NOAA RESEARCH • ESRL • PHYSICAL SCIENCES DIVISION

Theme 1: Observing the Physical System

Water Cycle - Summary

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Science Review
12-14 May 2015
Boulder, Colorado

OAR Science Questions Addressed

- How can we improve forecasts, warnings, and decision support for high-impact weather events?
  - Improved process understanding of key physical problems
  - Work with data assimilation and parameterization experts to test new methods that result in improving NWP skill.
- What are the best observing systems to meet NOAA's mission?
  - Conduct field experiments to test new gap-filling instruments and integrated observing strategies
  - Exploit NOAA's current observing assets using innovative techniques

Notable Successes with Respect to Water Cycle Science

- PSD is a leader in observing system science and physical process understanding
- PSD is a leader in executing integrated, multi-platform field campaigns to further the understanding of our environment
- PSD is a leader in wave propagation theory and applications
- PSD has unique and innovative observing capabilities and highly skilled engineering talent to support fast response and the other scientific needs of NOAA and external stakeholders

Future Directions

- Make PSD's observational data, tools, and research products more readily accessible
  - (Ex: Implement AWIPS-2 capability within PSD)
- Continue to innovate on observing system science
  - (Ex: Spaced-antenna wind profiler system)
- Work with stakeholders to improve water science and services
  - (Ex: Advanced Quantitative Precipitation Information [AQPI] project with City of San Francisco)
- Collaborate with other teams in PSD and GSD focused on Modeling and Data Assimilation to make improved predictions
  - (Ex: Use CalWater 2015 and HMT observations of ARs to assess forecast skill)

What You Heard

1-1. Ryan Spackman: CalWater 2015

Processes leading to too much or too little water in California

1-2. Jessie Creamean: Linking aerosols and precipitation

Role of aerosols in modulating orographic precipitation

1-3. Chris Fairall: Advances from CALWATER2/VAMOS/ DYNAMO campaigns

Air-sea interaction and boundary-layer cloud processes impacting ARs and the MJO

1-4. Rob Cifelli: Role of gap-filling radars to improve QPE in complex terrain

Gap-filling observations and radar algorithm improvements leading to more accurate orographic precipitation estimates

1-5. Valery Zavorotny: Measurements of soil moisture and ocean wind using reflected GNSS signals

Exploiting GNSS technology to measure soil moisture, snow-depth, and ocean winds