

Network of Network Efforts: History, Successes and Continuing Needs

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A Little History

- NAOS - NOAA/NWS/NCEP effort on rational approach to determine observing requirements - 1990s
- Community Meeting Dec. 2003; **BAMS** article, Dabberdt et al, July 2005 (USWRP sponsored)
- AMS APT Study on "Multi-Partner, Multi-Functional Mesoscale Observing Networks" 2006-2009
- NRC Study commissioned by BASC - late 2006
- Many other related efforts, studies, meetings.....
- Main issues: Coordination; Vertical data; How Choose? - Relative value; Leadership; Testbeds;

NAOS

Vision for MESO-OBS Proposal

Create a Significant Jump in the Information Content of the Mesoscale Observational Data Base which is Vital to Improving the Forecasts of High Impact Weather Events

Targets

Warm Season Storms Winter Season Storms

90% of Presidentially declared disasters are weather/flood related

NAS Study

Committee Membership

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Study Goals and Focus

- Develop an overarching vision for an integrated, flexible, adaptive, and multi-purpose mesoscale network
- Identify steps to help develop a network that meets multiple national needs in a cost-effective manner.
- Focus on mesoscale observational requirements over the United States and adjacent coastal zones
- Emphasize the planetary boundary layer (~2 meters below the surface to 2-3 km above)

network design was NOT a study goal

Vision: A Network of Networks

"The committee envisions a distributed adaptive Network of Networks (NoN) serving multiple environmental applications near the Earth's surface.

Jointly provided and used by government, industry, and the public, such observations are essential to enable the vital services and facilities associated with health, safety, and the economic well being of our nation."

So, What Happened?

- Some Congressional Interest - no large response occurred
- National Mesonet Program (more later)
- Testbeds
 - RZO Testbeds in NCEP, etc. (not NoN motivated)
 - CASA Testbed in DFW (NoN and NSF motivated)
- Surface observation innovations continued
 - Road weather, smart cars, cell phones, MOPED, etc.
- Upper air profiling - mixed record (wind profiler, TAMDAR, thermo., etc.)
- No "central authority" has emerged; MADIS playing important role
- "Summit" – This Forum a good start!

National Mesonet Program (NMP)

- NRC released the "From the Ground Up" report in early 2009, outlining a comprehensive strategy for designing, deploying, and operating a CONUS-wide and truly mesoscale observing system, in a "Network of Networks" (NoN) paradigm
- A key concept of the NoN involves leveraging non-federal data sources
- Consequently, Congress established the NWS's National Mesonet Program to procure non-federal data and apply that data in all facets of NWS operations
- The program began with 9 non-federal "mesonets" located mostly in the south-central U.S.
- The program has now grown to nearly 3 dozen networks operating across all 50 states, operating a broad variety of hydrometeorological observing systems
- Key partners include GST, Earth Networks, the University of Oklahoma, and WeatherFlow

Dallas-Fort Worth Urban Testbed

U-Mass (lead), U. Oklahoma, Colorado State Univ.

- Population ~ 6.5 million (4th largest city in U.S.)
- Severe weather – Floods, tornadoes, hail, severe winds, droughts
- Weather sensitive industries – transportation hubs (ground, air, rail), sporting venues
- Network of Networks approach
- Primary focus is urban flooding & severe weather



2015 Operational Configuration

OSCAR Boomer

Xeon64 Oct-core SandyBridge 2.0 GHz

- **Analyses at 400 m Resolution** Dedicated Qu
 - 3DVAR and Cloud Analysis
 - Sfc, Profilers, VAD, Radar Wind and Reflectivity
 - 5-minute Interval
 - 400-m grid spacing Grid Size 448 x 456 x 28
 - Processors: 8 x 24 = 192
 - Obs Processing & Analysis Wallclock ~8 min
- **Assimilation/Forecasts On-Demand**
 - 3DVAR and ARPS with 10-min IAU
 - Sfc, Profilers, VAD, Radar Wind and Reflectivity Assimilation
 - 2-hour Forward Forecast
 - 15 minute Interval
 - 1-km grid spacing Grid Size 363 x 323 x 53
 - Processors: 12 x 16 = 192
 - Obs Processing + Analysis + Forecast Wallclock ~20-25 min



Continuing Needs - Where Do We Go From Here?

- **Growth of NMP**
 - TAMDAR; GPS-MET, PBL Sensing, MADIS ingest/QC being planned
 - Other opportunities? (e.g. – PBL data from ceilometers; private sector systems/networks; cell phones, cars, X-band radar networks; etc.)
- **Obs System Assessment - NOSIA**
 - NOAA Obs systems inventoried/assessed/prioritized (now can identify value of each observing system to NWS operational requirements; helps to defend or improve existing systems)
 - No formal process for evaluating potential new measurement system or instrument
 - Need to involve OSE, OSSE, FSO tools into process
- **Role of this Forum**
 - Stimulate thinking on what obs are most needed and how they could be obtained
- **AMS 2017 Annual Meeting Theme: "Observations Lead the Way!"**
 - Observation Symposium (follow-up to this Forum) – will concentrate on greatest obs. needs
 - Each AMS Conf. this year (and at Annual Meeting) will be asked to have session on greatest observational needs in their disciplines; this info. will be collated and disseminated