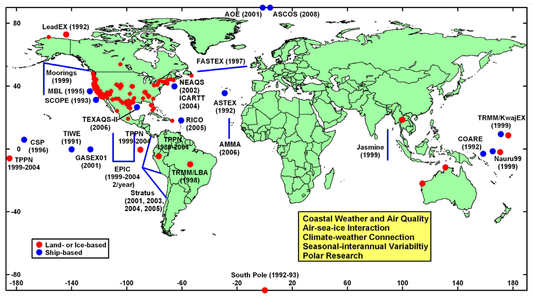
Integrated Water Resources Observing Systems and Networks

Jim Jordan, R. Cifelli, S. Abbott, K. Clark, T. Coleman, D. Costa, J. Gibson, D. Gottas, D. Hazen, P. Johnston, C. King, D. Kingsmill, J. Leach, F.M. Ralph, T. Schneider, A. White



PSD develops and uses an integrated set of instruments to monitor water resources in key parts of the earth-atmosphere system - from water vapor and its transport, to clouds, precipitation, snow and soil moisture. These instruments have been deployed at over 300 sites world wide by PSD's engineering staff. The data are used to increase understanding of physical processes related to the movement of water across different "reservoirs" in Earth's hydrosphere. This supports the development of tools to better address challenges related to water supply and to extremes from drought to flood.

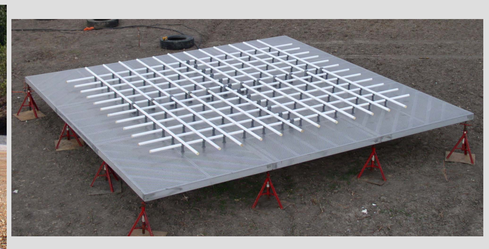
Observations

Vertically Pointing Radars (Profilers)

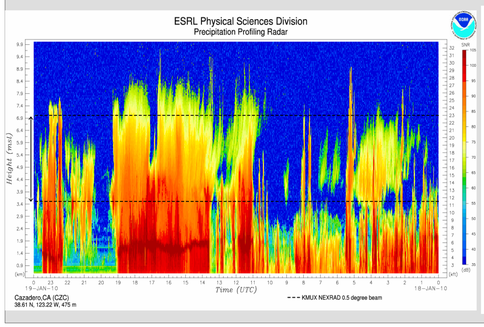
Provide unattended, high time resolution observations of atmospheric vertical structure

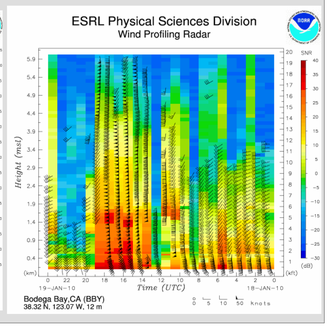
- **S-Band**
  Detailed profiles of precipitation, including characteristics of the drop size distribution (DSD)
- **FM-CW**
  Inexpensive measurement of snow level height
- **915 MHz**
  Wind and temperature profiles in the boundary layer
- **449 MHz**
  Wind and temperature profiles up to 8km

"S-Prof" precipitation profiler



"1/4-scale 449 MHz" wind profiler ("TARS")

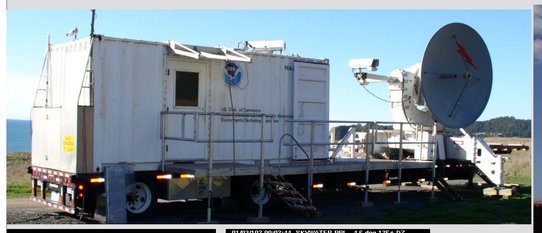


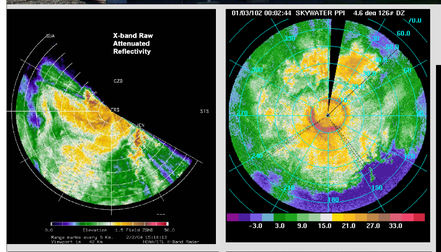


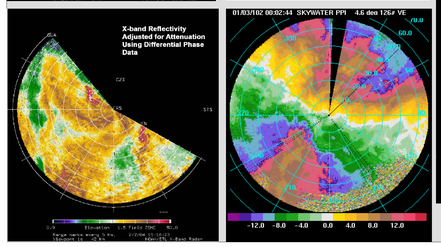
Scanning Radars

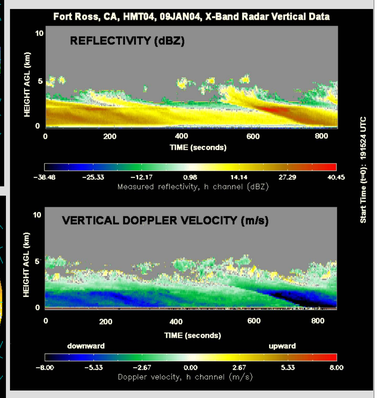
Provide details of the horizontal and vertical structure of precipitation and air motions over large regions

- **X-Band (HYDROX)**
  Dual polarimetric system used for QPE and DSD retrievals; provides gap-filling coverage in complex terrain
- **C-band (SKYWATER)**
  Provides increased coverage compared to X-band; used for kinematic retrievals





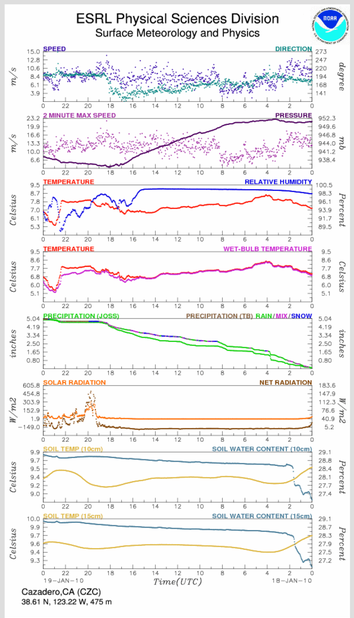




Surface Meteorology

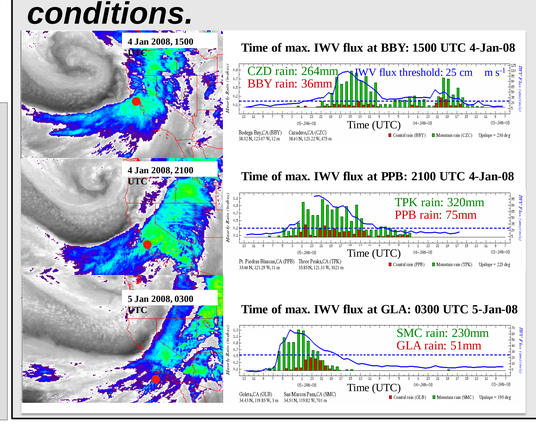
Used to monitor precipitation at the ground as well as air and soil conditions

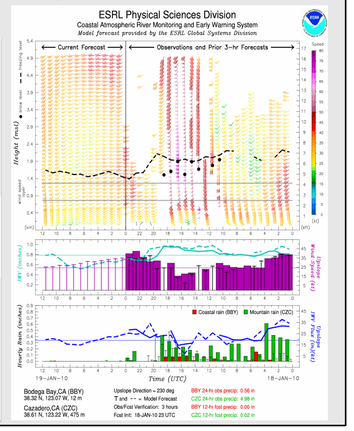
- **Rain-snow intensity and accumulation**
- **Snow depth**
- **Soil moisture and temperature**
- **Temperature and humidity**
- **Wind speed and direction**
- **Solar radiation**
- **Integrated water vapor**



Atmospheric River Observatory

An integrated tool for monitoring and short-term prediction of winds, snow level, water vapor transport and precipitation optimized for atmospheric river conditions.





Data Archive and Display

Data from the observing networks are QC'd, archived, displayed, and analyzed to better understand precipitation processes.

Applications and Forecast Tools

Synthesis of observations leads to new tools to improve weather forecasting and monitor changes in the climate system

- **Flux Tool**
- **Snow Level**
- **Boundary Layer**
- **Wind and Temp Profiles**
- **Satellite Ground Validation**
- **Vertical Air Motion**
- **Model Validation**
- **Drop Size Distribution**
- **Cloud Physics**
- **QPE**