Soil Moisture Monitoring at NOHRSC and the NWC

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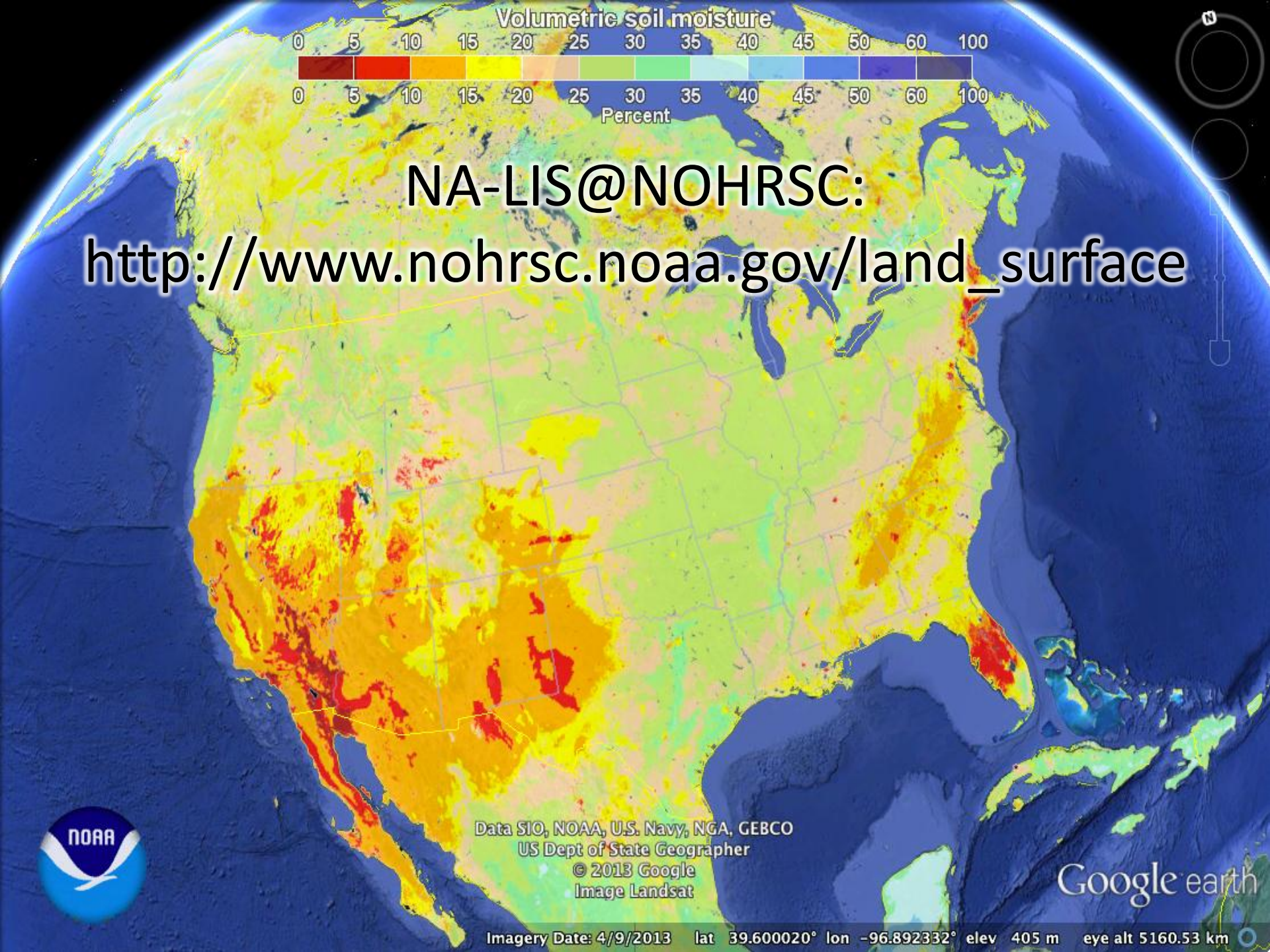
Experimental Land Surface Modeling at NOHRSC, 2013-14

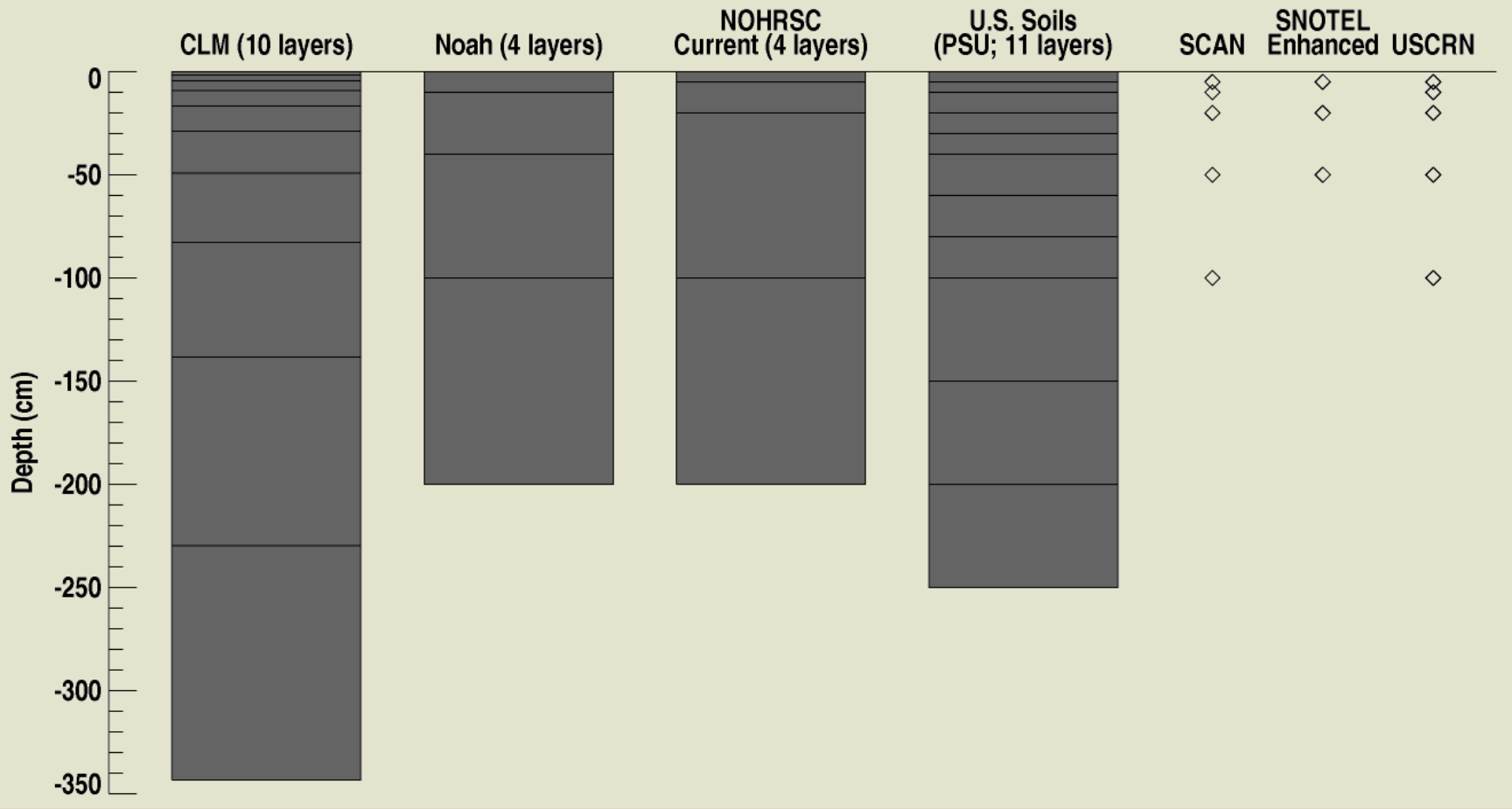
- Routine operations established 1 October 2013.
- Originally conceived as capacity building exercise for National Water Center "Initial Operating Capability."
- Domain: 120° x 58° at 30" (~800 m) resolution; 10^8 cells (39,003,064 unmasked)
- LSMs:
  - CLM 2.0, Noah 3.2 via NASA LIS
  - Sac-HTET (CONUS analysis only, 4 km HRAP)
- Forcings: Rapid Refresh and NAM
  - Data from multiple grids combined to cover full domain: RAP 130, 221, 242; NAM 218, 221, 242
  - Downscaled from ~12 km (1/8 degree) to ~800 m (30")

Experimental Land Surface Modeling at NOHRSC, 2013-14

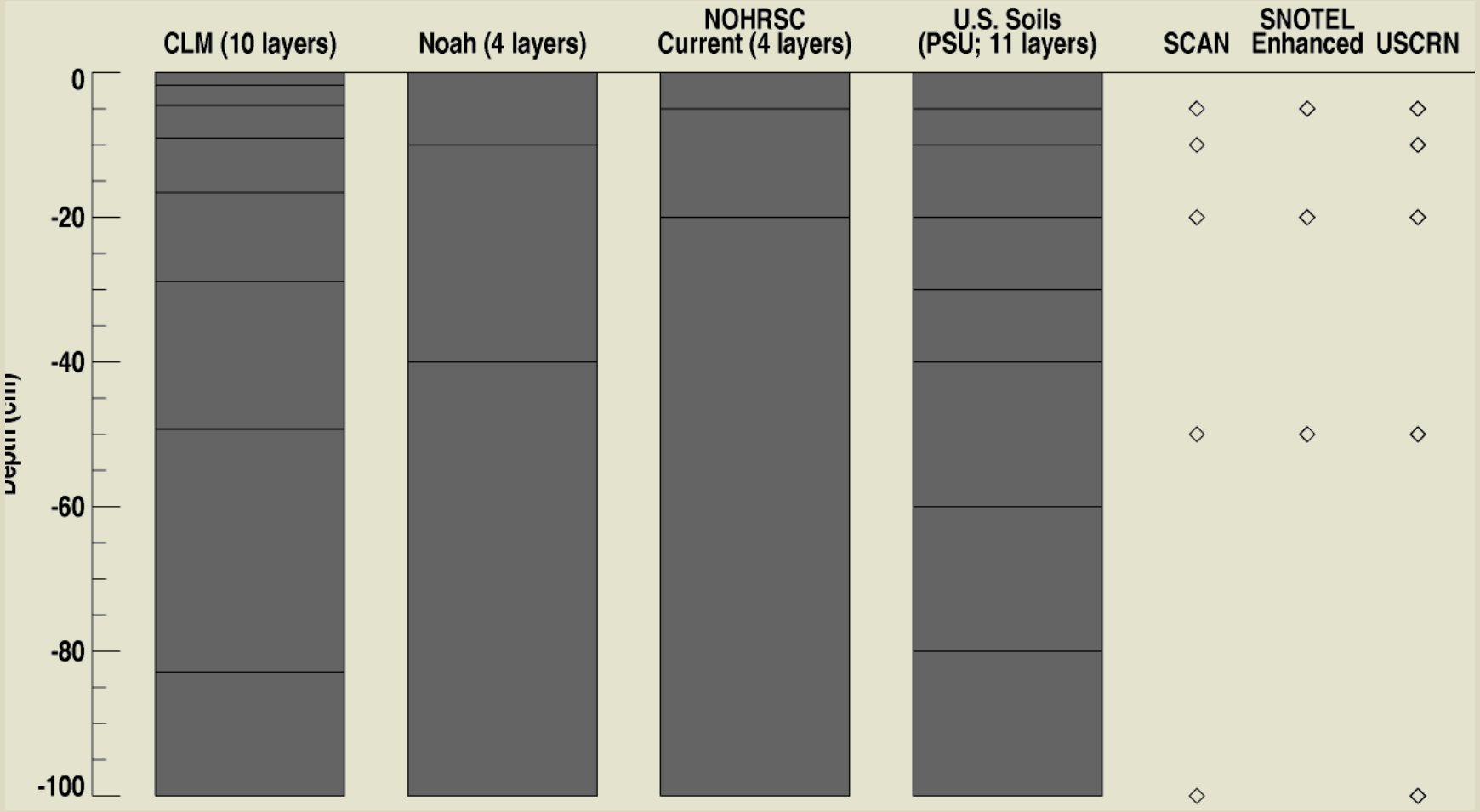
- 4x-daily analysis cycles, driven primarily by Rapid Refresh analysis
- 1x-daily forecasts to 72 hours, driven by Rapid Refresh and NAM forecasts
- Hourly time steps and history files
- States: snow water equivalent, soil moisture, soil temperature
- Fluxes: snow melt, runoff, evapotranspiration
- No data assimilation


Volumetric soil moisture
0 5 10 15 20 25 30 35 40 45 50 60 100
0 5 10 15 20 25 30 35 40 45 50 60 100
Percent
NA-LIS@NOHRSC:
http://www.nohrsc.noaa.gov/land_surface
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
US Dept of State Geographer
© 2013 Google
Image Landsat
Google earth
Imagery Date: 4/9/2013 lat 39.600020° lon -96.892332° elev 405 m eye alt 5160.53 km

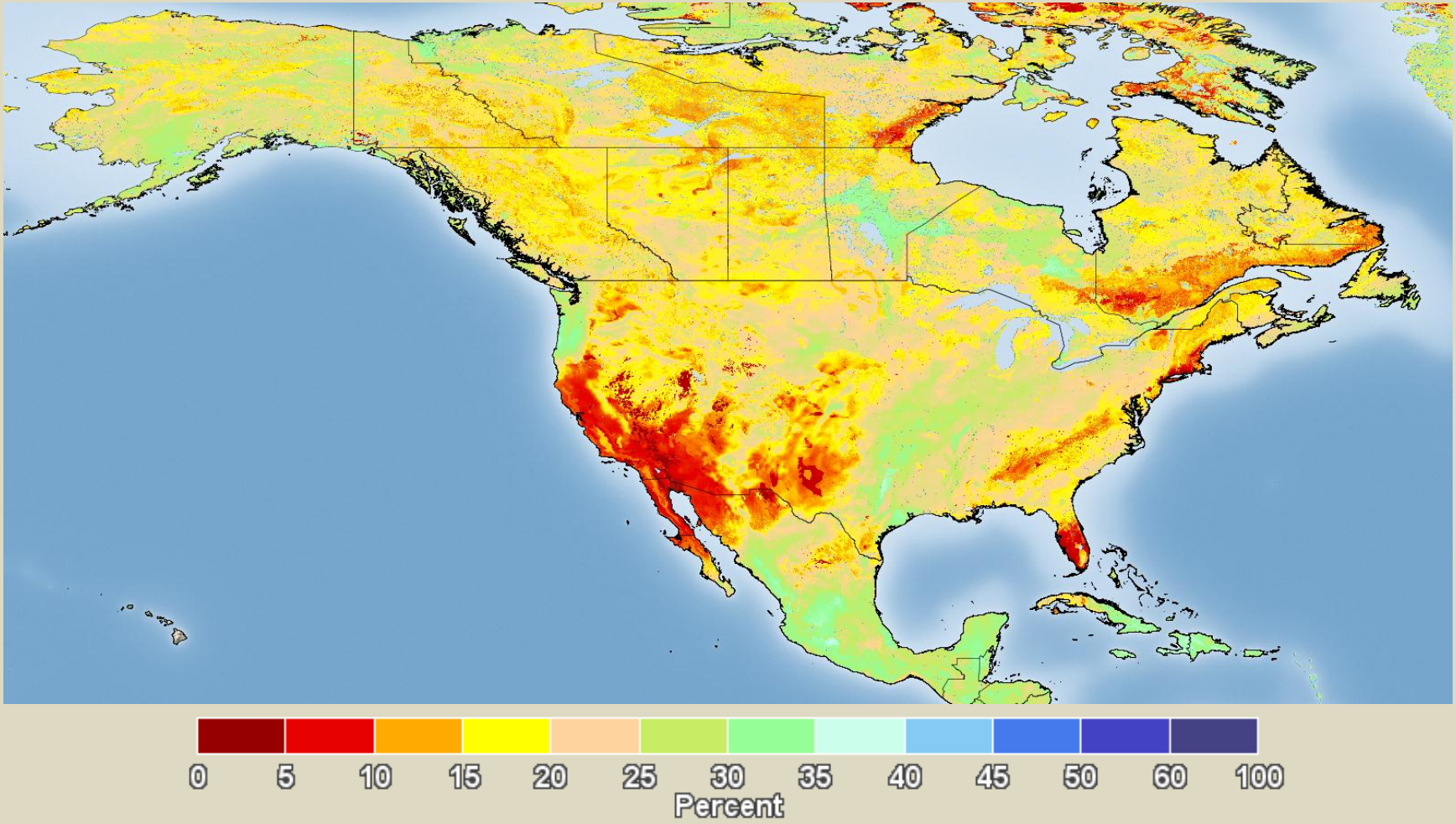
Soil Profile (full)



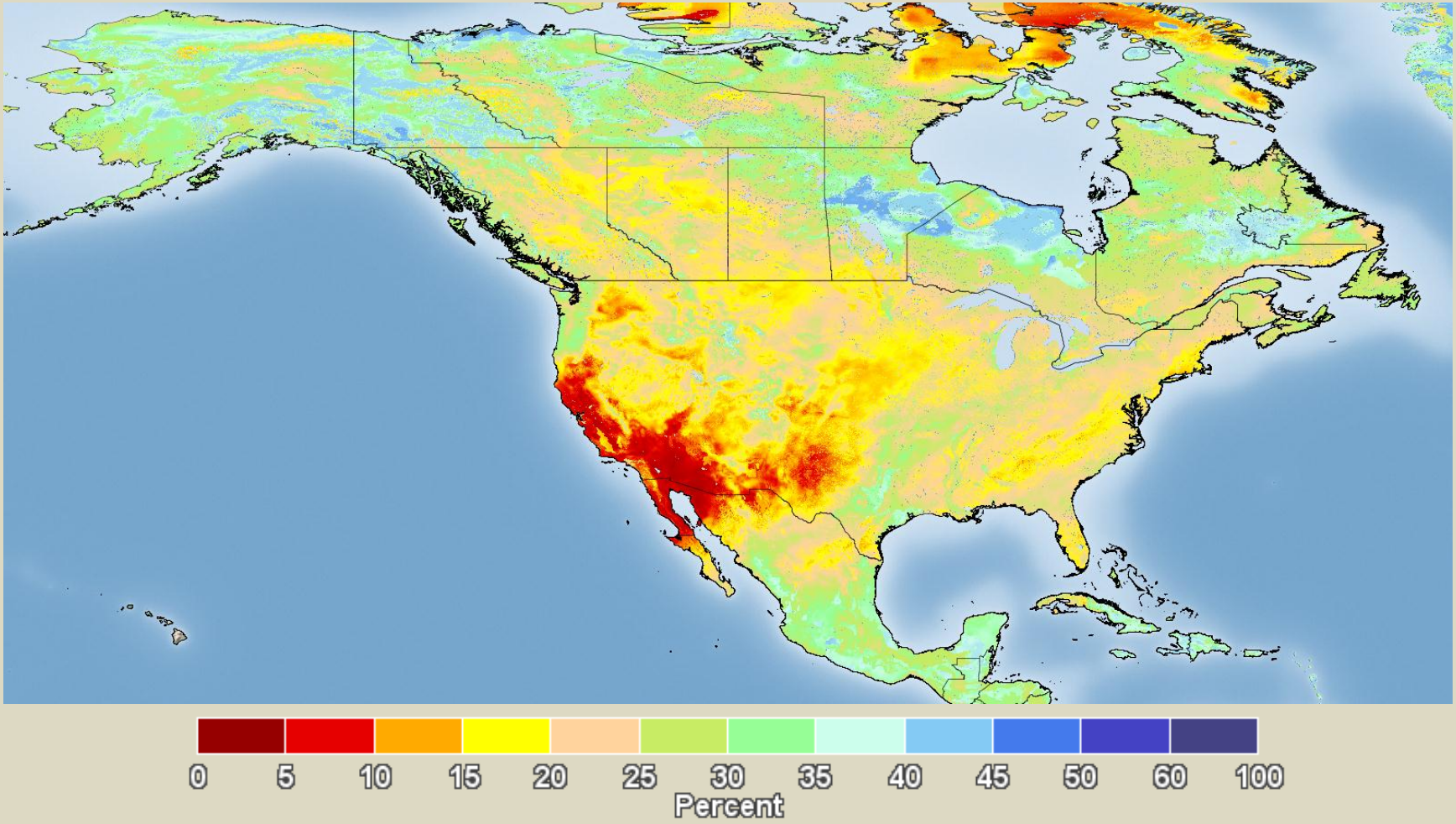
Soil Profile (uppermost 100 cm)



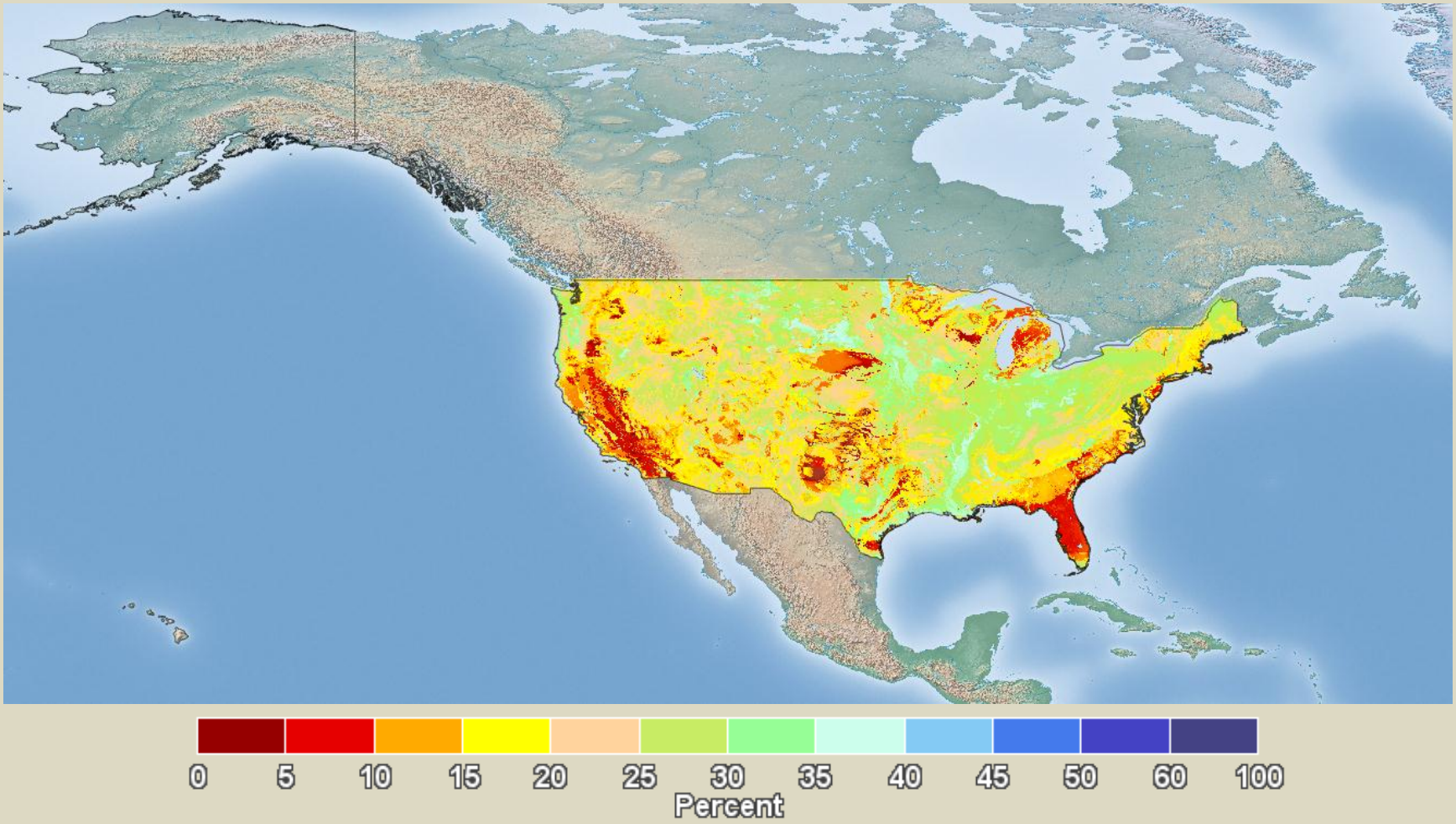
CLM 0-5 cm Soil Moisture
2013-11-05 12Z



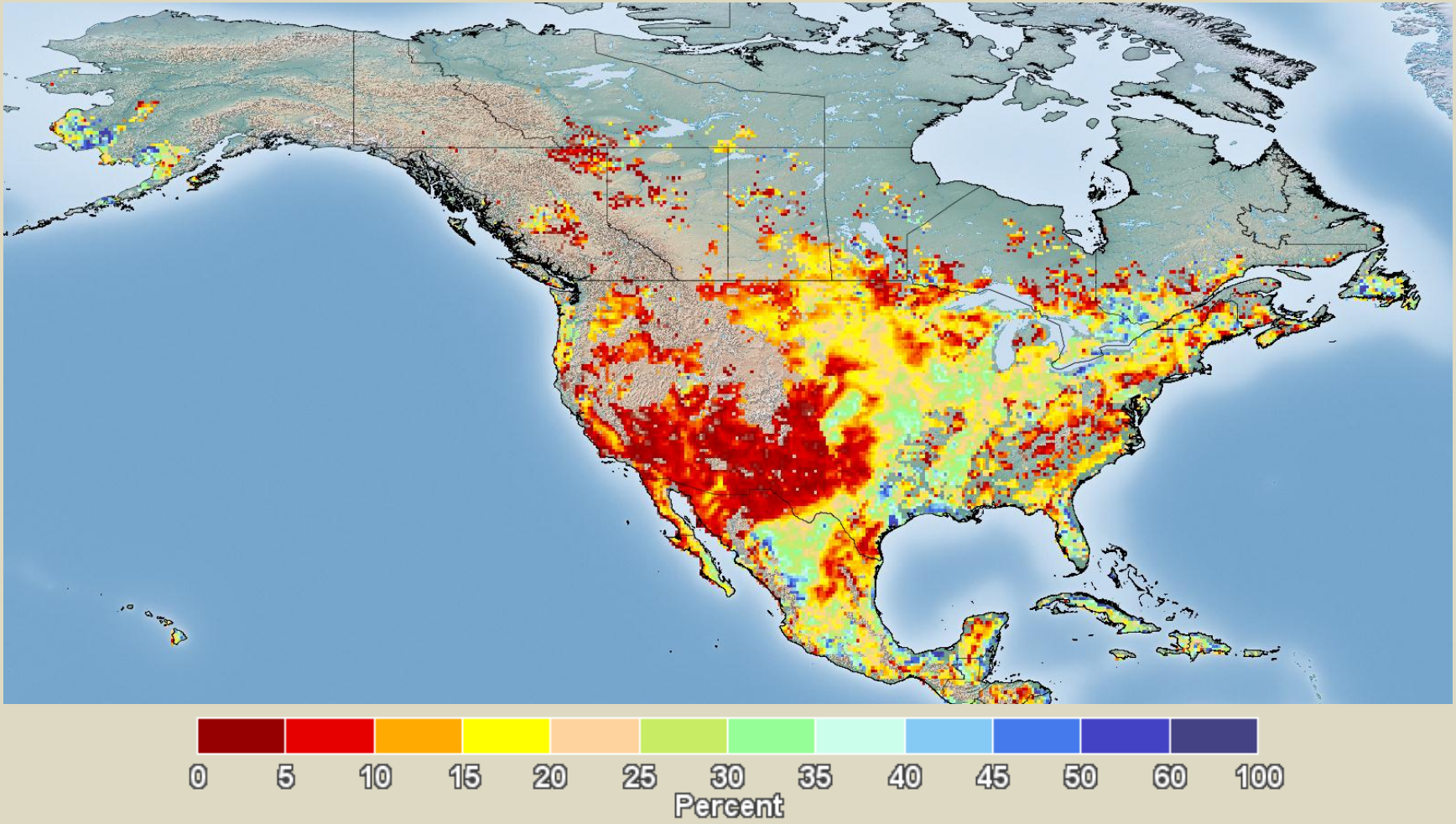
Noah 0-5 cm Soil Moisture
2013-11-05 12Z



Sac-HTET “smc1” Soil Moisture 2013-11-05 12Z



SMOS Surface Soil Moisture
2013-11-03 to 2013-11-05
6 AM Local Time (ascending orbits)



Soil Moisture Monitoring (next ~1 year)

- Essential first step: evaluation and refinement
  - Routine comparison w/observations
  - Improve parameter data
    - FAO -> PSU CONUS-Soil + HWSD (easy)
    - Gridded SSURGO + STATSGO (hard)
- Second step: data assimilation
  - Direct insertion likely
  - Satellite (SMOS)
  - In situ observations
    - Resolve acquisition and metadata questions
    - Establish sample-to-layer comparisons

National Water Center Role (>1 year from now)

- Disclaimer: WFIPP requirements scoping (in progress) is the first step in establishing NWC capabilities.
- Current NOHRSC activities will be placed under the NWC "banner."
- New soil moisture modeling and (hopefully imminent) data assimilation capabilities will continue to evolve towards operational status.
- A new generation of ingest software and operational database for in situ data (including SM!) will be established.
- NWC could contribute to QC, archiving, dissemination of in situ data.