Validation with deep, high temporal resolution soil moisture, temperature, and flux data for the area of mixed temperate hardwoods near the University of Michigan Biological Station, Northern Michigan

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## Site Description: Core Site Proposal

- 4 Soil pits (points, ~ 1.5 km apart)
  - 30-min Soil Moisture, Soil Temperature (Stevens Hydra II SDI-12)
    - At 5, 15, 30, 60, 100, 200 and 300 cm
    - 0-5cm integration (Stevens Hydra II SDI-12)
  - 30-min Soil Skin Temperature (same locations)
    - 0 cm (CL-107 temperature probes)
- Sparse Networks (including the locations of 4 pits)
  - Monthly Soil Moisture (Hydrosense (CS620): 20cm / MiniTRASE: 40 cm)
    - 156 points, at two 50 m x 50 m plots (@20 cm & 40 cm)
    - Several ~450 800 m radial transects around two flux towers (@40 cm)
- Meteorological and Flux Data (at the locations of 4 pits)
  - Ameriflux observations + FASET + 4 sub-canopy eddy-flux towers
    - Precipitation (2 above-, 4 below-canopy), temperature (+profile), humidity (+profile), wind speed (+profile), radiation (short-, longwave, PAR), ecosystem GPP, NEE, respiration
    - Phenological state, tree bowl temperature (32), etc.

## Project Supporting the Site and Research Focus

- Soil moisture: NSF grant "Collaborative Research: Linking Heterogeneity of Above-Ground and Subsurface Processes at the Gap-Canopy Patch Scales to Ecosystem Level Dynamics," (09/01/2009–08/31/2012); observations began in 04/2009.
- Ameriflux observations: DOE, NSF grants. Started in 1999.
- Forest Accelerated Succession ExperimenT (FASET)
  - a DOE-NICER funded study, in which manipulations of the canopy structure simulate a shift from mid- to latesuccessional tree community in a 40 ha area. Started in 2008.
  - Transient ecosystem: ~7,000 of aspen and birch trees were girdled in 2008



## US-UMB, Lat. 45.5598; Long. -84.7138

## Issues?

- Site is existing
- **Data latency** (for soil moisture only)
  - Point observations: hour to few hours
  - Spatial transects: one week
- GSM 0-5 cm validation for SM
  - 30-min 0-5cm SM at 4 points
- Plan for scaling points to footprints:
  - Installation of sensors with wireless data transfer (see below)?
- Ideas for improvements: core validation site:
  - Most data satisfy the requirements of the core site
  - The only "issue" is the required footprint scaling:
    - soil moisture fields are fairly homogeneous (from previous obs-ns)
    - patches of sandy clays and loams: need to know coordinates of SMAP grid box to address scaling intelligently