Center for Western Weather and Water Extremes
SCRIPPS INSTITUTION OF OCEANOGRAPHY AT UC SAN DIEGO

LEVERAGING MULTI-BENEFIT OBSERVATION NETWORKS

Anna Wilson, F. Martin Ralph, and many others

Center for Western Weather and Water Extremes

UC San Diego | SCRIPPS INSTITUTION OF OCEANOGRAPHY

FIRO Workshop, 8 August 2019, La Jolla, CA

CW3E – "AR Recon" 2019 Drifting Buoy Project ("AR-Buoy Project")

PI: F. Martin Ralph, Scripps Partner: Luca Centurioni

- **Purpose**: To explore the potential of drifting buoys (with pressure sensors), in concert with AR Recon dropsondes and data assimilation efforts, to improve west coast forecasts of landfalling atmospheric rivers and precipitation. Supports California's Atmospheric Rivers Program (PI: F.M. Ralph; CA Dept. of Water Resources – sponsor), and Atmospheric River Recon project (PI: F. M. Ralph; USACE FIRO – lead sponsor).

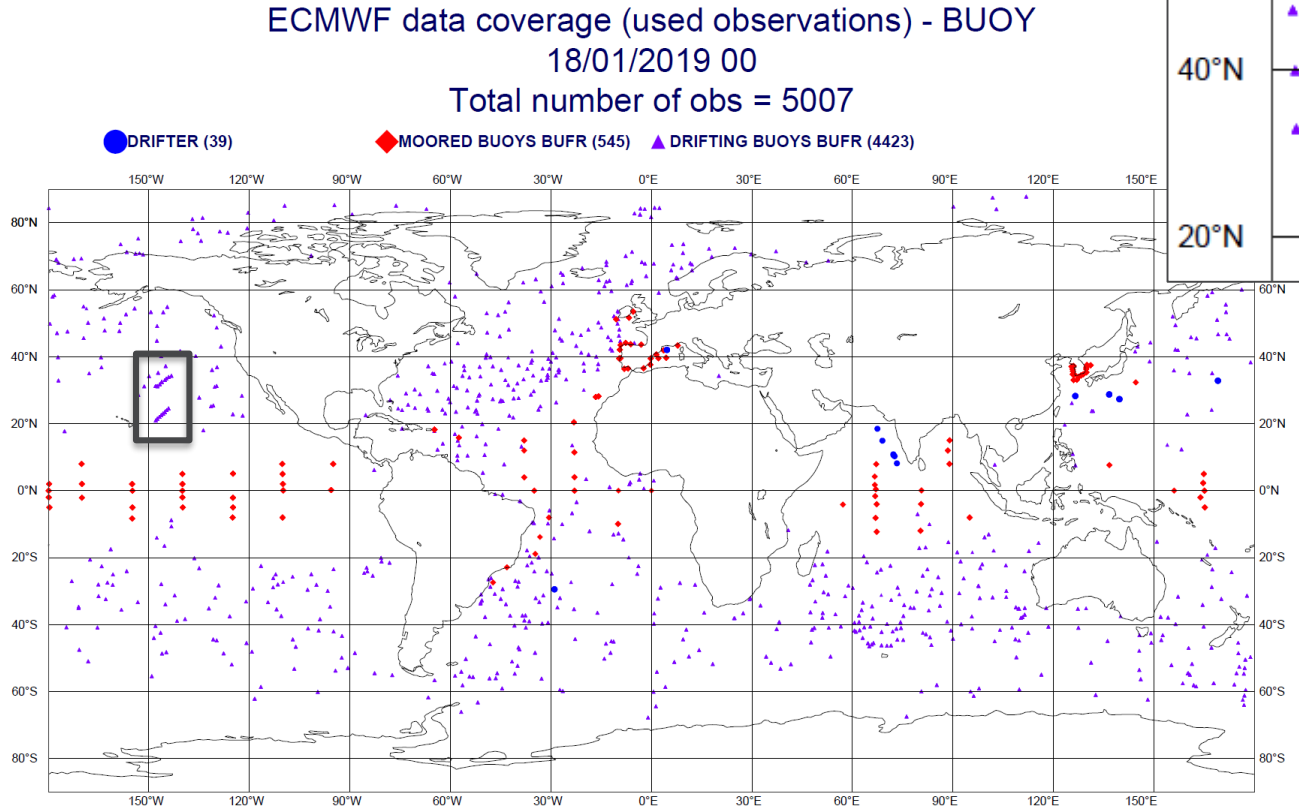
- **Background:** Including surface pressure measurements on drifting buoys can improve the representation of large-scale circulations in global weather prediction models, which is essential for accurate AR landfall forecasts

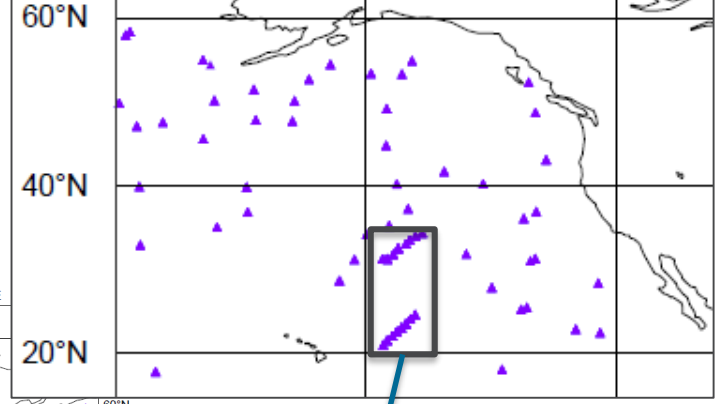
- **Partners**: Deployment leverages the Global Drifter Program barometer upgrade program (PI: Luca Centurioni, SIO; NOAA/OAR/OOMD – sponsor); deployment is by the Air Force 53rd Weather Reconnaissance Squadron. Letter of support from the European Centre for Medium-Range Weather Forecasts (ECMWF).

Sponsored by California's Atmospheric Rivers Research, Mitigation, and Climate Forecasting Program Managed by CA DWR, led by CW3E

PI: F. Martin Ralph, Scripps Partner: Luca Centurioni

AR Recon 2019 - Drifting Buoys Assimilated

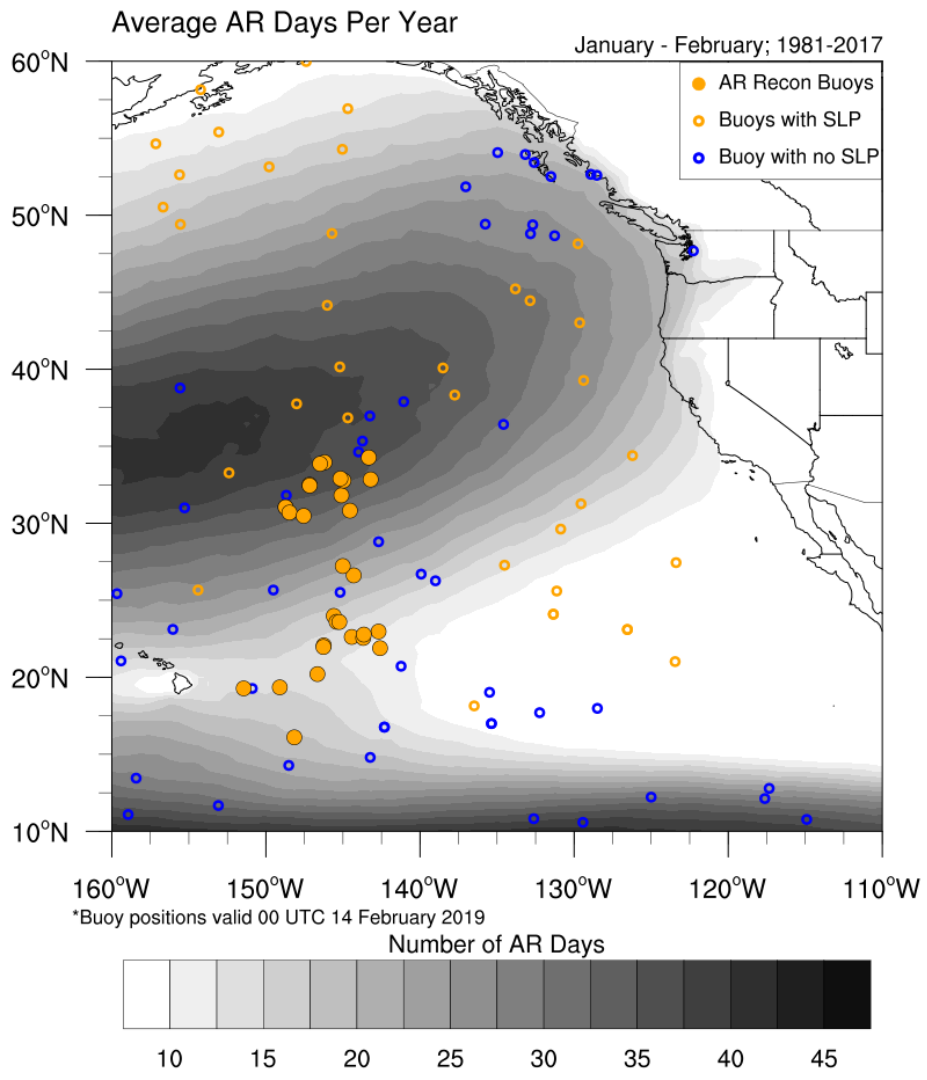




AR Recon – 2019
Added pressure to 32 drifters in coordination with Global drifter program. Air Force's 53rd Weather Recon Squadron deployed the drops during two training flights.

Sponsored by California's Atmospheric Rivers Research, Mitigation, and Climate Forecasting Program Managed by CA DWR, led by CW3E

PI: F. Martin Ralph, Scripps Partner: Luca Centurioni

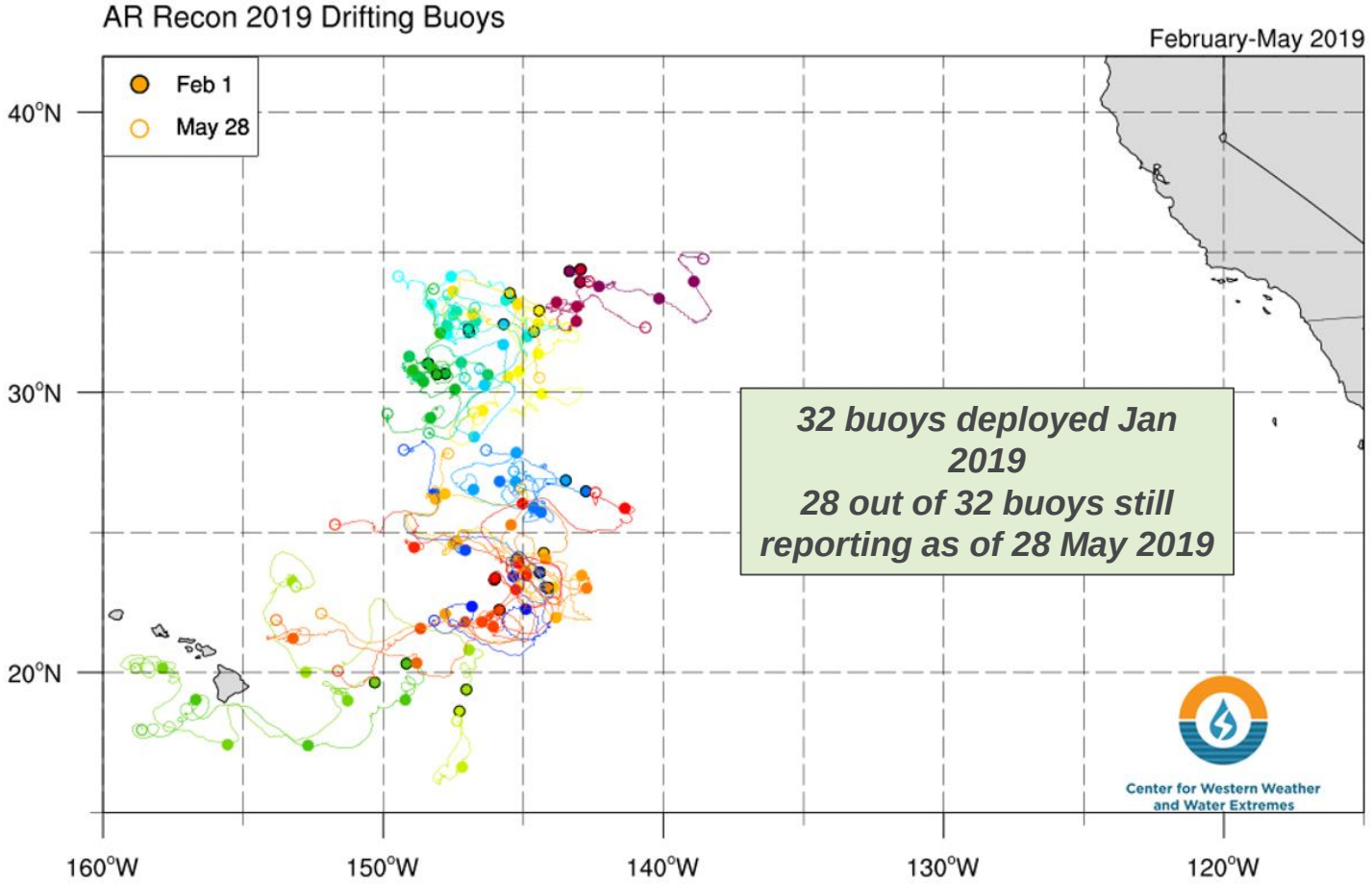


Climatology of ARs by number of days exceeding AR conditions per year during the months of January and February between 1981 - 2017 (shaded; MERRA-2 data). AR days identified using the Rutz et al. 2014 algorithm.

Buoys are overlaid within the map area with positions valid at 00 UTC on 14 Feb 2019.

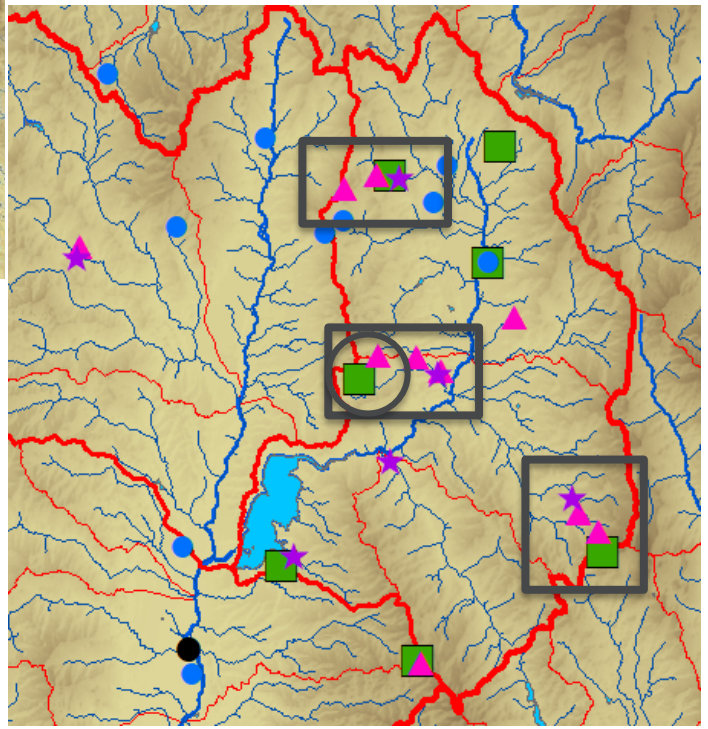
PI: F. Martin Ralph

Provided by Brian Kawzenuk, CW

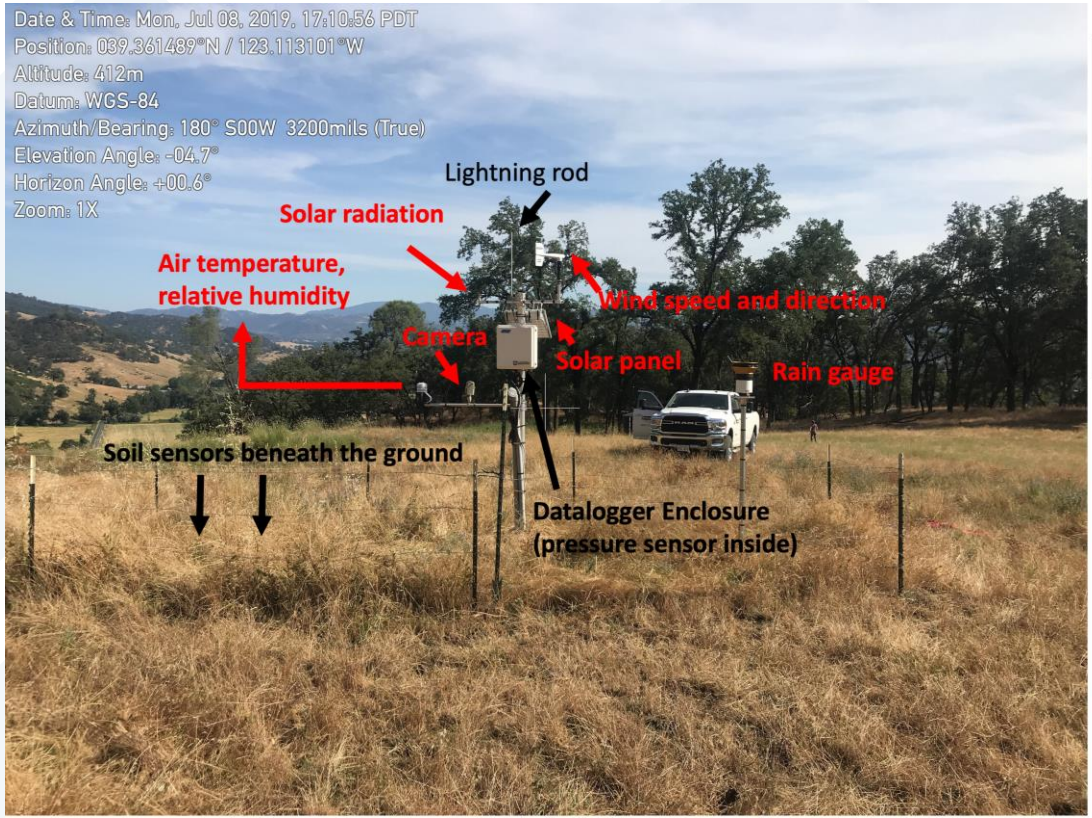


PI: F. Martin Ralph Provided by Brian Kawzenuk, CW3E

ONSHORE: MULTI-BENEFIT OBSERVATION NETWORKS

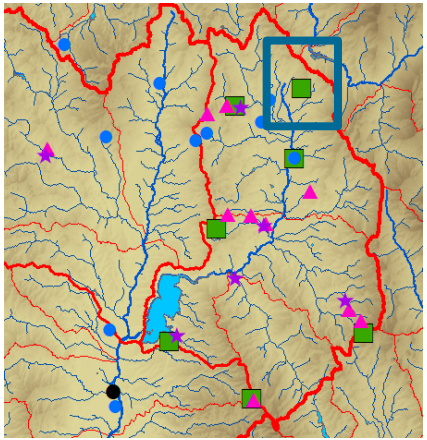


EXAMPLE SITE – POTTER VALLEY NORTH

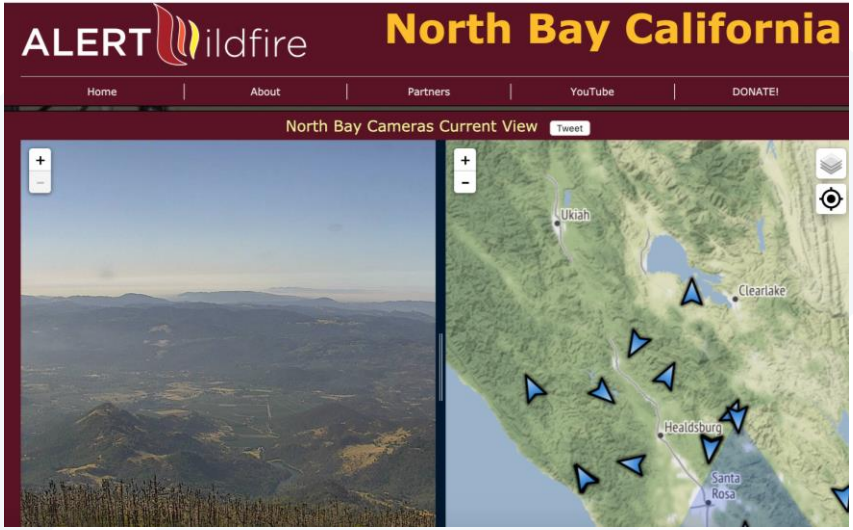


Soil Temperature sensor
Length 4.1 in
Diameter 0.3 in

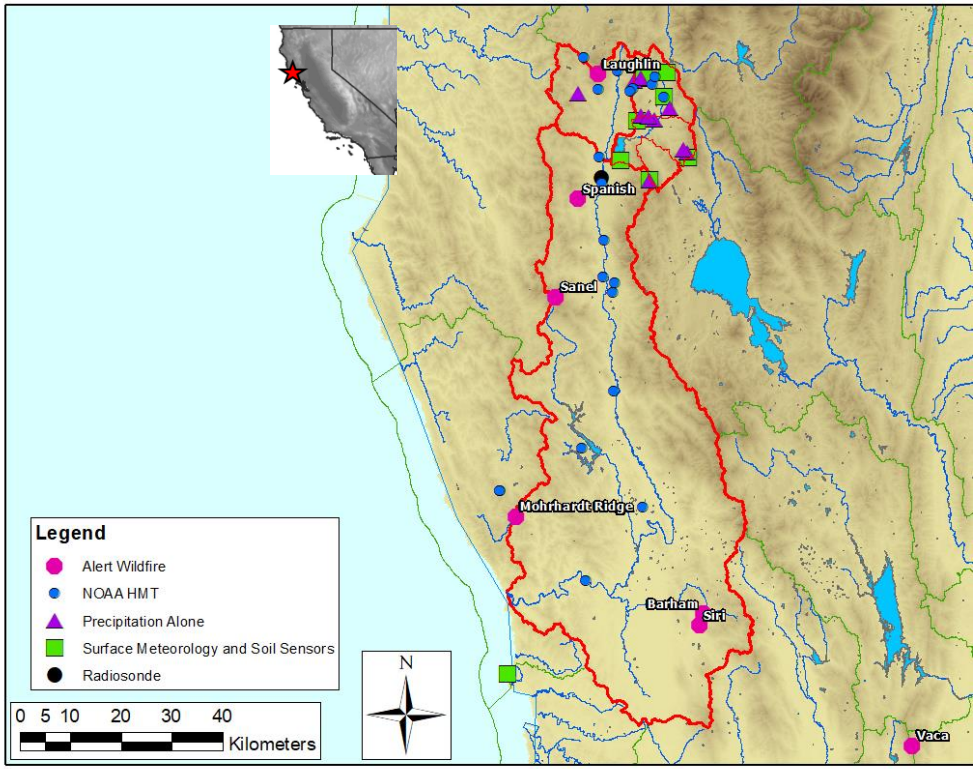
Soil Moisture sensor
Length 11.8 in
Width 1.5 in



ALERT WILDFIRE – NORTH BAY



- Site permissions and basic infrastructure (e.g. towers, communications, power) is the biggest challenge. Adding instrumentation to existing sites can benefit multiple projects at once.



Breaking Silos to Leverage With Other Resource Management & Public Safety Programs

- Monitoring systems are often low priority for funding
- Resources are limited for everyone – partnerships & coordination is a more effective approach
- Different monitoring programs often have similar needs
- Shared data transmission infrastructure
- Examples of other interests:
  - SGMA
  - Wildfire safety (e.g., fire weather stations, etc.)
  - Flood management
  - Natural resource management
  - Seismic early warning systems

Sonoma Water

Slide provided by Jay Jasperse