

Impact of Land Processes on WRF

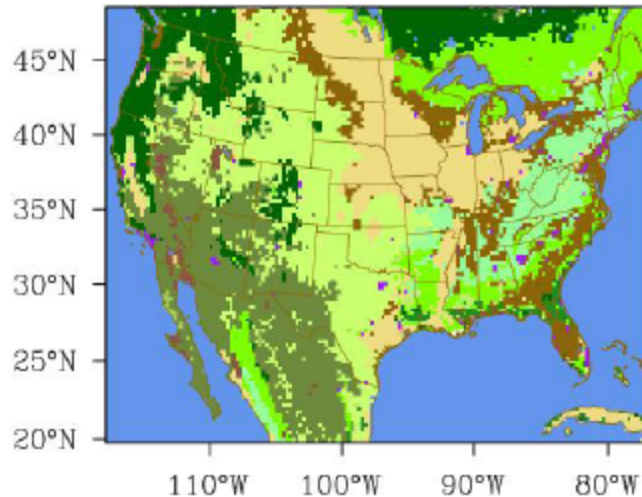
Vince Wong & Michael Ek

EMC/NCEP/NOAA

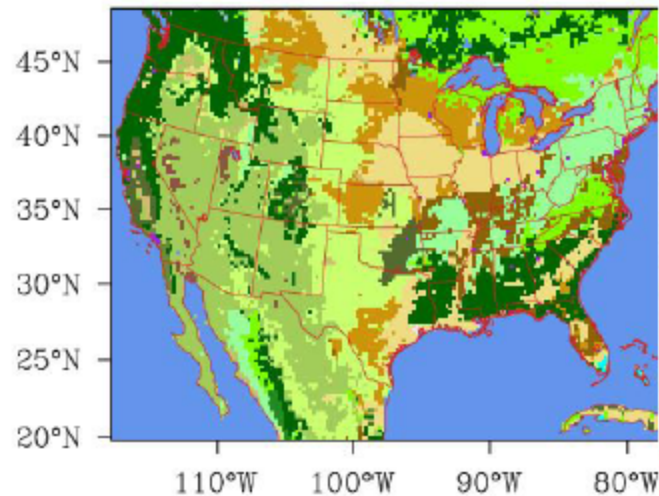
1. Implementation of MODIS-IGBP Vegetation Data
2. MODIS Albedo Data
3. AVHRR Green Vegetation Fraction near Real Time Data

Modis Vs USGS Landuse

Vegetation Type (Modis LU)

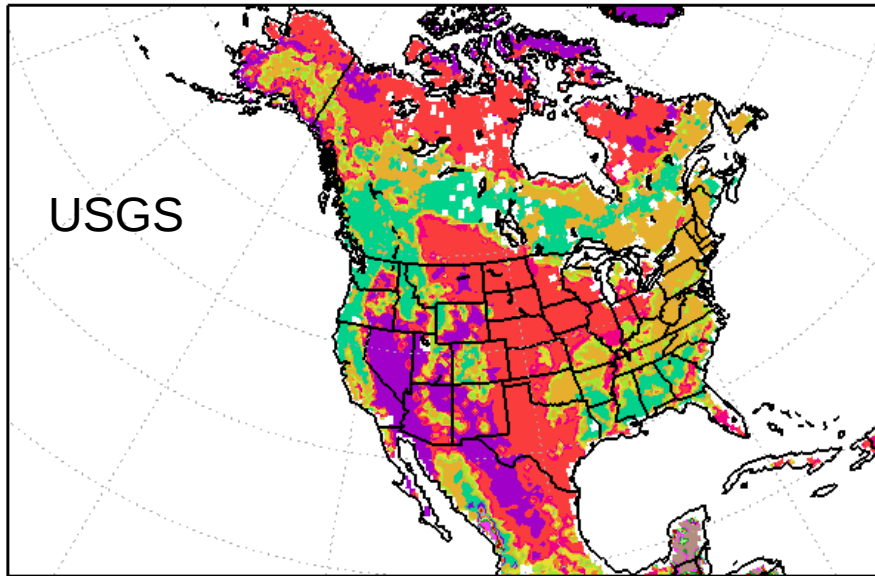


Vegetation Type (USGS LU)

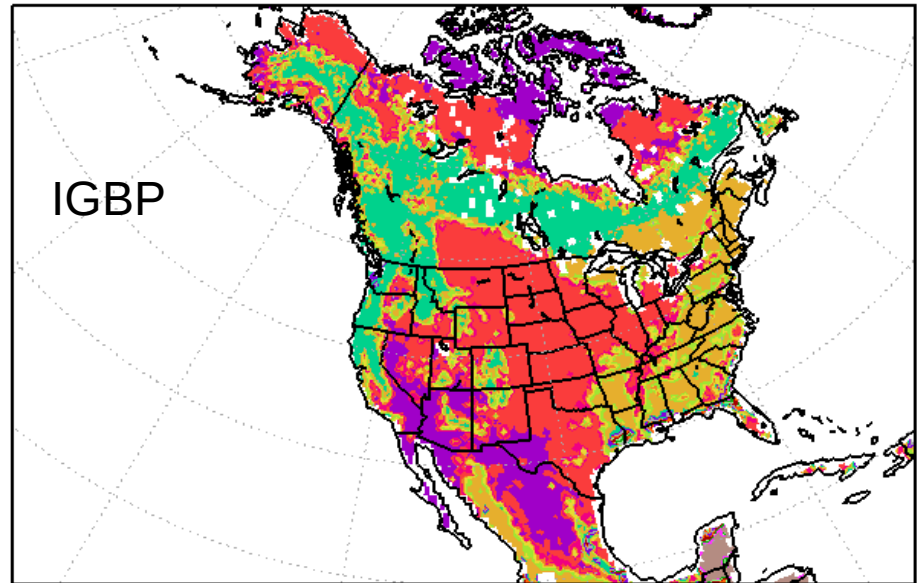


Classified Scheme	IGBP	USGS
Satellite Instr.	MODIS 2001- 2005	AVHRR 1992- 1993
Coastline	detailed	
Urban	More	
Evergreen	More in Alaska & Canada	More in SE of US
Deciduous Broadleaf		More
Shrubland	More	

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.

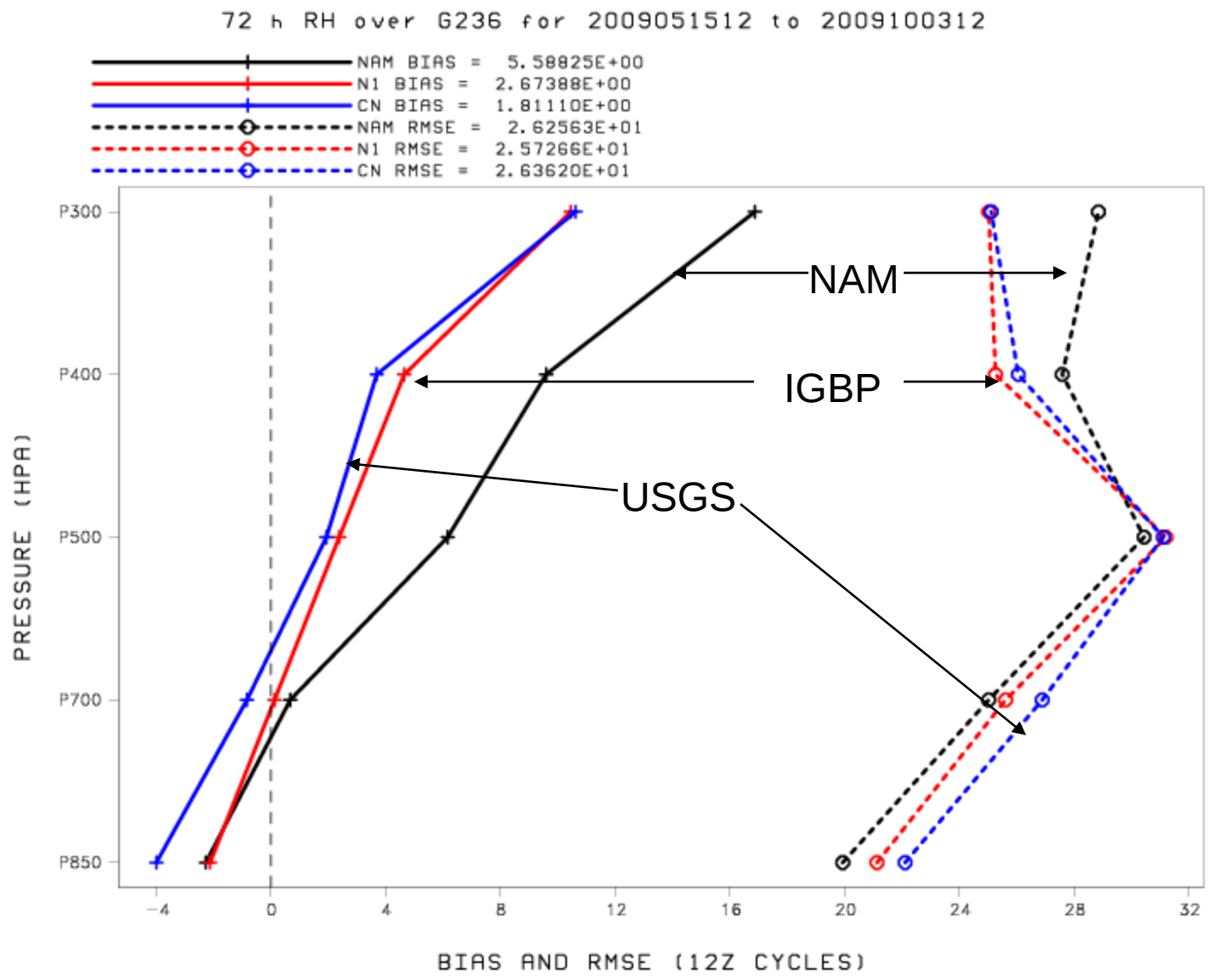
Comparison between N1 & CN Runs for 10 cases

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

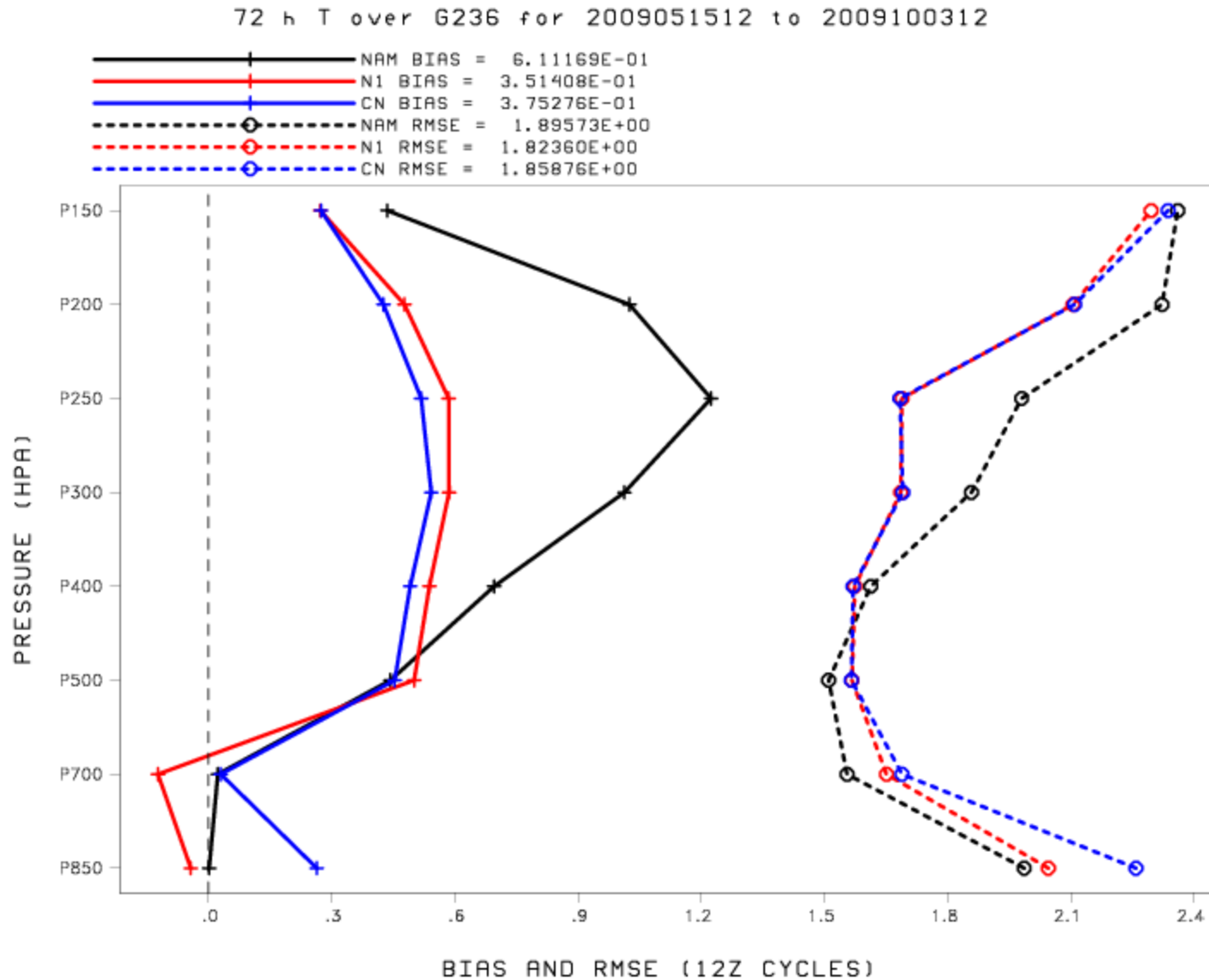
CN: Same as N1 except using USGS vegetation map

NAM: present mesoscale operational model

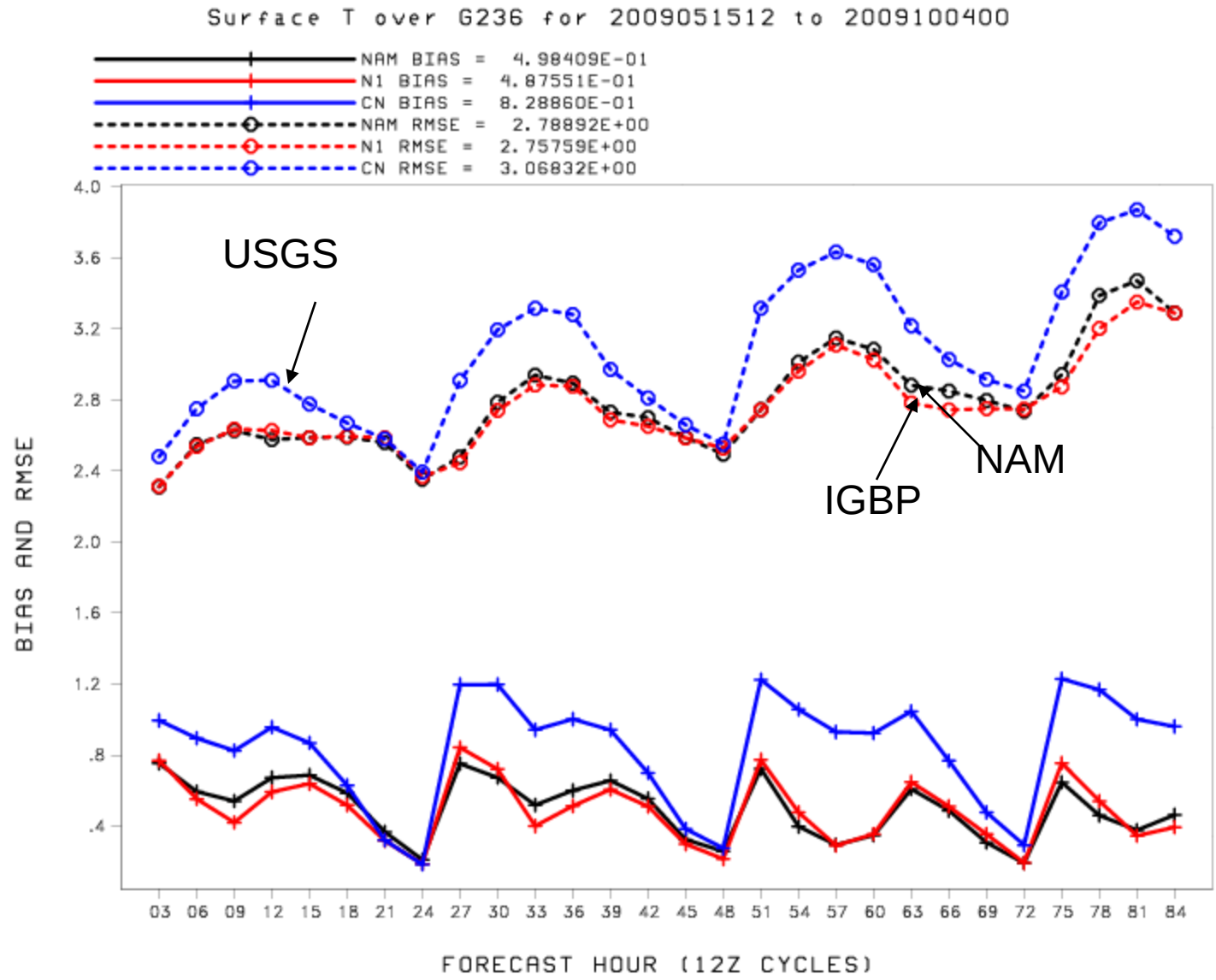
Relative Humidity Bias & Root-mean-square Error



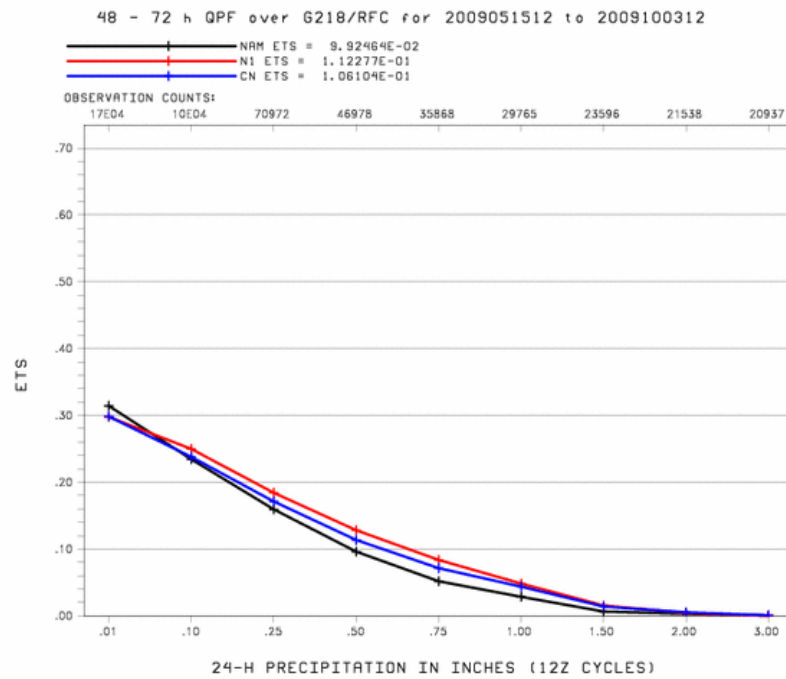
Temperature Bias & Root-mean-square Error



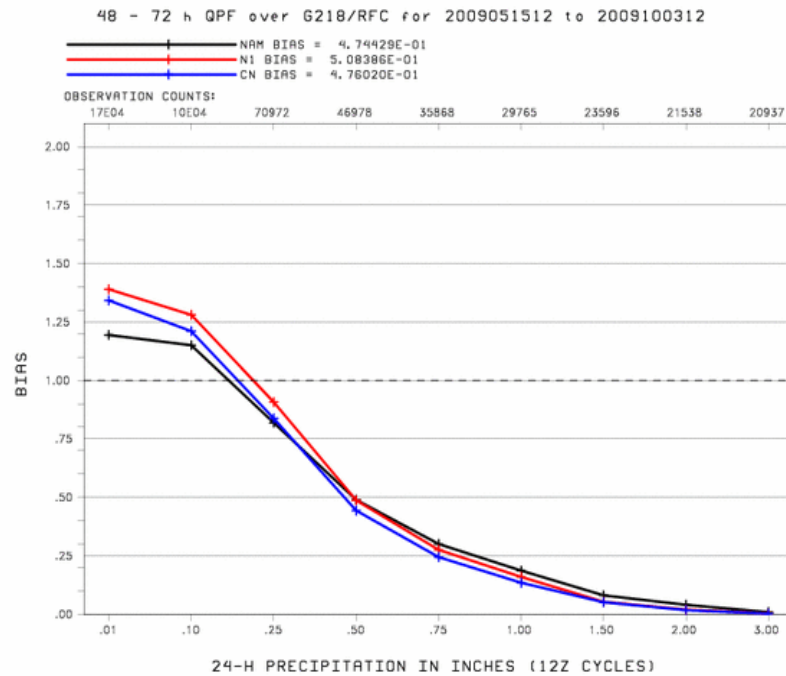
Surface Temperature Bias & Root-mean-square Error



Precipitation Score



Precipitation Bias

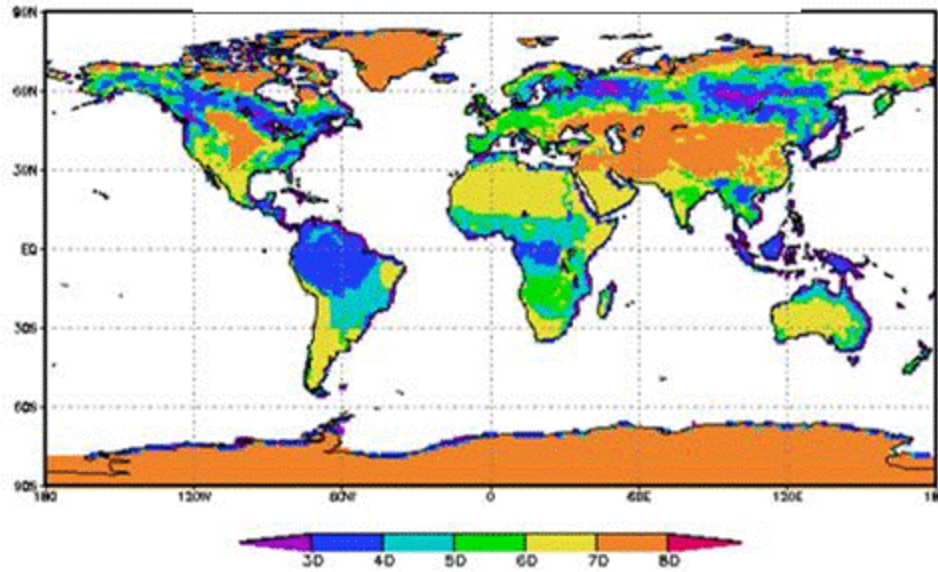


MODIS Max Albedo & Snow-free Albedo

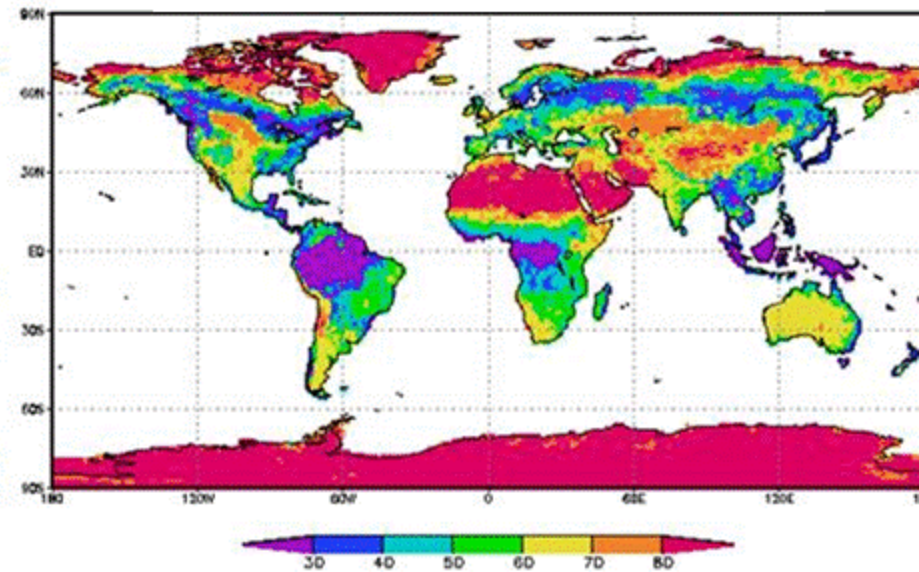
- Visible Direct Albedo (Solar zenith angle dependent)
- Visible Diffuse Albedo
- Near Infrared Direct Albedo
(Solar Zenith angle dependent)
- Near Infrared Diffuse Albedo
- ~1km Resolution over the Globe
- Monthly Averaged

Max Albedo

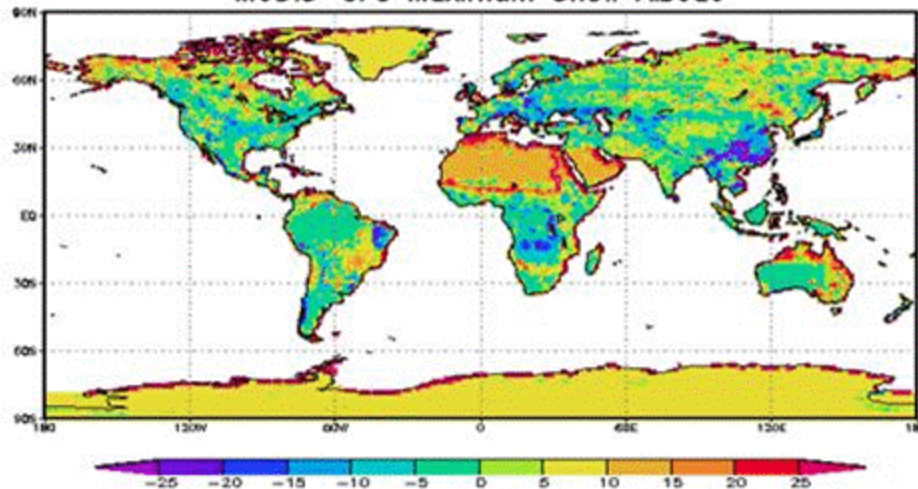
Operational GFS



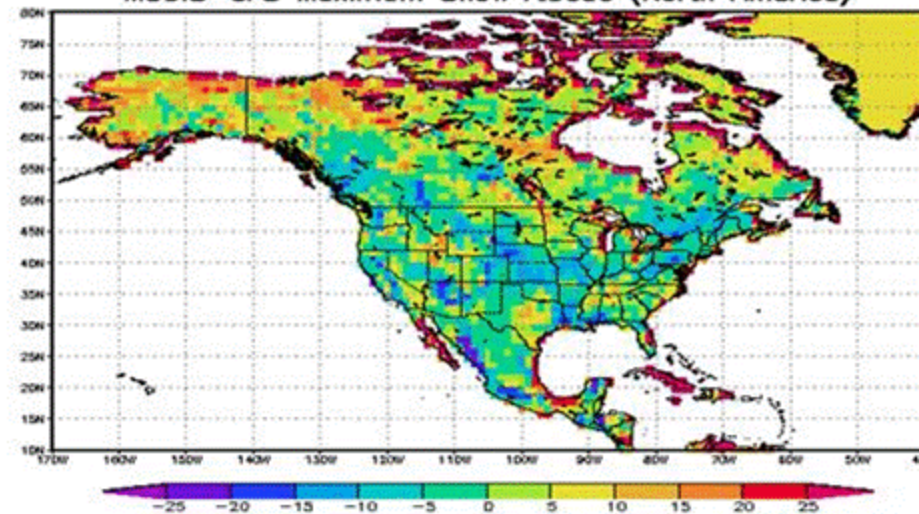
MODIS



MODIS-GFS Maximum Snow Albedo



MODIS-GFS Maximum Snow Albedo (North America)



Snow-free Albedo = Total Outgoing Short Wave / Solar Radiation

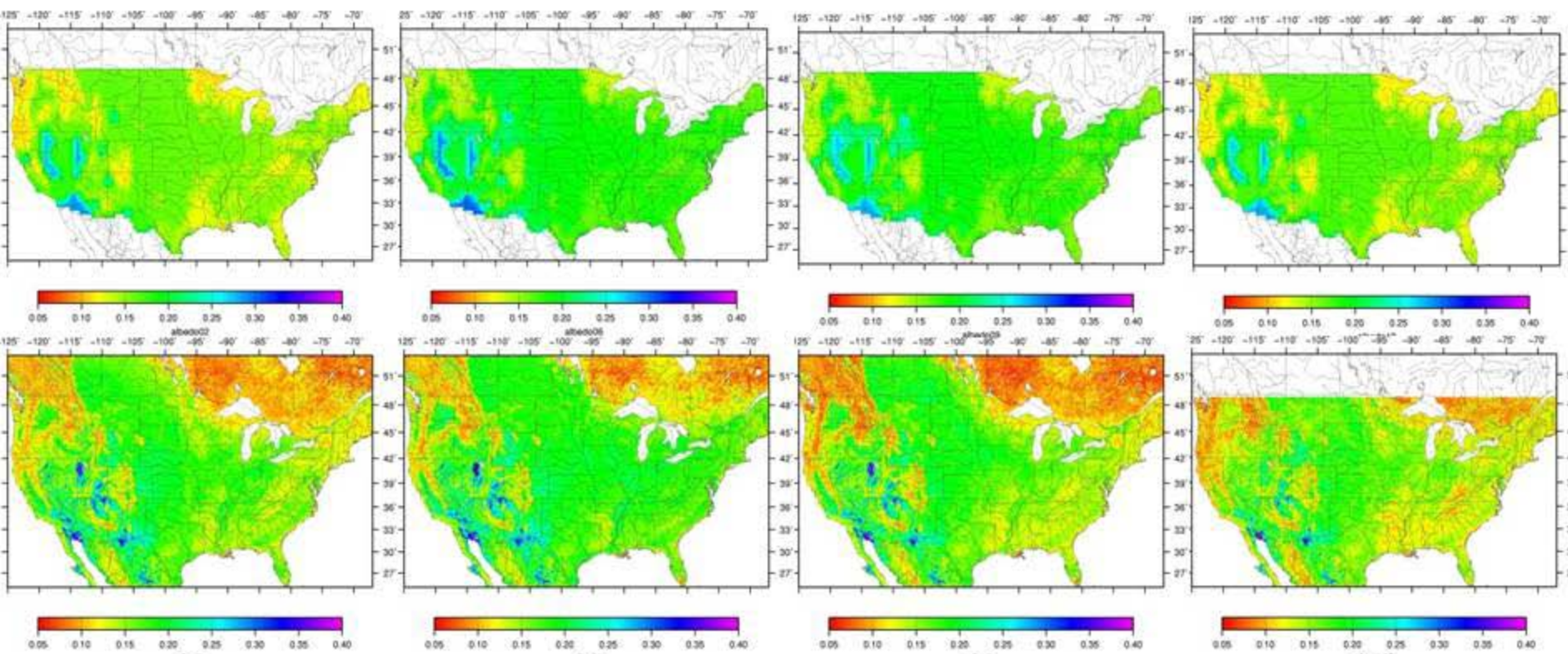
ORIGINAL

MARCH

JUNE

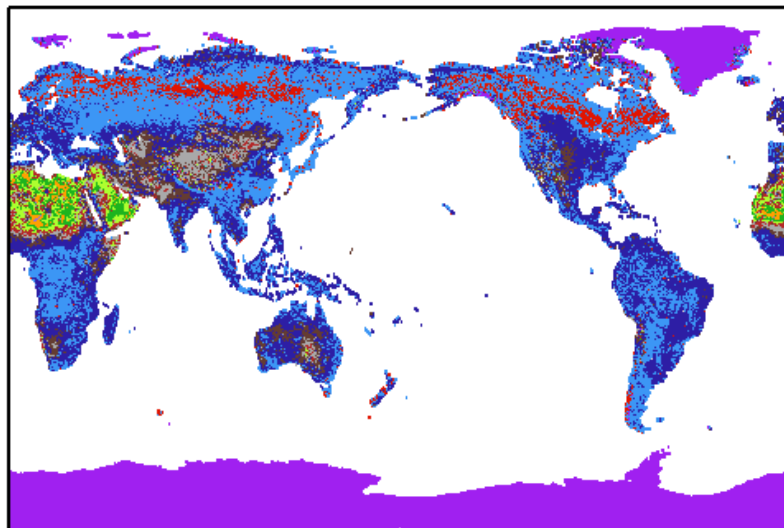
SEPTEMBER

DECEMBER

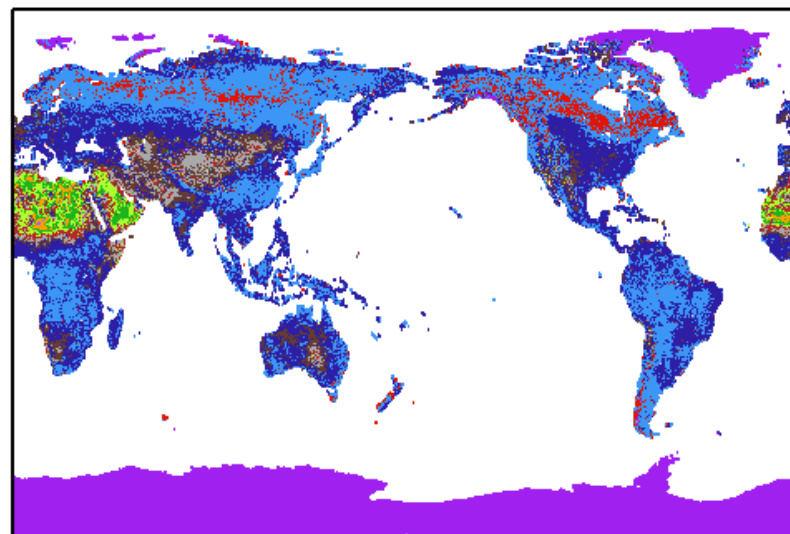


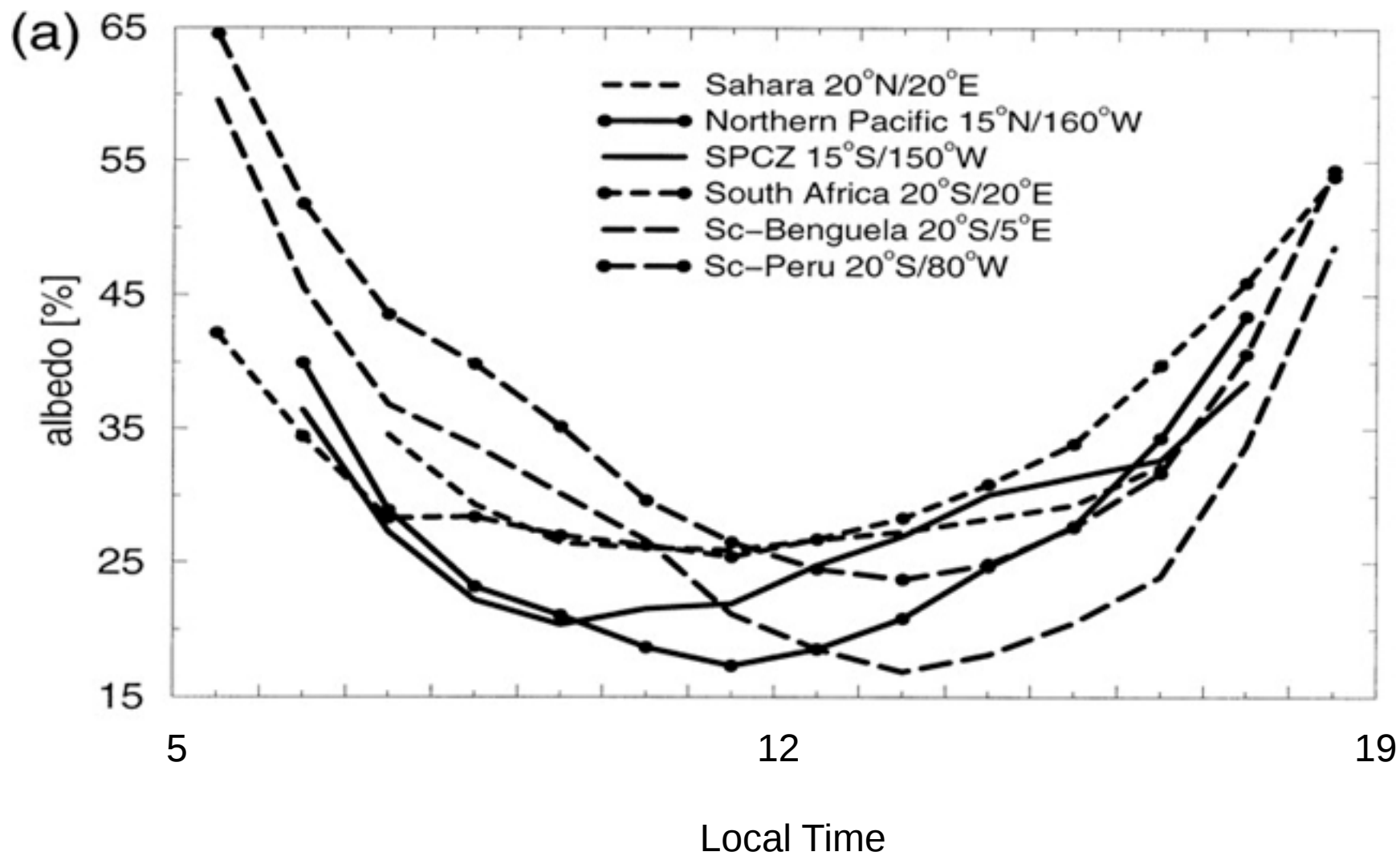
MODIS

April Broadband Direct Albedos

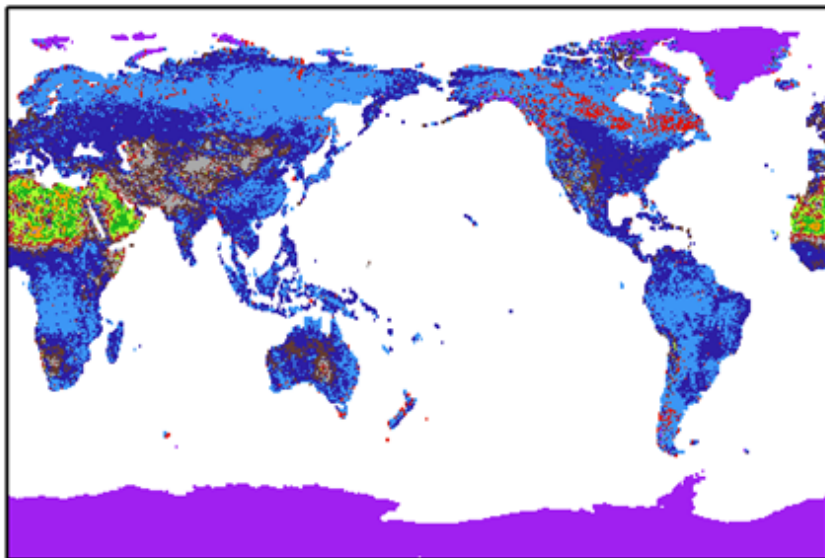


May Broadband Direct Albedos





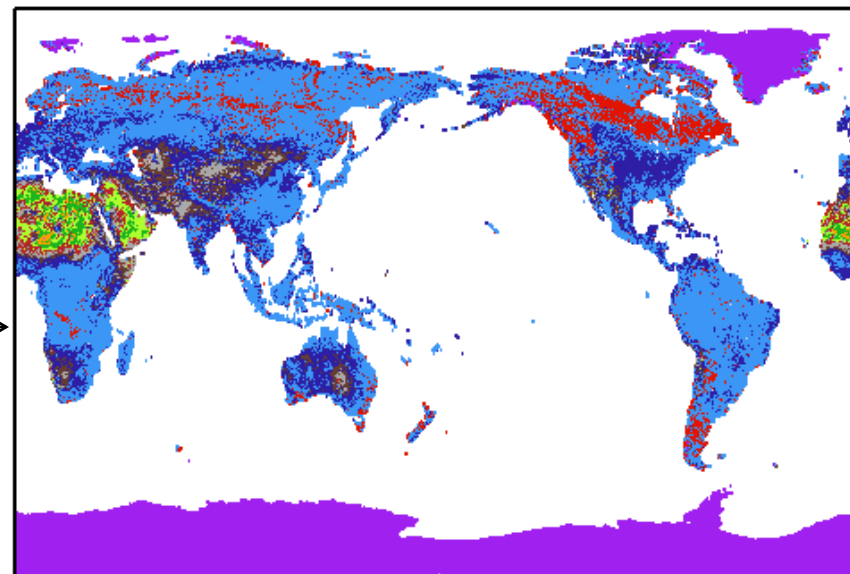
June Broadband Direct Albedos



Zenith Angle=60°



June Broadband Direct Albedo3



Zenith Angle=30°



Green Vegetation Fraction “Real Time” → LAI, Roughness, Snow-free Albedo. Emissivity

