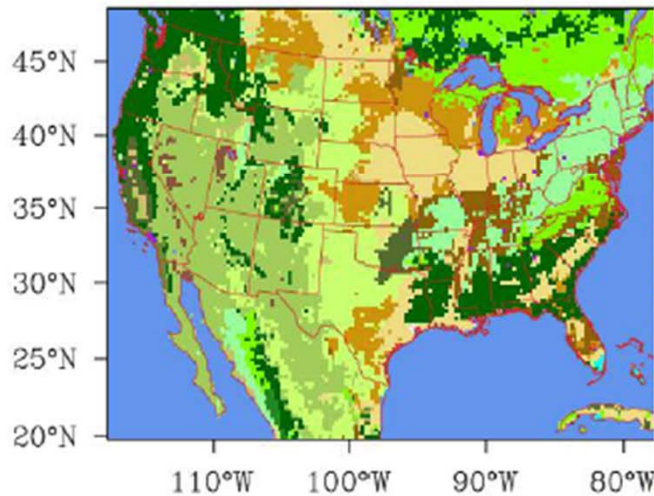
Modis Vs USGS Landuse

Vegetation Type (Modis LU)



- Evergreen Needleleaf Forest
- Evergreen Broadleaf Forest
- Deciduous Needleleaf Forest
- Deciduous Broadleaf Forest
- Mixed Forest
- Closed Shrubland
- Open Shrubland
- Woody Savannas
- Savannas
- Grasslands
- Permanent Wetlands
- Croplands
- Croplands/Natural Vegetation Mosaic
- Urban and Built-up
- Snow and Ice
- Barren and Sparsely Vegetated
- Water
- Wooded Tundra
- Mixed Tundra
- Barren Tundra
- Urban and Built-up

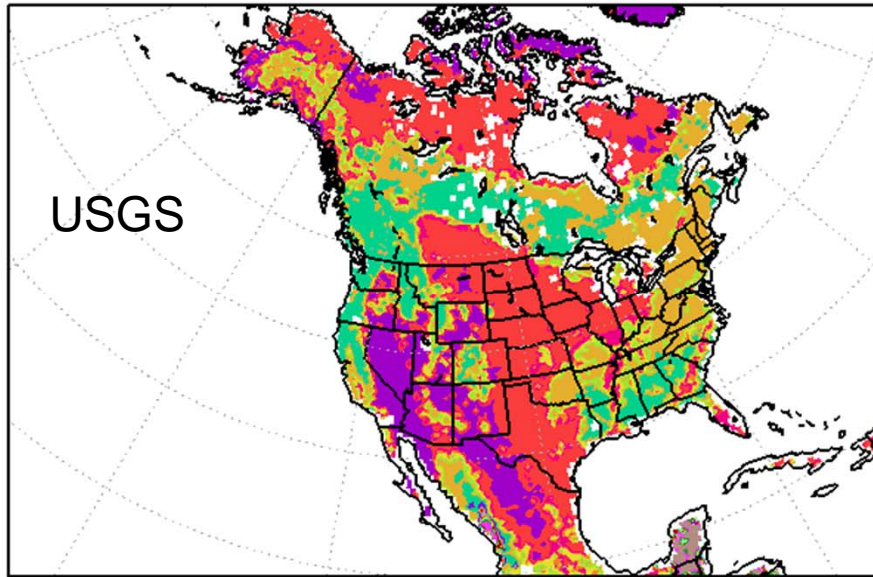
Vegetation Type (USGS LU)



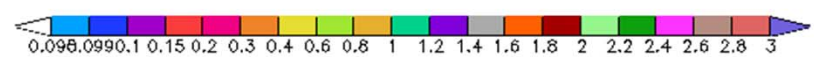
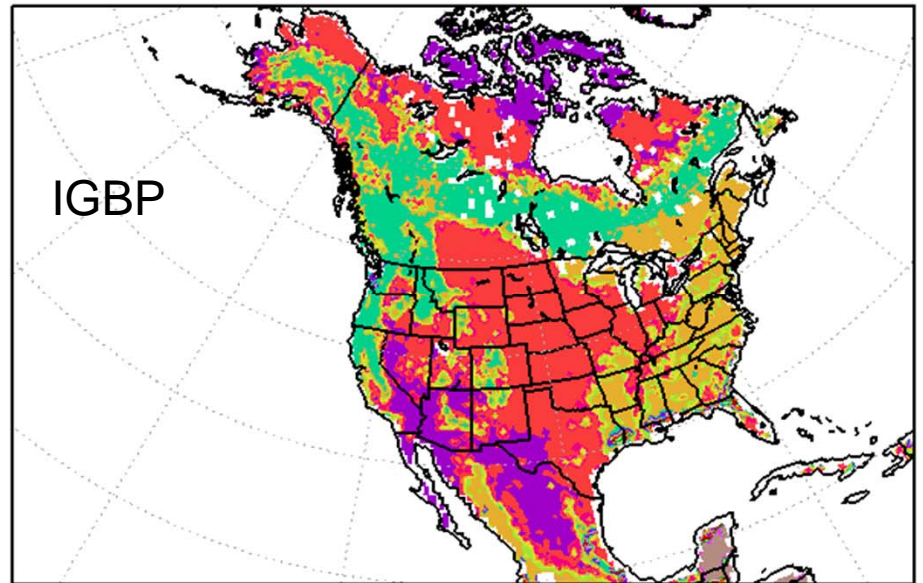
- Dryland Cropland and Pasture
- Irrigated Cropland and Pasture
- Mixed Dryland/Irrigated Cropland and Pasture
- Cropland/Grassland Mosaic
- Cropland/Woodland Mosaic
- Grasslands
- Shrubland
- Mixed Shrubland/Grassland
- Savanna
- Deciduous Broadleaf Forest
- Deciduous Needleleaf Forest
- Evergreen Broadleaf Forest
- Evergreen Needleleaf Forest
- Mixed Forest
- Water
- Herbaceous Wetland
- Wooded Wetland
- Barren and Sparsely Vegetated
- Herbaceous Tundra
- Wooded Tundra
- Mixed Tundra
- Bare Ground Tundra
- Snow and Ice

Classified Scheme	IGBP	USGS
Satellite Instr.	MODIS 2001- 2005	AVHRR 1992- 1993
Coastline	detailed	
Urban	More	
Evergreen	More in Alaska & Canada	More in SE of US
Deciduous Broadleaf		More
Shrubland	More	

SINGLE_DOMAIN ROUGHNESS LENGTH NAM 00H
FCST VALID 12Z 20 APR 2010



SINGLE_DOMAIN ROUGHNESS LENGTH NA12AQ 00H
FCST VALID 12Z 20 APR 2010



Change of Vegetation Type ==> Change of Vegetation Parameters:

1. Roughness Length (Z_0)
2. Minimum Stomatal Resistance (R_{Smin})
3. Radiation Stress Function (RGL)
4. Root Depth (NRoot)
5. Threshold Snow Depth that implies 100% Snow Cover(SNUP)
6. etc.

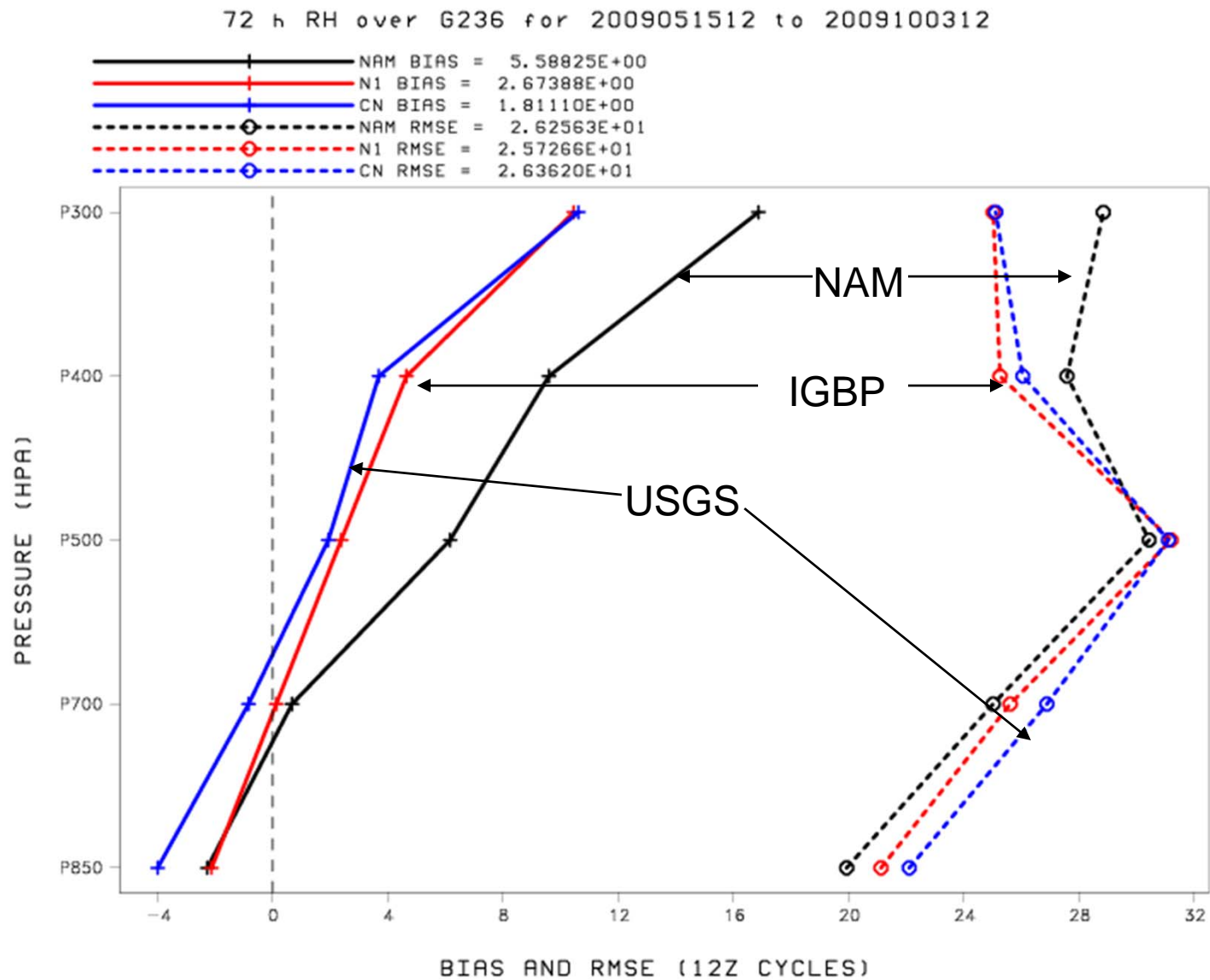
Comparison between N1 & CN Runs for 10 cases

N1: IGBP (Parallel Testing with Operational Model since last August)

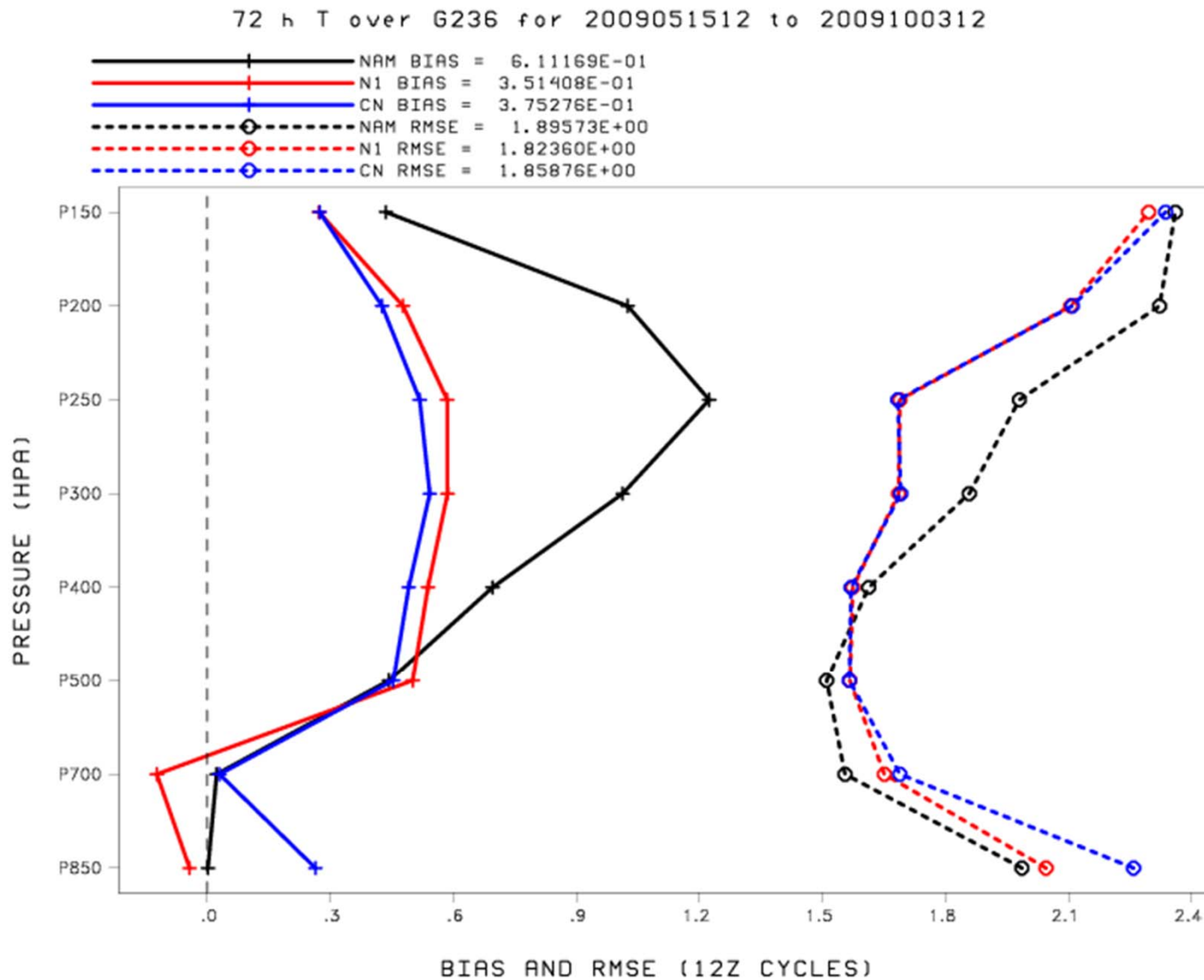
CN: Same as N1 except using USGS vegetation map

NAM: present mesoscale operational model

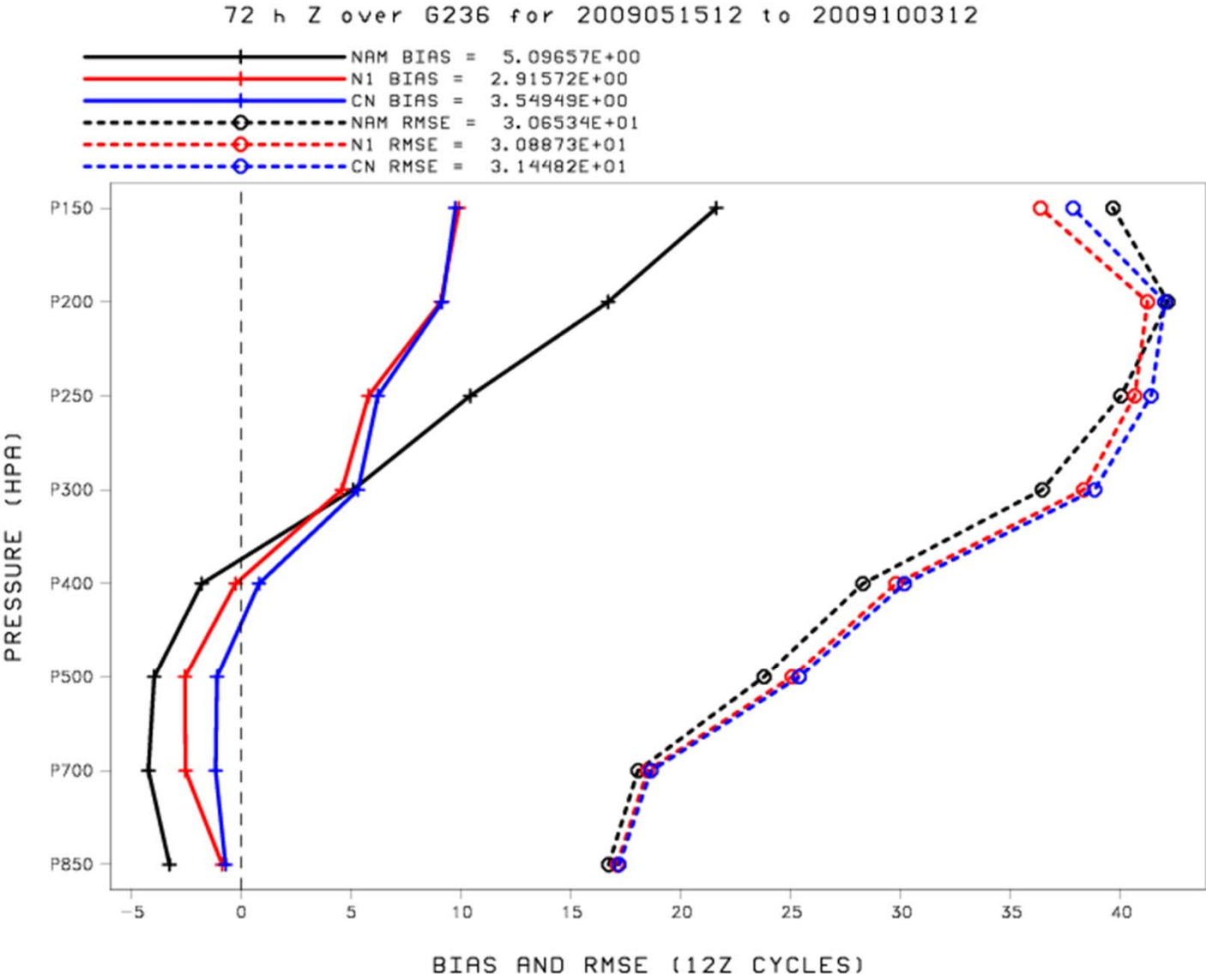
Relative Humidity Bias & Root-mean-square Error



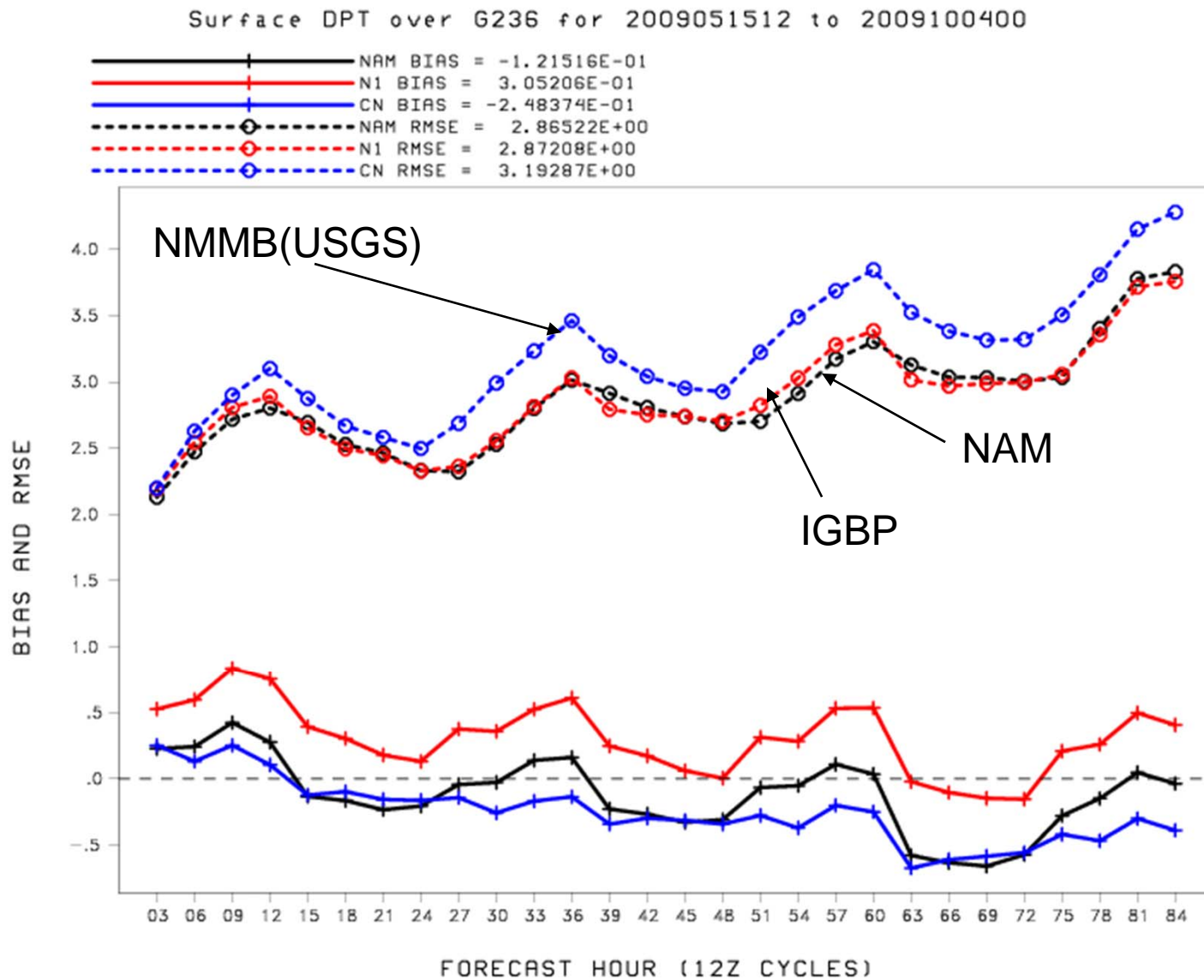
Temperature Bias & Root-mean-square Error



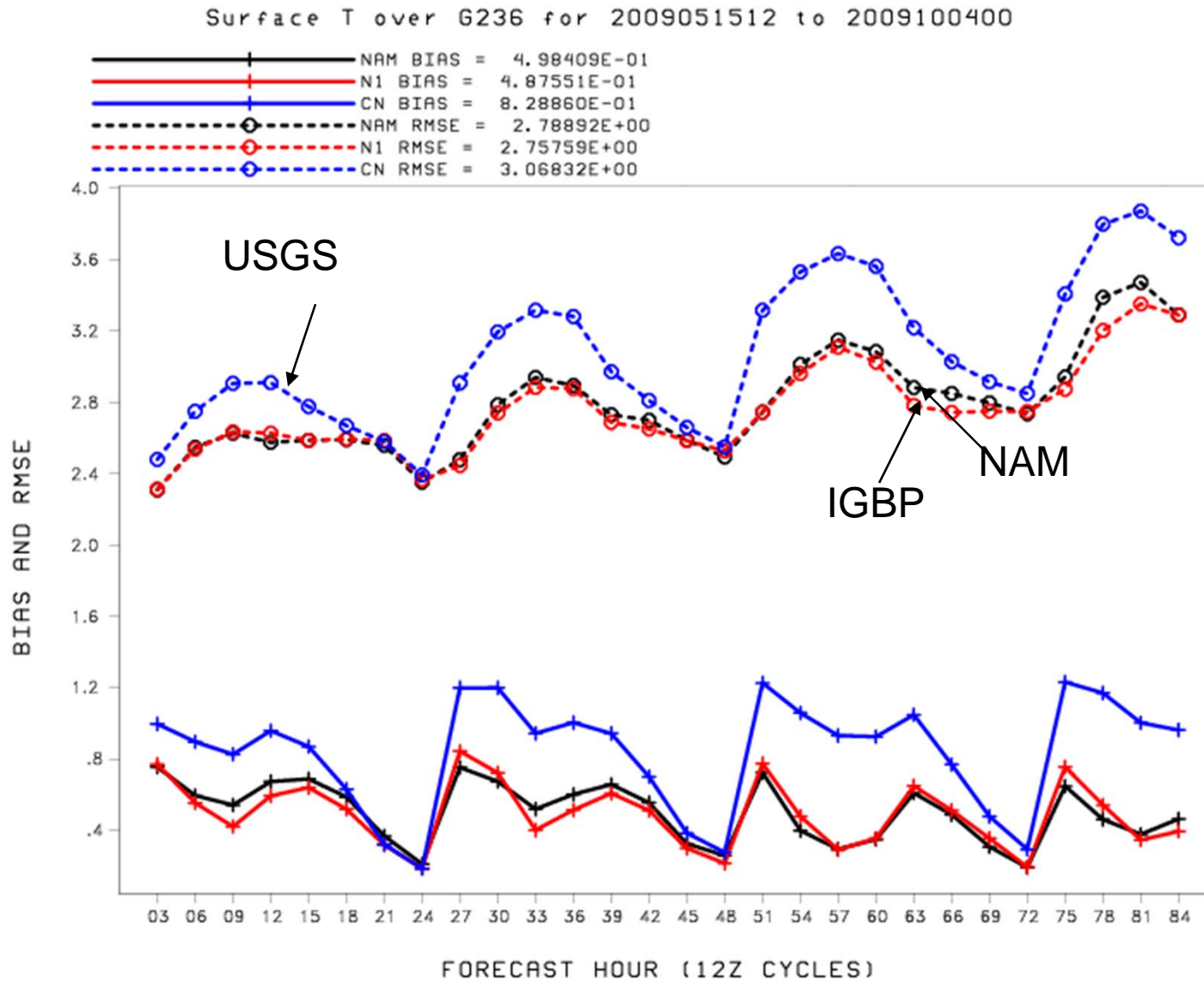
Z Bias & Root-mean-square Error



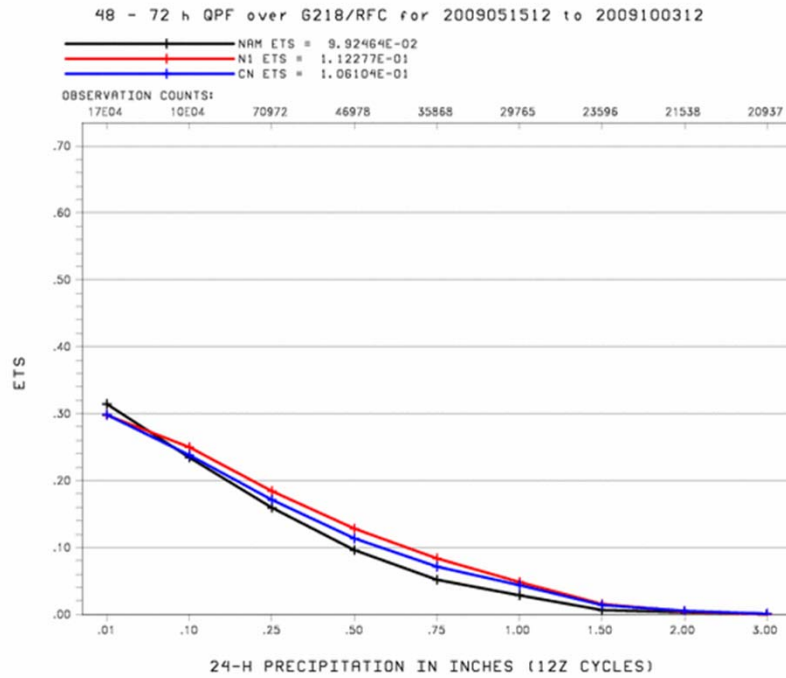
Surface Dew Point Temperature Bias & Root-mean-square Error



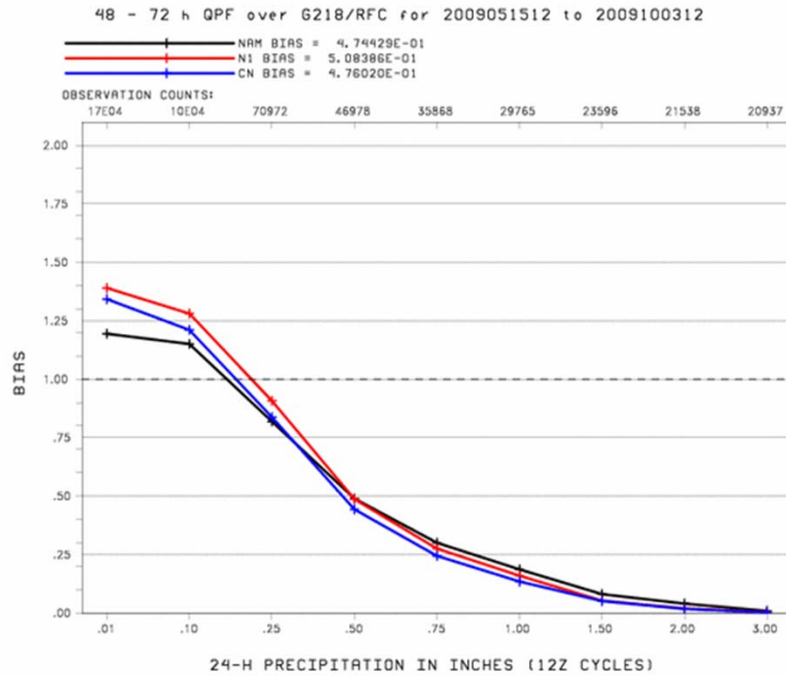
Surface Temperature Bias & Root-mean-square Error



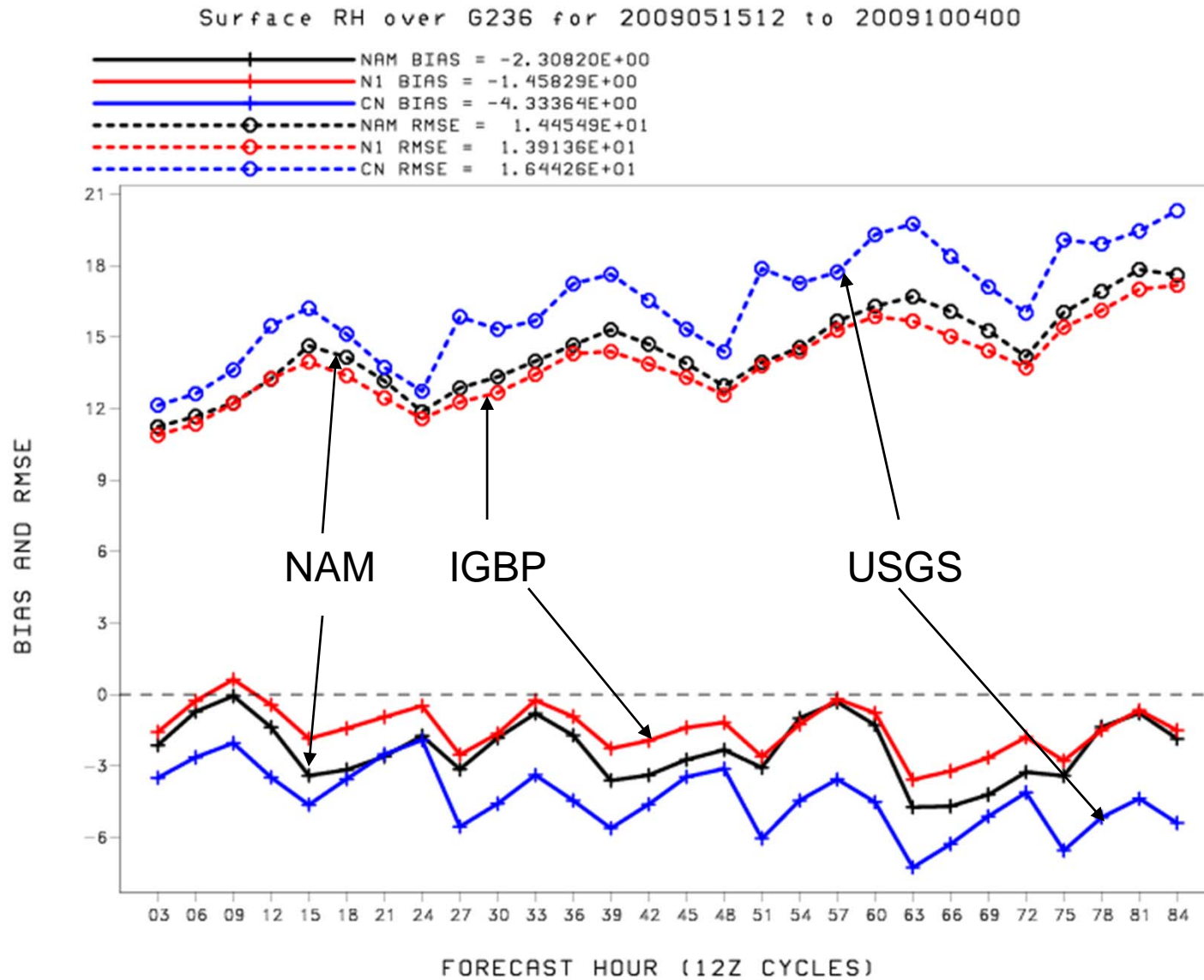
Precipitation Score



Precipitation Bias



Surface Relative Humidity Bias & Root-mean-square Error

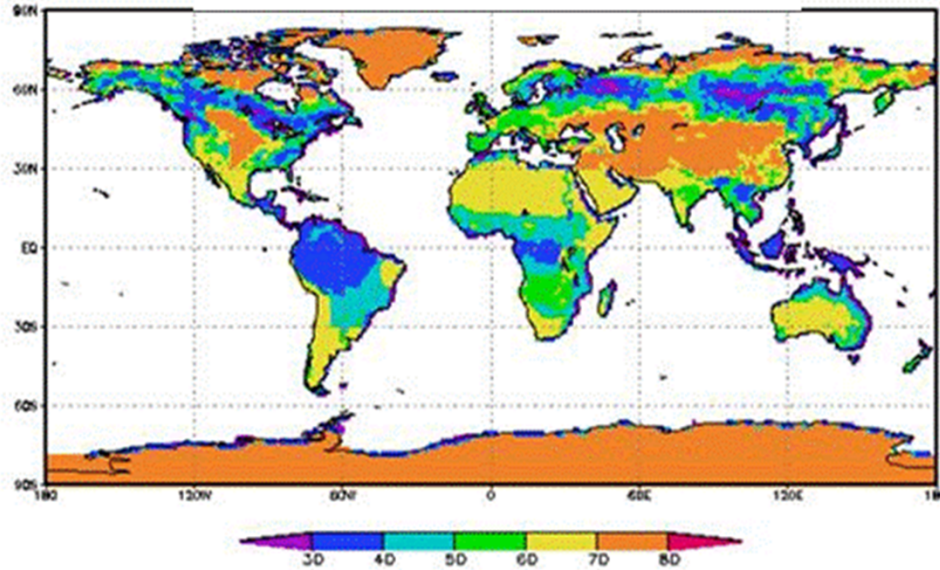


MODIS Max Albedo & Snow-free Albedo

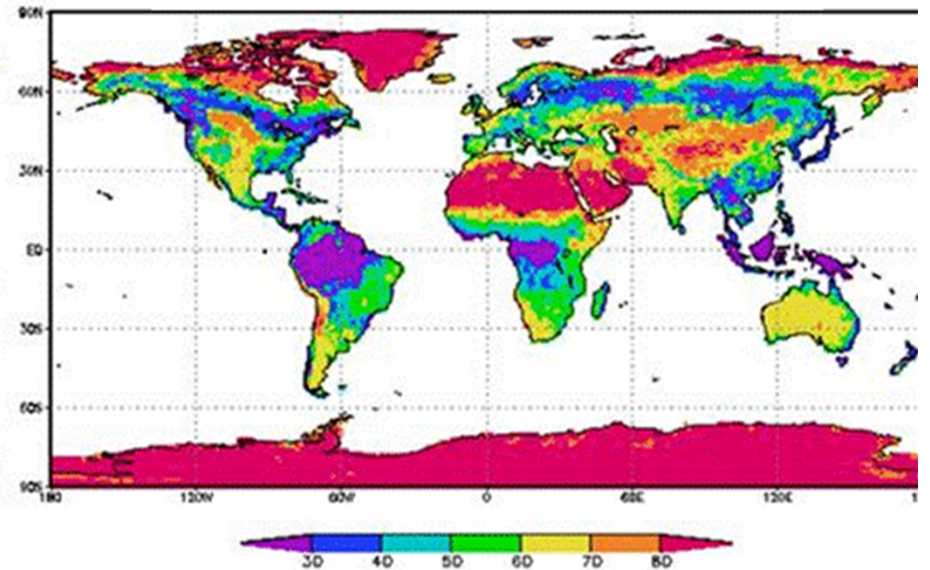
- Visible Direct Albedo (Solar zenith angle dependent)
- Visible Diffuse Albedo
- Near Infrared Direct Albedo
(Solar Zenith angle dependent)
- Near Infrared Diffuse Albedo
- ~1km Resolution over the Globe
- Monthly Averaged

Max Albedo

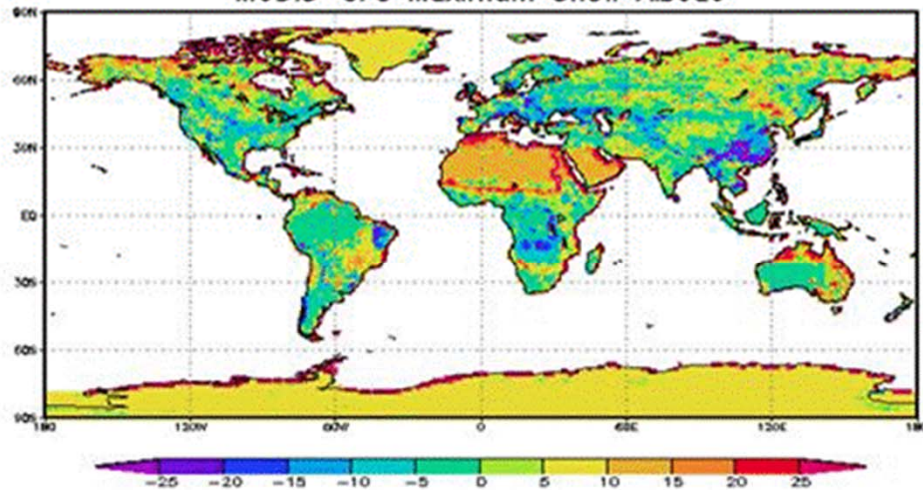
Operational GFS



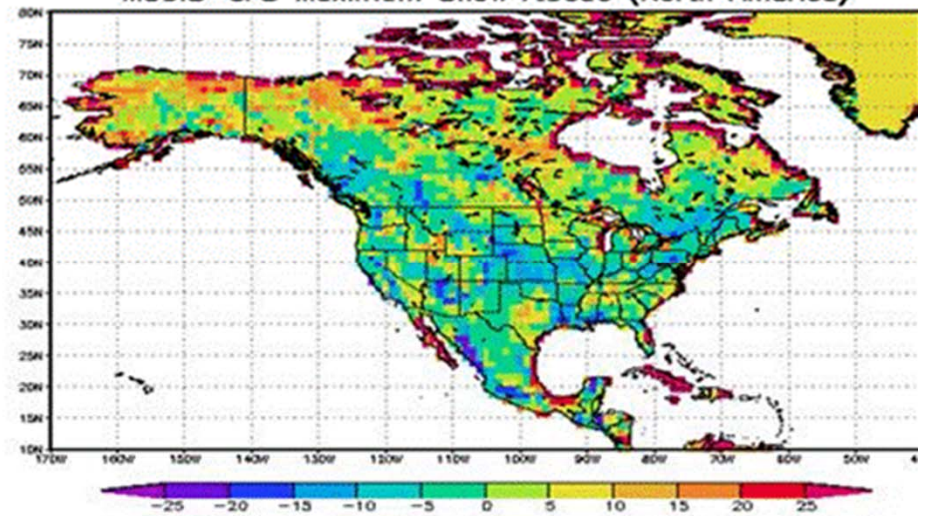
MODIS



MODIS-GFS Maximum Snow Albedo



MODIS-GFS Maximum Snow Albedo (North America)



Snow-free Albedo

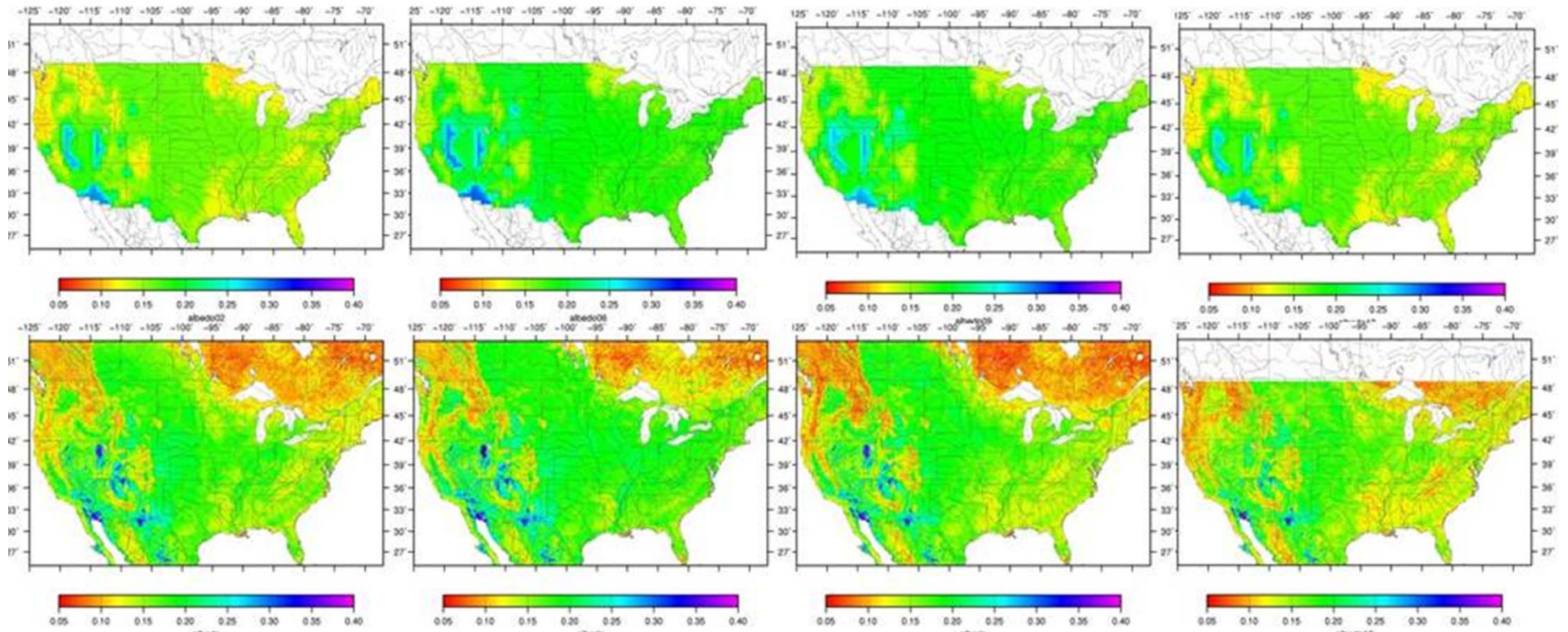
ORIGINAL

MARCH

JUNE

SEPTEMBER

DECEMBER

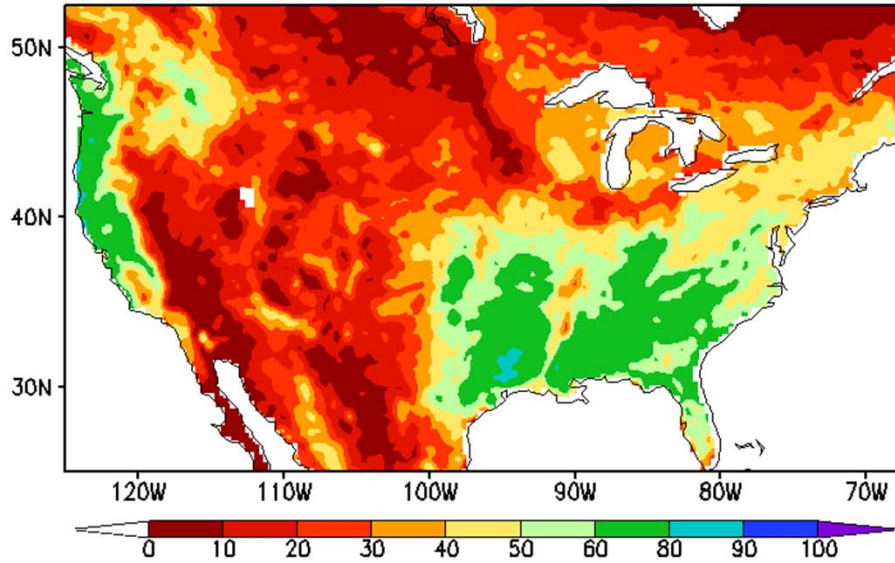


MODIS

Green Vegetation Fraction requires “Real Time” Data

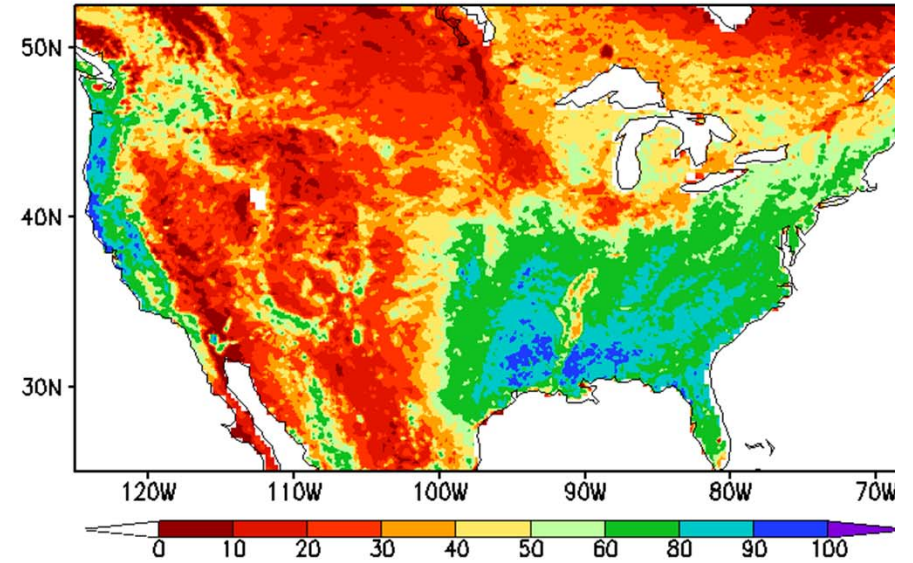
Old Climatology GVF (Gutman)

April



Multi-Year Mean GVF

Week 16



Diff. of Two Climatology datasets

April

