NOAA's Hydrometeorological Testbed (HMT)

The Empirical Approach to Observing System Design & Demonstration

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June 6, 2007
National Testbed Strategy
Regional Implementation

Foci
- QPE
- QPF
- Hydrology
- Verification
- Enhancing & Accelerating Research to Operations
- Building Partnerships

The national Hydrometeorological Testbed program will be implemented incrementally in different regions of the U.S.
HMT’s Products

Decision Support Tools

21st Century Observations

21st Century Modeling

Science
The Foundation
R&D and Operational Perspectives: Observing Systems

**R&D Priorities**
- Exploratory
- Higher Resolution
- Multi-Sensor
- New Variables
- Publication

**Operational Priorities**
- Reliability
- Cost Effectiveness
- COTS (plug n’ play)
- Continuity
- GPRA Measures

**Testbed Domain**

- **R&D**
  - Basic R&D
  - Improved User Decisions

- **Operations**
  - “Culture”
The HMT Concept
Testbed as a Process

Input

Develop and introduce new ideas, data, etc.

Test and refinement loop

Revise and iterate

Output

Operationalize new methods
- NWS, NOS
- OAR
- State and Local agencies

Experimentation and demonstration

Impact assessments


Marty Ralph
NOAA/ETL-PACJET
Building Partnerships

- Critical Element: engaging local, state and federal stakeholders…

June 6, 2007
A Hydrometeorological Testbed (HMT) for the Russian River Watershed

HMT-2004

HMT-2004 Microphysics Array

- BBY = Bodega Bay
- BSC = Big Sulfur Creek
- CVD = Cloverdale
- CZC = Cazadero
- FRS = Fort Ross
- GRK = Goat Rock
- HBG = Healdsburg
- HLD = Hopland
- LSN = Lake Sonoma
- ROD = Rio Dell
- SPT = Salt Point

Legend:
- Profiler/RASS/Met (ETL)
- Profiler/RASS (Other Agency)
- X-band/Met/Rain gauge
- S-band/Met/Disdrometer
- WSR-88D (NEXRAD)
- Sfc. met. + rain gauge
- Additional rain gauges
- Soil-moisture probes
- GPS IPW
- X-band polarimetric scanning radar
- S-band precip profiler
- 915-MHz wind profiler
- Raindrop disdrometer
- GPS rain gauges
- River gauges
- Ocean buoy

Map showing locations of various monitoring stations and instruments related to the HMT-2004 project.
Why the American River Basin?

Changes in Peak Flows
American River

American River Runoff
Annual Maximum 1-Day Flow

Unimpaired Runoff at Fair Oaks

Red Line = Construction of Folsom Dam

Lester Snow, CA-DWR
Tier 2: Adds networks of proven, moderately expensive technologies:
- Wind profilers
- AtmosRiver Observatories

Tier 1: Builds on existing networks and adds proven inexpensive technologies:
- GPS-met
- Soil moisture
- Snow-level radars

Tier 4: Adds an offshore recon. program to improve lead time of adverse weather forecasts:
- Two m/u aircraft stationed in CA
- Two add’l m/u aircraft out of AL and HI

Map of Tier I-IV
# Observations & Modeling

- Diagnoses
- Quantitative precipitation estimation (QPE)
- Climate change monitoring
  - Assimilation in numerical weather prediction (NWP) models
  - Verification
    - Confidence and credibility in QPF is achieved through verified
  - Observing System Simulation Experiments (OSSE)
  - NWP can improve QPE through assimilation

* Indicates a direct linkage between the observational and modeling components of this vision