**Project Overview and Objectives**

- Assess high-temporal resolution surface pressure observations from the US Transportable Array (USArray) spatially with gridded background surface pressure fields
- Examine case events of high-impact phenomena that traversed active region of deployed USArray platforms
- USArray observations are accessible via numerous sources:
  - NCEP Rapid Refresh (RAP) downscaled 2.5 km
  - USArray Surface Pressure Network
  - MesoWest: [http://mesowest.utah.edu](http://mesowest.utah.edu)
  - Five-minute observations distributed in real-time to NWS Western Region, MADIS, and other NOAA entities

**USArray Surface Pressure Network**

- EarthScope-sponsored network of 400+ seismic stations
- Platform spacing based on a ~70 km quasi-grid
- Equipment deployed for 1-2 yr, then redeployed east of array
- Pressure sensors added in 2010 (1 and 40 Hz sampling)
- 2014 main array location along eastern coast of US
- Subset of ~150 stations to remain in place over central and eastern US for next several years with more deployed in Alaska

**Case Selection and Methodology**

1) Cases selected using pressure signature catalogues via web tools (Jacques et al. 2015 – accepted by *Monthly Weather Review*).
2) NCEP Rapid Refresh (RAP) downscaled 2.5 km 1-h forecast surface pressure grids collected as background “first guess” fields
3) USArray surface observations retrieved from archived repositories
4) Grids and observations spline-interpolated at 5 minute intervals
5) Hourly pressure changes for grids and observations computed to eliminate potential elevation-based differences and influences
6) Gridded analyses of hourly pressure change computed using the University of Utah Two-Dimensional Variational Analysis (UU2DVAR – Tyndall and Horel 2013) at 5 minute intervals
7) Hourly pressure change added to previous background field and converted to sea-level using 2.5 km resolution terrain and standard altimeter conversion algorithm

**Summary**

- Intensifying synoptic system over Great Plains
- Mesoscale solitary wave of depression propagated through Great Lakes region under primarily stable air mass north of warm front
- Large pressure falls with wave (> 8 hPa h⁻¹)

**Future Work**

- Use UU2DVAR to produce high-temporal resolution gridded pressure fields for additional mesoscale (and other) cases using USArray observations
- Assess objective feature identification and tracking abilities using gridded analyses at higher temporal resolutions (e.g., every 5 minutes)
- Explore potential methods to analyze gradients using resultant analyses
- Improve and enhance capabilities for web tools
- Continue to collect, analyze, and disseminate USArray observations in real-time

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**Project Website:**
- Grids and observations [spline](http://meso1.chpc.utah.edu/usarray)
- Hourly pressure change for grids and observations [computed](http://mesowest.utah.edu)
- Prominent pressure rises and falls associated with mesohigh/wake-low couplet

**5 September 2012 Great Plains Mesoscale Convective System**

- Developed in northwestern Iowa and propagated southeast through Iowa and Illinois
- Several wind damage reports in Iowa/Illinois
- Prominent pressure rises and falls associated with mesohigh/wake-low couplet

**11 April 2013 Midwest Synoptic System and Inertia Gravity Wave**

- Intensifying synoptic system over Great Plains
- Mesoscale solitary wave of depression propagated through Great Lakes region under primarily stable air mass north of warm front
- Large pressure falls with wave (> 8 hPa h⁻¹)