



# Integrated Observations



## Improving NOAA's Observing System for the 21<sup>st</sup> Century

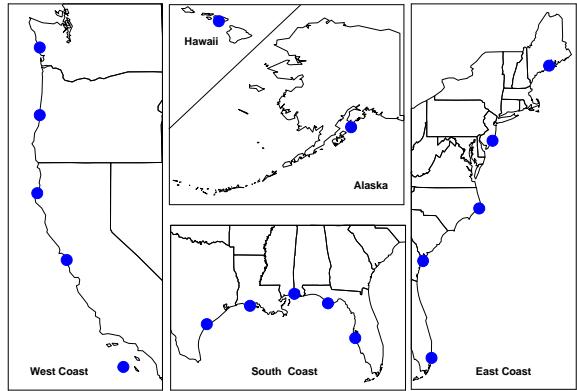


NOAA's Weather and Water Science, Technology, and Infusion Program includes an approved (FY10-14) program element for Integrated Observations Research and Development (R&D). This element will improve NWS coastal and marine weather forecasts to protect against loss of life and damage to the economy. Today, more than half of the U.S. population lives in coastal counties. Coastal storms, including hurricanes, account for 71% (\$7 Billion) of recent U.S. disaster losses annually. Accurate and timely prediction of these events suffers from a lack of available observations.

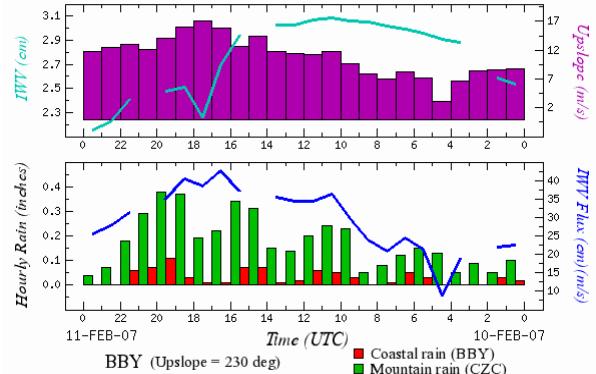
### Method:

The Integrated Observations R&D program element has four integrating activities:

- Optimization planning – What is the best combination of sensors and observing networks for NOAA? This activity will help prioritize acquisitions to intelligently fill gaps in NOAA's observing system for weather and climate.
- GPS Meteorology – Water vapor is the fuel that feeds the storms that cause devastation along our crowded coasts. GPS receivers provide reliable measurements of total water vapor. R&D funds will ensure the GPS data is being utilized fully and will expand the GPS network.
- Coastal Wind Profilers – Wind profilers are radars that are able to measure profiles of the wind remotely in all weather conditions. These measurements are necessary to characterize the transport of water vapor and are useful for a host of other forecast applications, including air quality, fire weather, and aviation weather.
- MADIS – The Meteorological Assimilation and Data Ingest System will serve as NOAA's clearinghouse for data and products resulting from Integrated Observations R&D. MADIS currently provides access to nearly 30,000 real-time surface and upper-air observations of the atmosphere.



A proposed strawman for regional implementations of new coastal wind profiler networks (blue dots) using proven 1/4-scale 449-MHz wind profiler technology that has been tested and evaluated in NOAA's Integrated Ocean Observing System.



Upslope wind measured by a coastal wind profiler (purple bars) and integrated water vapor (IWV) measured by a collocated GPS receiver (cyan curve) are combined to calculate the water vapor transport (blue curve) slamming into the coastal mountains of northern CA during a potent winter storm. The rainfall that fell in the mountains (green bars) is well correlated to the magnitude of the transport.

### Outcomes:

- Improved usability, reliability, timeliness, and accuracy of the integrated surface and upper-air observations used by the NWS to warn the public about hazardous weather
- Improved precipitation forecasts associated with land-falling storms, including hurricanes, and more timely warnings of storm impacts (e.g., floods, storm surge, wind damage)
- New and improved climate-quality data records to help assess the impact of climate change on coastal weather