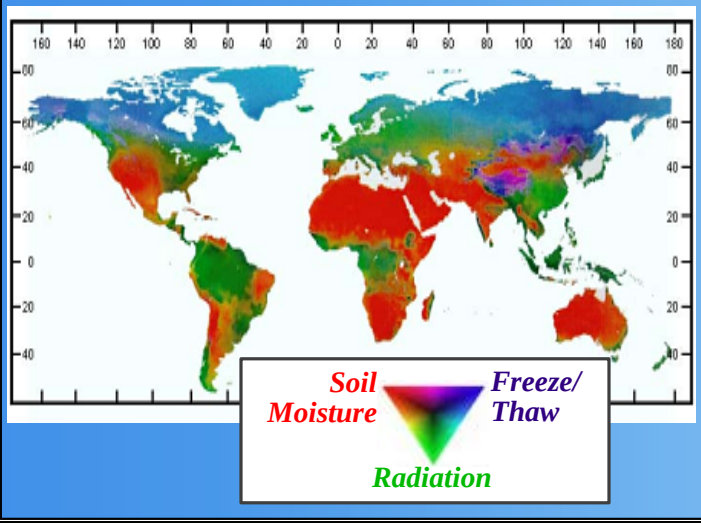
SMAP/Sentinel-1 Active-Passive Data Contributions to SMAP Science Goals

Jet Propulsion Laboratory
California Institute of Technology

Science Returns

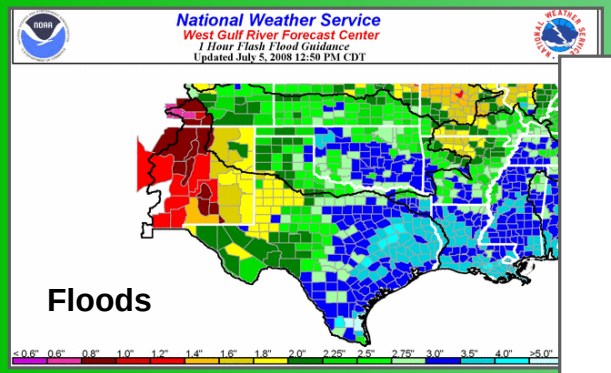
Soil Moisture *Links* the Global Land Water, Energy, and Carbon Cycles

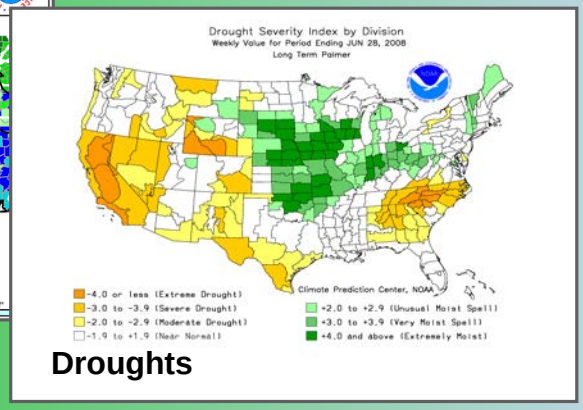


1. Estimating global surface water and energy fluxes
2. Quantifying net carbon flux in boreal landscapes
3. Reduce uncertainty of climate model projections

High-resolution AP product allows the identification of the *link* between the water, energy and carbon cycles over land (#1 and #3) and its dependence on landscape features.

Applications Returns





4. Enhancing weather forecasts
5. Improving flood prediction and drought monitoring

High-resolution AP product allows the identification of flood potential as well as severe convection over land (#4) and their dependence on landscape features.

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Request for Sentinel-1 Data at the SMAP Cal/Val Sites
For Discussion by JPPG (Cal/Val and Field Campaigns)

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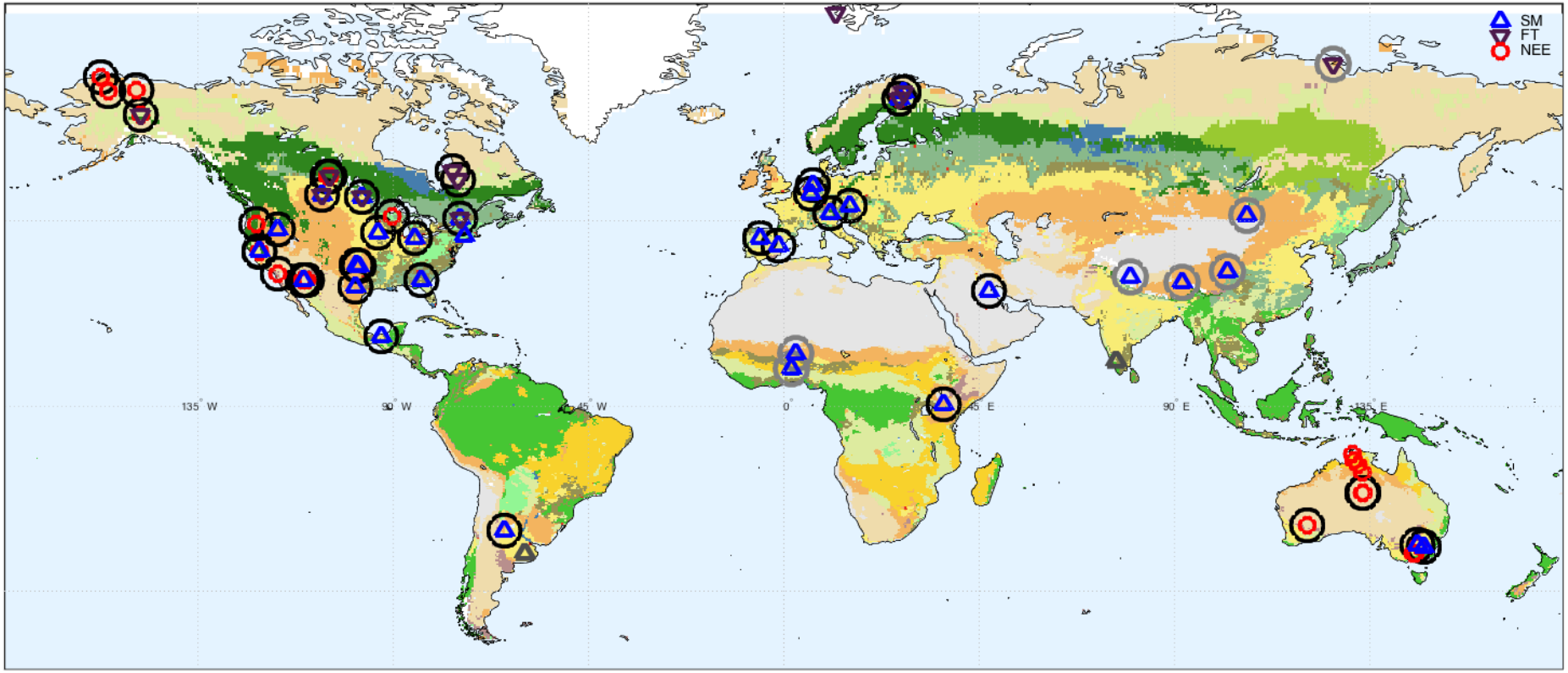

Black circles: Near real-time data access established
No circle: Near real-time data access being established
Grey circles: No near real-time data access available (data available at the end of Cal/Val Phase)
Grey triangles: installations on-going, but expected to provide useful data at some point during the Cal/Val Phase

The Sentinel-1 data over SMAP's core cal/val sites will

- Be beneficial for the calibration/validation of Sentinel-1 sigma0 and soil moisture
- Be used to cal/val SMAP/Sentinel-1 soil moisture products

Request for Expanded Coverage of Sentinel-1 Data

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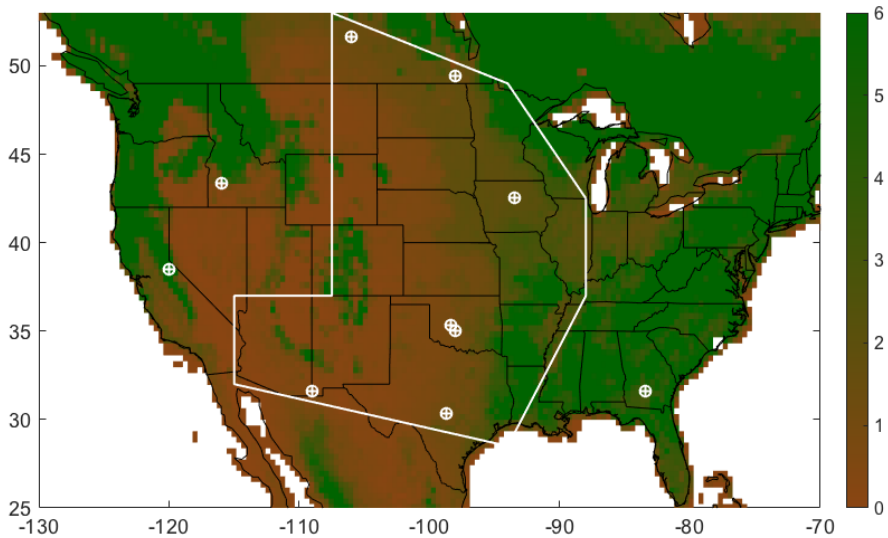
- Expanded coverage includes Illinois agriculture, goes along Mississippi (excludes East of River which is high VWC), includes Texas, New Mexico and Arizona and avoids the Rockies. It goes to include the two Canadian cal/val sites.
- What it encloses are the priority/relevant core cal/val sites, US croplands and relevant Midwest areas of land-atmosphere coupling.
- The box size/shape can be revised based on detailed data acquisition analysis
- Regular repeat sampling required.



The box is defined by the lat/lon pairs:

```
bx=[42.5  -88.0;...
    37.0  -88.0;...
    28.5  -94.0;...
    32.0 -115.0;...
    37.0 -115.0;...
    37.0 -107.5;...
    53.0 -107.5;...
    49.0  -94.0;...
    42.5  -88.0];
```

NASA/ESA/EU Agreement Objective

- **SMAP/NASA agreement objective:**
  - C-band radar data with regular, repeated sampling (12 day average intervals) over the following specific areas/regions:
    - US and Canadian core cal/val sites (+/- 50 km)
    - North America region bounded by US & Canadian core cal/val sites, beneficial for assessing land-atmosphere coupling over agricultural regions
  - Sentinel data is already delivered to ASF DAAC, SMAP will access C-band data from this source (no dedicated data interface is necessary)
- **ESA/EU benefit:**
  - Participation in SMAP team (no exchange of funds basis) research product development and cal/val (leverages SMAP effort which will aid Sentinel product development)
  - Access to SMAP core cal-val site data
  - Study on whether and how NASA can provide additional downlink support

** Interferometry Wide-Swath VV-VH dual-polarization observation mode*