NSSL Hydro-Meteorology Research

David Jorgensen
Hydrometeorology
Outline

Brief History – How we got here

Overviews – National QPE Mosaic Project, Collaborations in HMT, Debris Flow Projects, Use of Hydro Models

Relevance – NOAA 20-Year Vision, OAR 5-Year Research Plan documents

Quality – Presentations, Papers (>20), Awards

Performance – Tech Transfer to NWS, Continued Grant Awards (2008: $949k) ~64% of group budget
Who We Are

NSSL HydroMet Research Group (left to right)

- Youcun Qi
- Dr. Ming Fang
- Dr. J. J. Gourley (Fed)
- Dr. Jian Zhang (Fed)
- Mr. Kyle Pickens
- Ms. Carrie Langston (CIMMS)
- Mr. Ken Howard (Fed)
- Ms. Ami Arthur (CIMMS)
- Mr. Steve Vasiloff (Fed)
- Dr. David Jorgensen (Fed)
- Dr. Suzanne VanCooten (Sea Grant)

5 Ph.D, 4 Federal Employees
in the future, NOAA can not only reduce the costs associated with weather disasters, but also increase economic and human benefits, particularly through increasing the forecast accuracy of precipitation and water availability.
Definitions

We’ll try to avoid jargon and acronym use . . But

- QPE – Quantitative Precipitation Estimation

Usually an empirical relation of the form $Z = AR^b$
Outgrowth of NSSL’s Historical Radar Expertise . . .

- Salt River Project (1990s through present)
- Quantitative Precipitation Estimation through Segmentation Using Multiple Sensors (QPE-SUMS)
- Taiwan Support (2002 through present)
- National Radar Network over the Internet (CRAFT)
- National Radar Mosaic (FAA Support)
- National QPE (Q2) – Conus QPE every 5 minutes
Recent Collaborations

- **HydroMet Testbed** (field work 2005-2007)
  - ESRL/PSD/GSD, NWS/OHD

- **Debris Flow** (field work 2005 to present)
  - NWS/OHD, USGS, NWS/WSFO Oxnard, San Diego

- **Q2 Development**
  - FAA, Taiwan CWB, HMT, NOAA/NWS, NWS/OCWWS, SRP

- **Hydro Modeling**
  - NWS/OHD
National Radar Mosaic & QPE (Q2)

- QPE Development & Evaluation Tool (http://nmq.ou.edu/)
- FAA development of “Weather Cube”
- RUC data assimilation
- Monitoring of 88D network performance


QPE Improvements: Calibration with Disdrometer & Z-R Optimization

Significant improvements with VPR correction and stitching with ESRL/PSD’s polarized radar (Matrosov 2006)

However, “best” QPE was from NWS Radar (150 km away!) with optimized Z-R equation and simple VPR adjustment

Debris Flow Collaboration

Collaboration between NSSL, NWS/OHD, & USGS to implement prototype debris flow warning system in Southern California

SMART-R Contribution: High Resolution Rainfall – For Research & Real-Time Use by NWS in Warning Decisions

4th field season

Improvements to rainfall thresholds & construction of hazard maps for NWS warning operations

Devore, CA – Dec 25, 2003 – Greenwood Ave
Exploring Hydro Modeling

- Evaluate hydrologic sensitivity to improving accuracy of model inputs
  - TREX (open source distributed model from Colorado State Univ.) used for event-based simulation
  - Continuous simulation now possible with HL-RDHM (NWS/OHD new distributed model)
CI-FLOW – Coastal & Inland Flooding Observation & Warning

Outreach, Education, and Customer-Driven Product Improvement from the Sky to the Summit to the Sea


Source: Edward Reppas—Chief, Technical Support Branch, Tropical Prediction Center
Today's Presentations

**Howard** – Challenges in Improving QPE for Improved Flash Flood Warning Guidance

**Zhang** – Q2 Description, Results & Plans

**Gourley** – Local Testbeds and Field Results

**VanCooten** – Project CI-FLOW (Coastal, Inland FLood Observation and Warning)

**Jorgensen** – Summary and Discussion