Regional rainfall measurements using Passive Aquatic Listener during SPURS field campaign

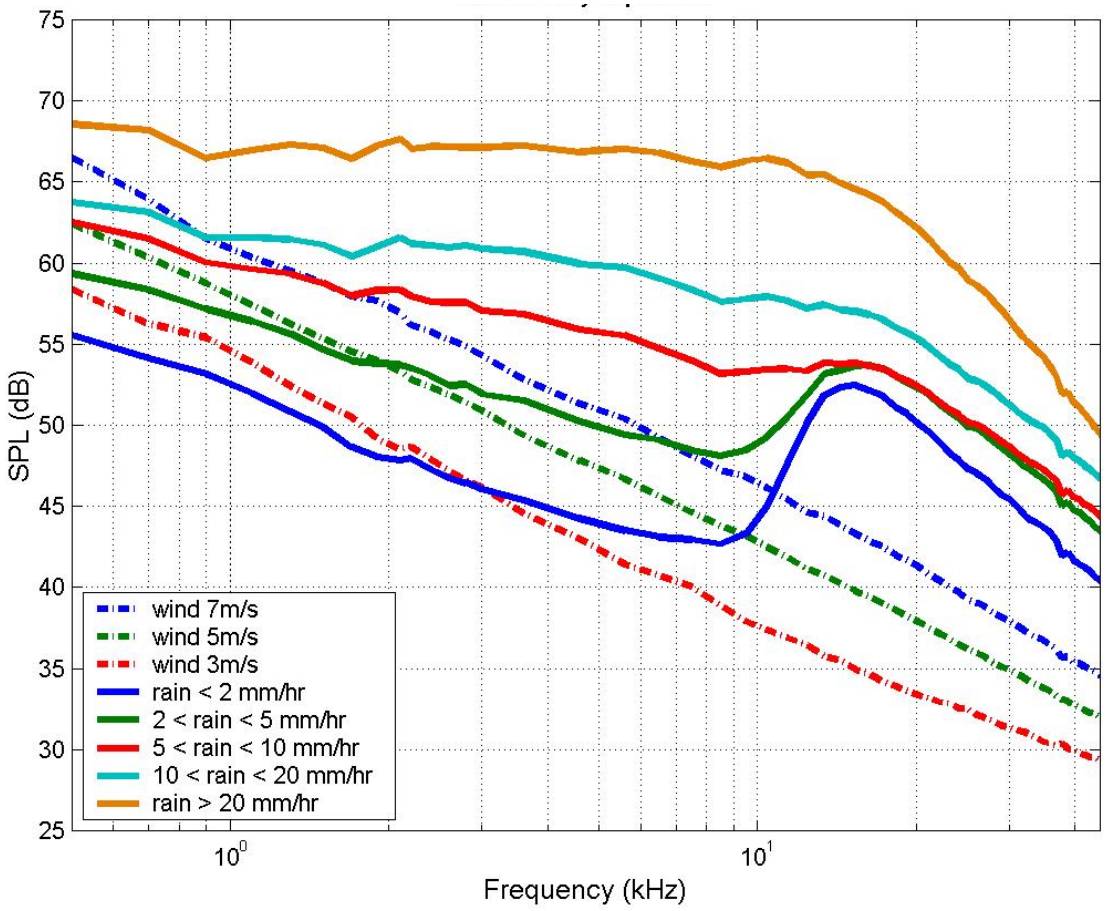
Jie Yang, Stephen C. Riser, Jeffrey A. Nystuen, William E. Asher, and Andrew T. Jessup

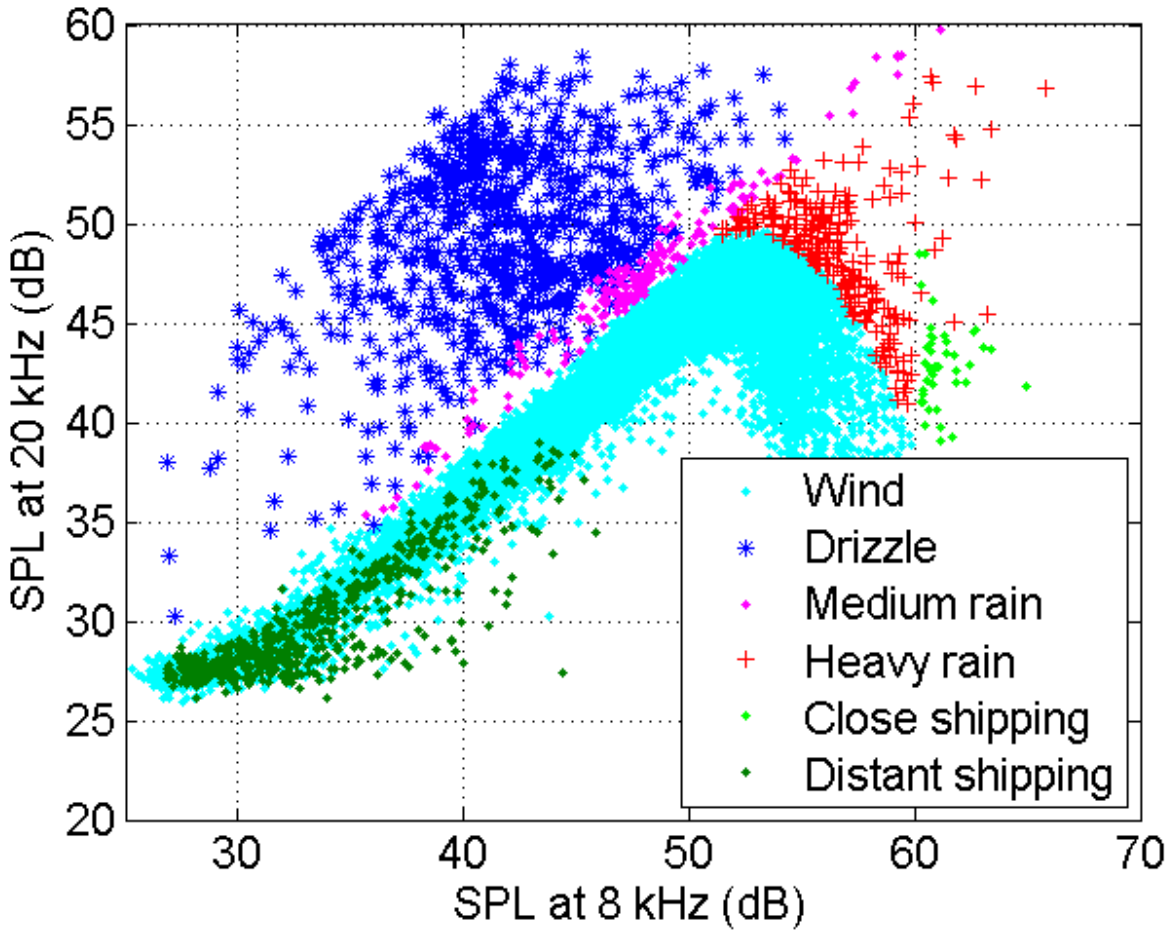
2014 Aquarius/SAC-D Science Team Meeting
November 11 – 14, 2014, Seattle, Washington USA

Outline

- Passive Aquatic Listener (PAL) calibration using 6-year Ocean Station PAPA data
- Rainfall measurements using PAL during SPURS
  1) Rain rate and wind speed results during SPURS
  2) Rainfall seasonal and intra-annual variability
  3) Implication of rainfall measurements on salinity
- Summary and future work

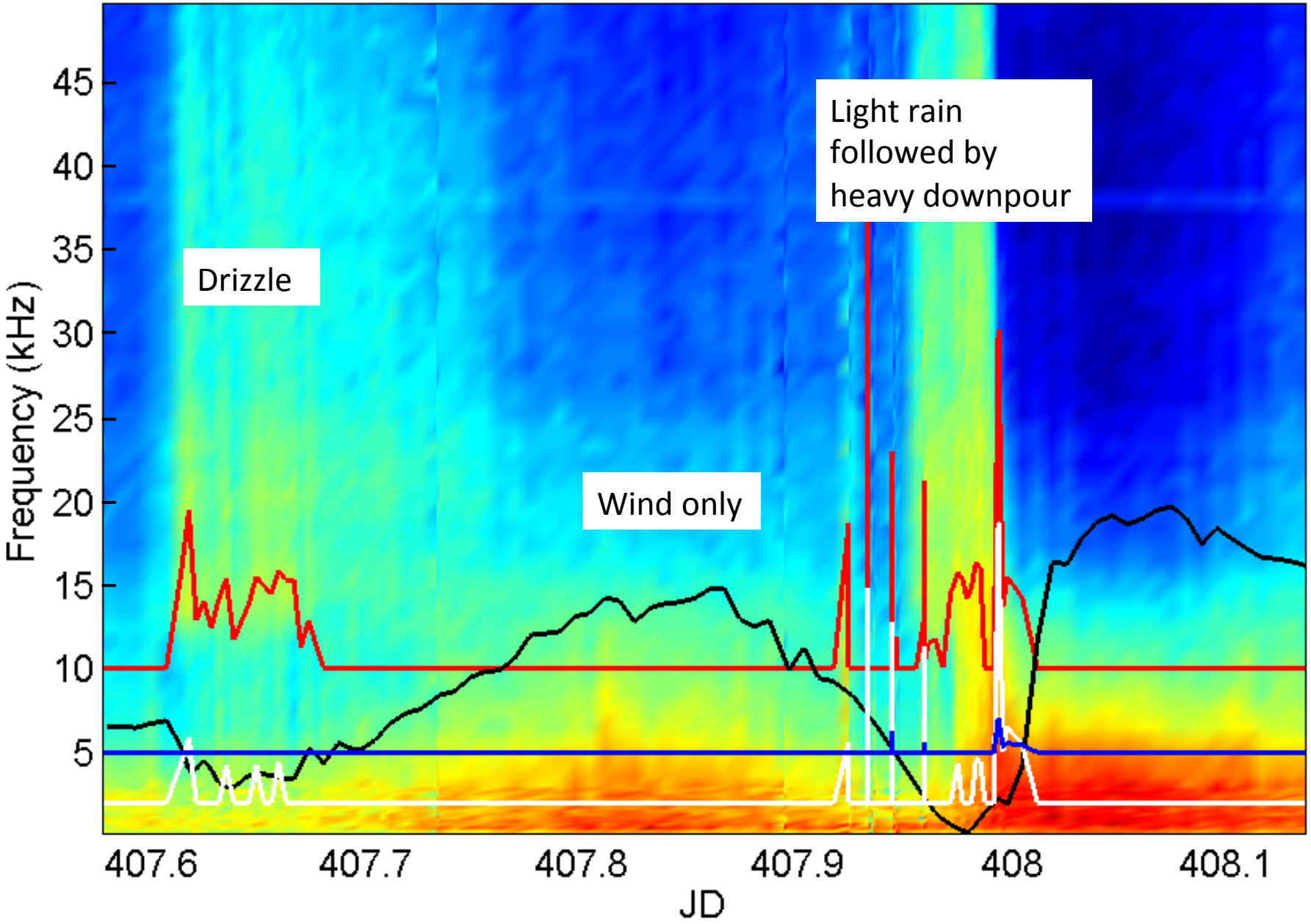
PAL working mechanism and calibration



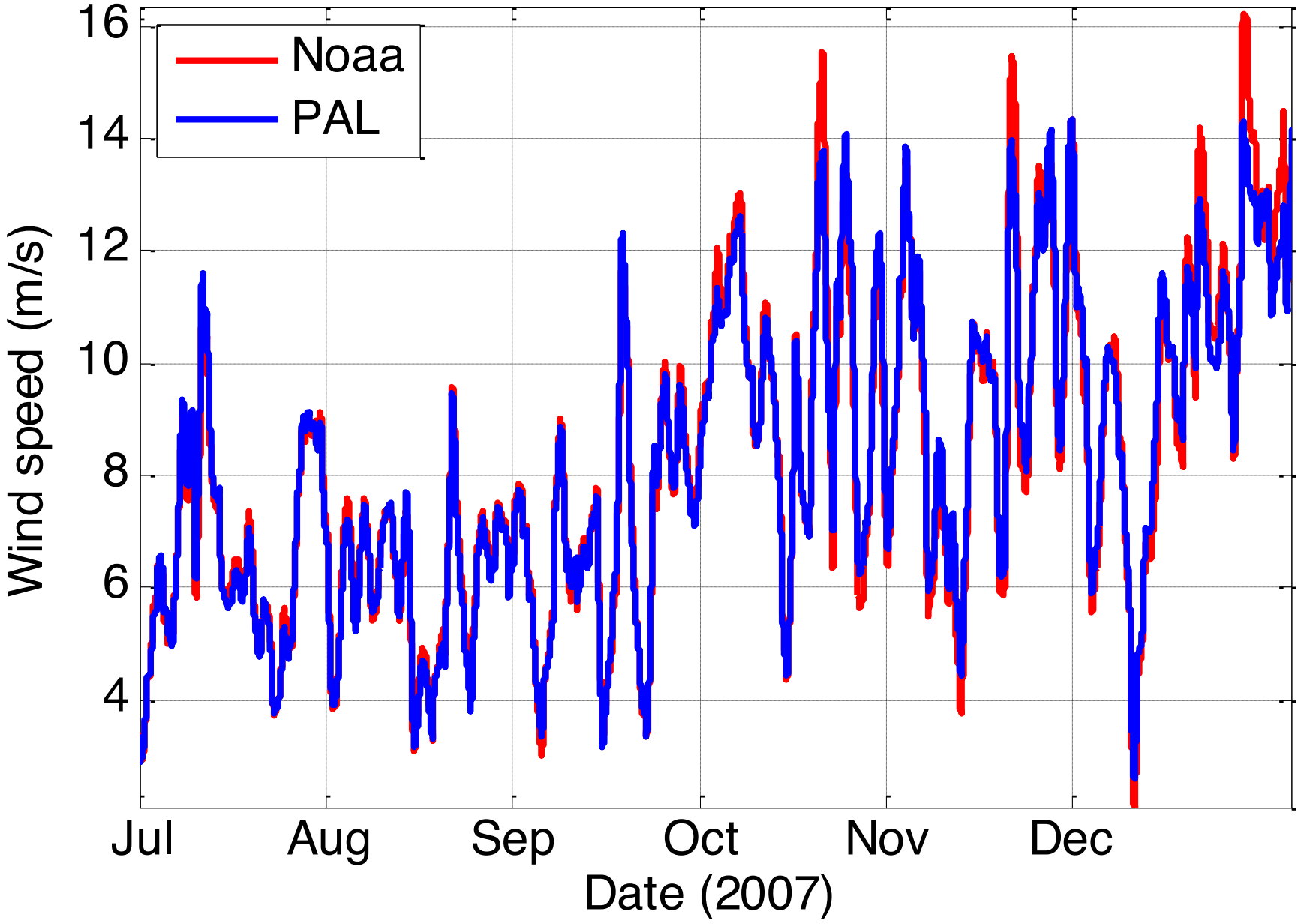


Spectrogram using PAL OSP data

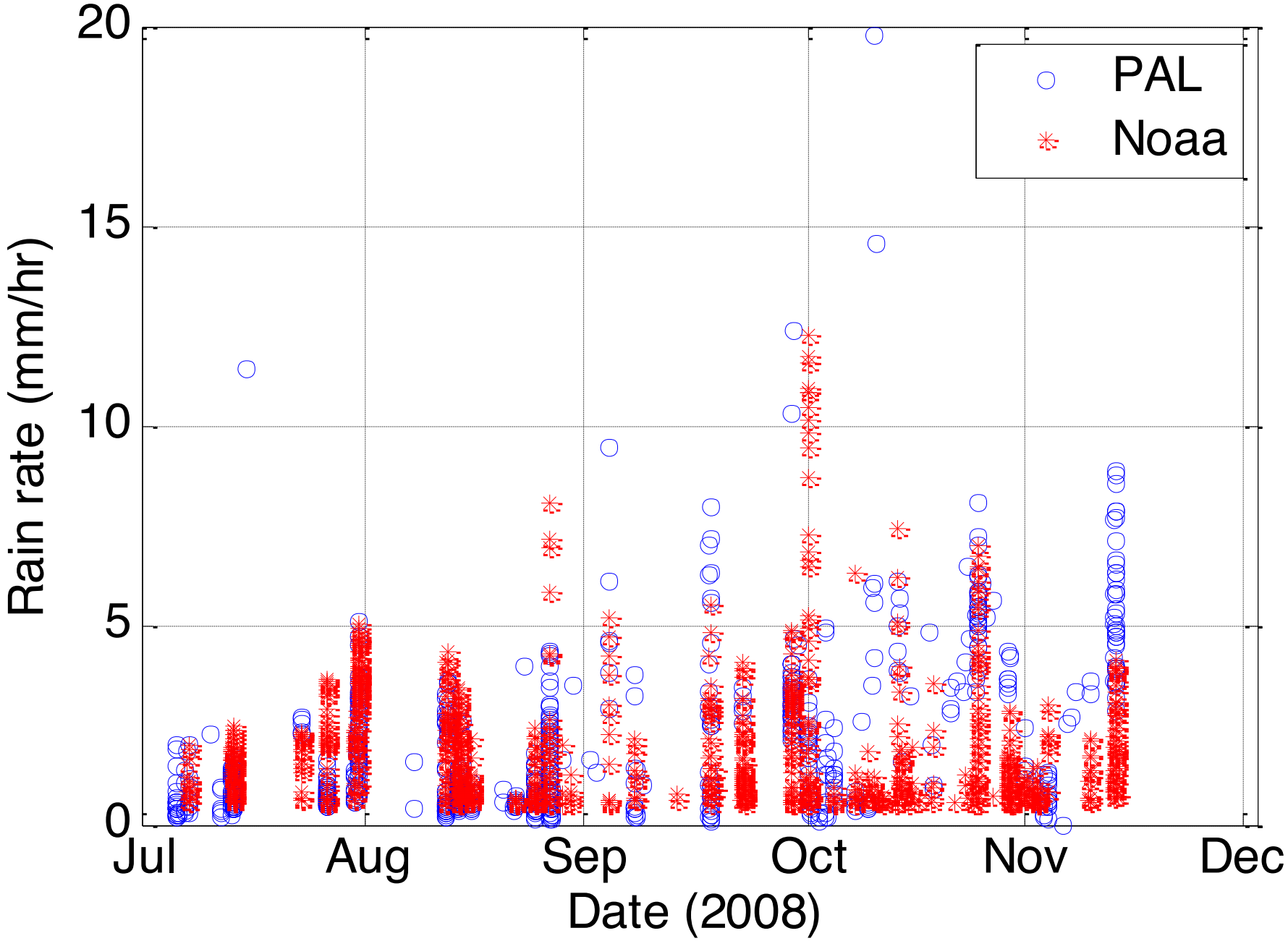
Feb. 11–12, 2008



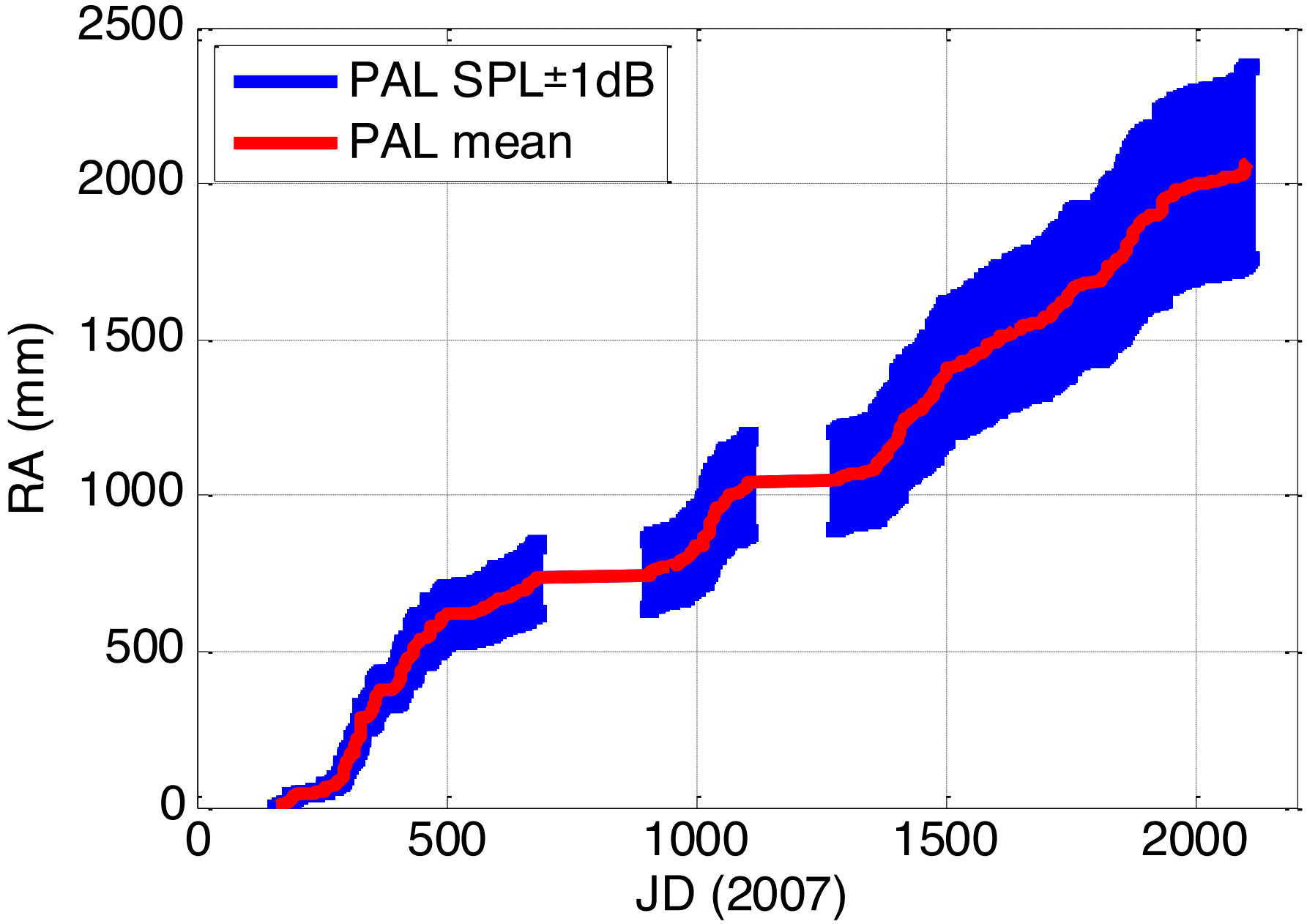
Comparison of wind speed between PAL and anemometer



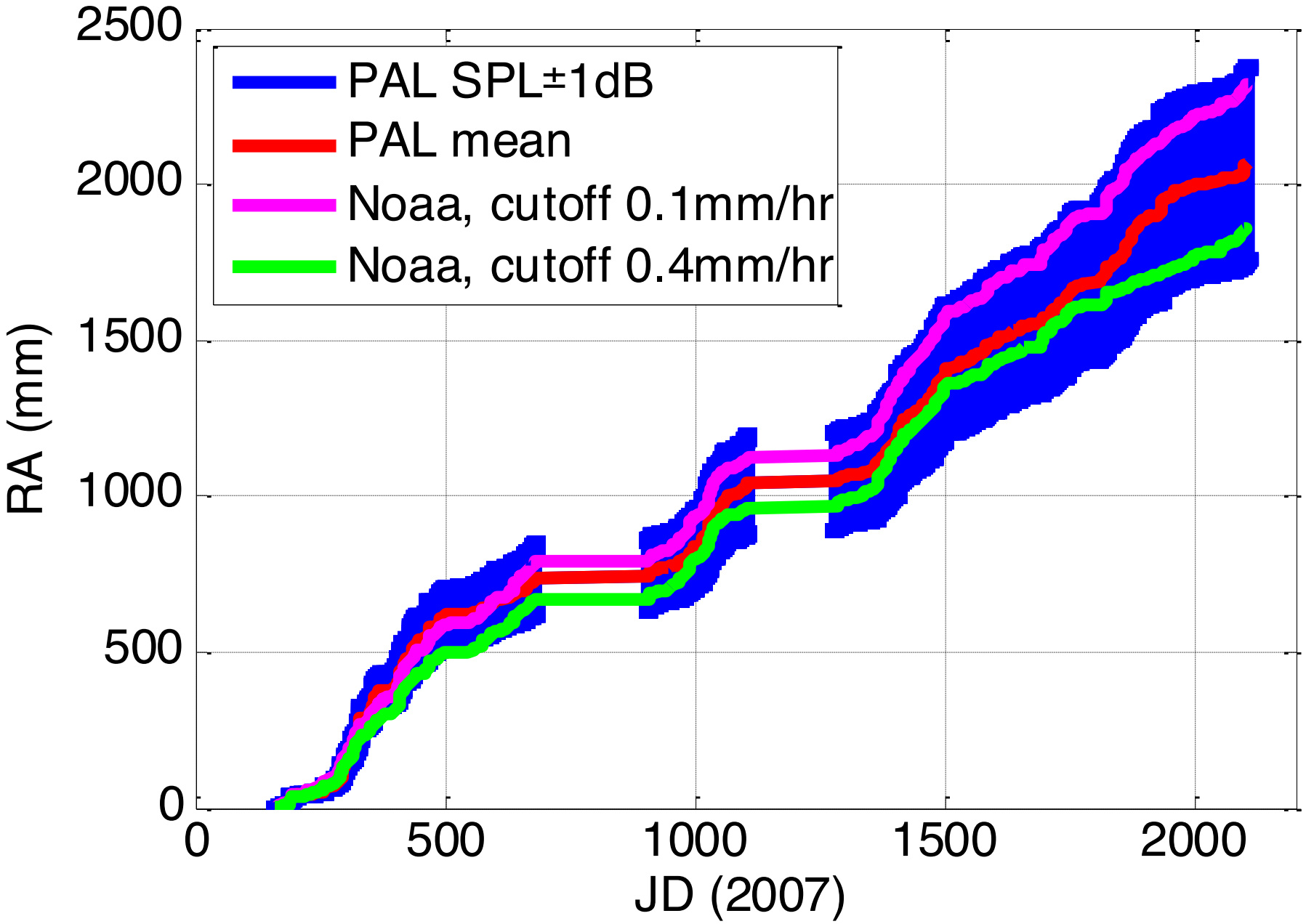
Comparison of rainrate between PAL and in situ rain gauge



PAL Rain accumulation using 6-year OSP data

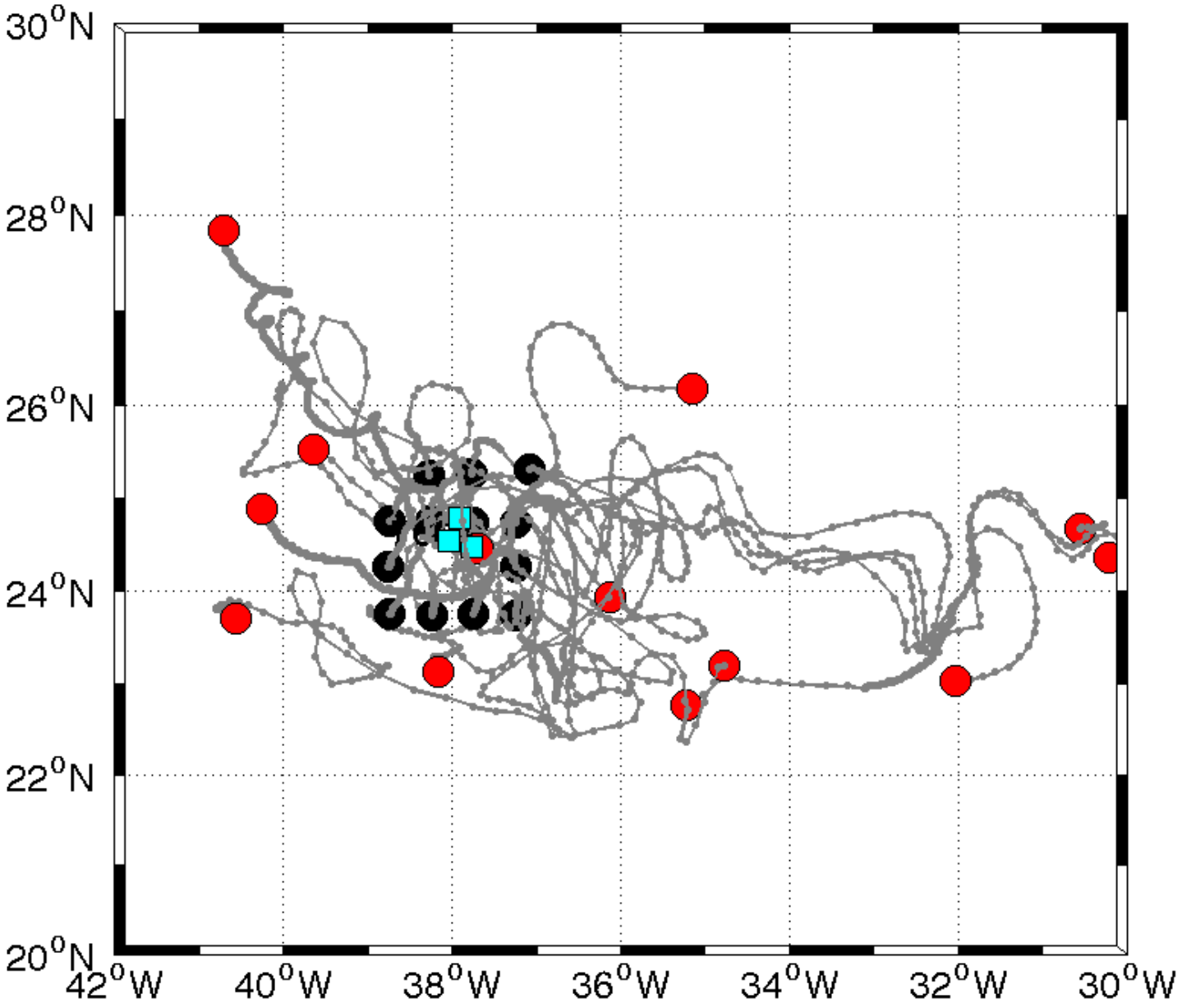


Comparison of rain accumulation between PAL and in situ rain gauge

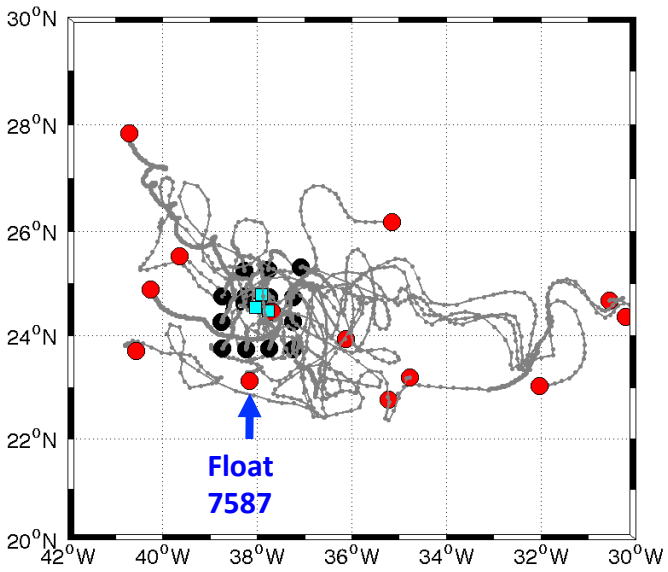


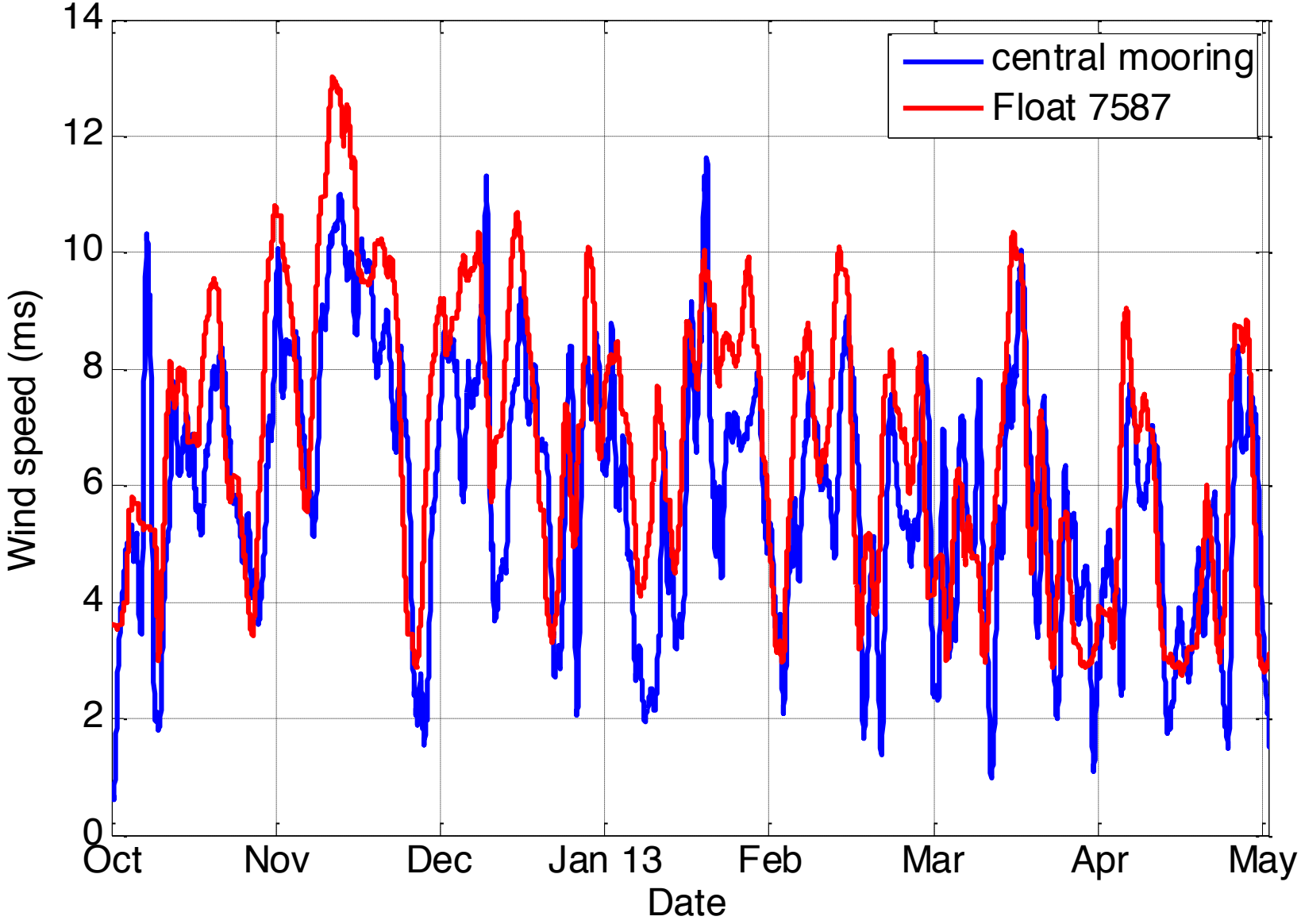
Rainfall measurements during SPURS

Figure: Jessica Anderson



Comparison of wind speed between PAL and central mooring

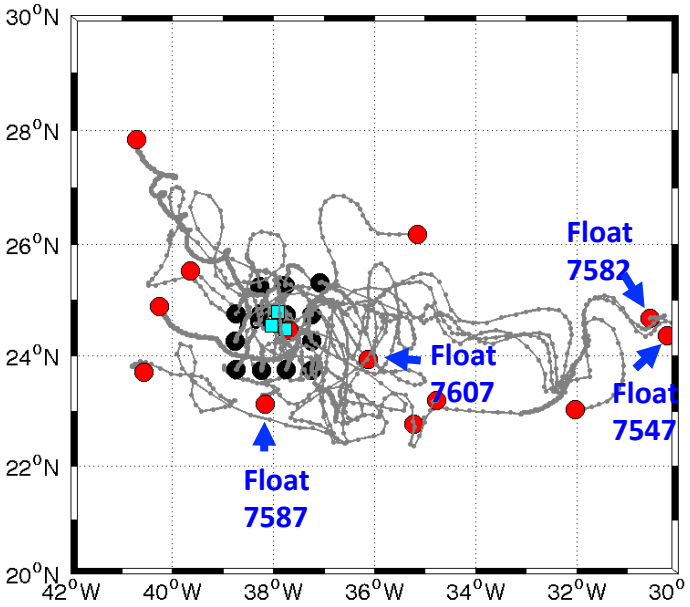


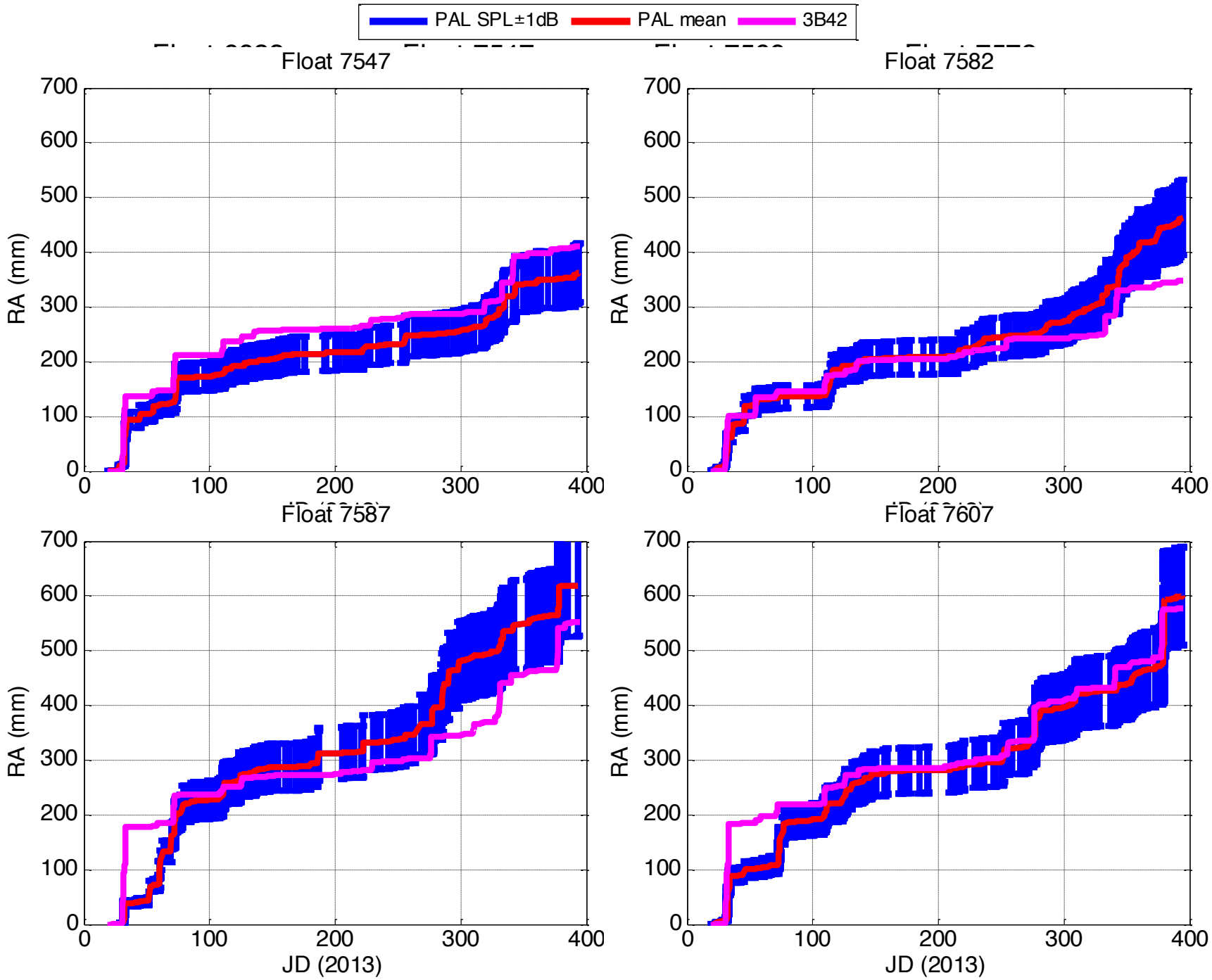


Float 7587 end position:
~200 km away from
central mooring

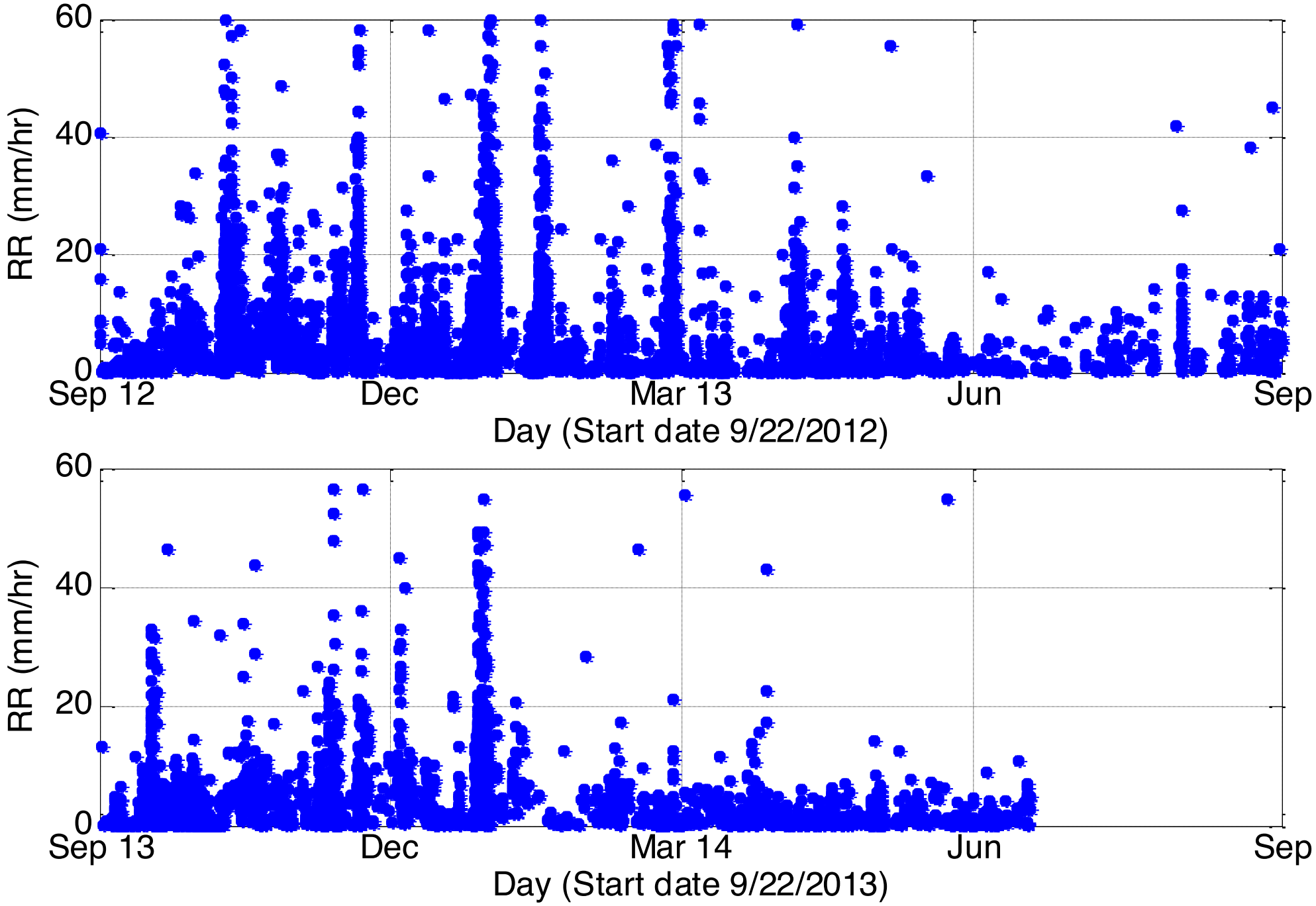
Comparison of rain accumulation between PAL and 3B42

Feb. 2013 – Jan. 2014



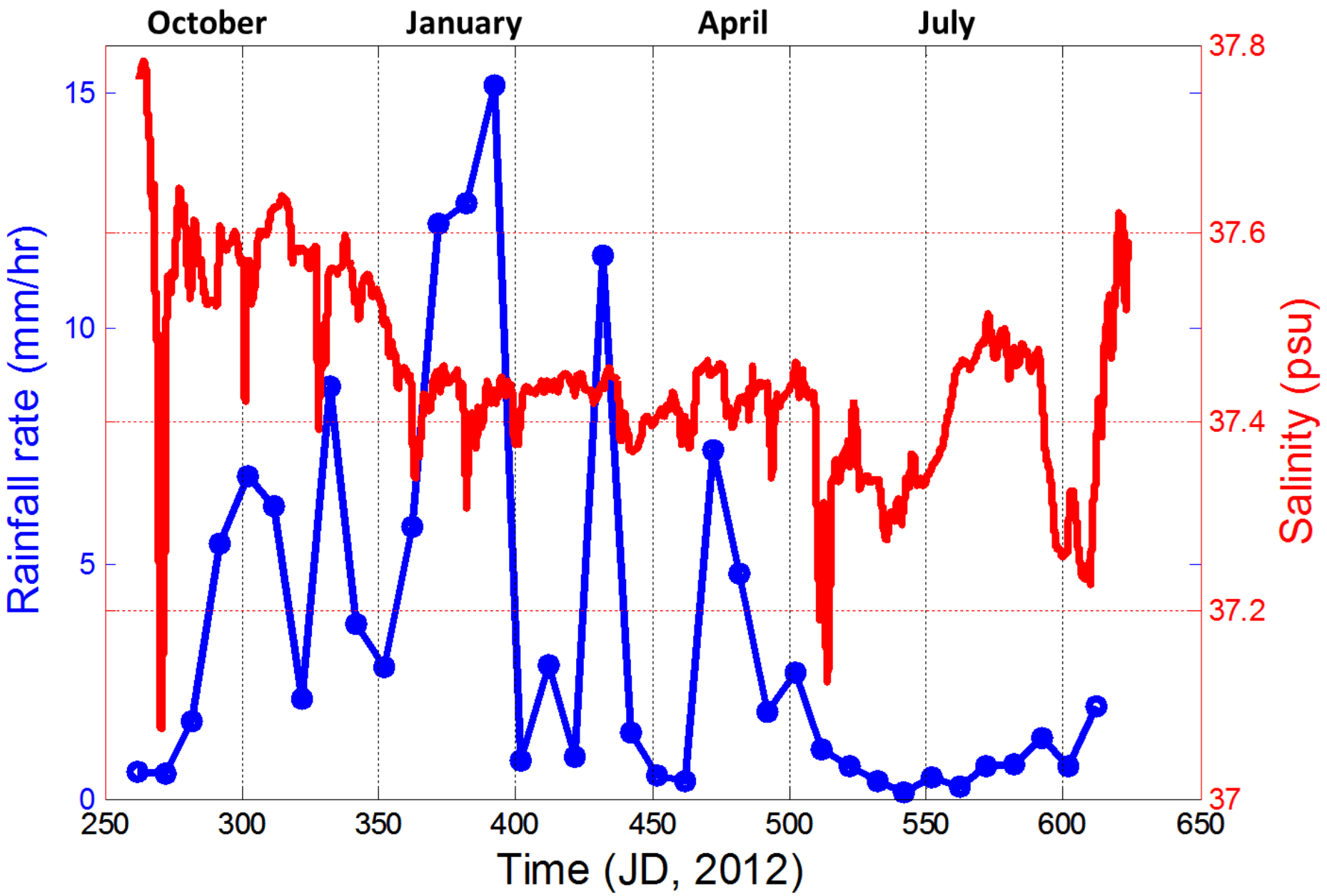


Rainfall seasonal and intra-annual variability during SPURS



Implication of rainfall measurements on salinity

Salinity data: central mooring



Summary and future work

- PAL has been established to provide reliable estimates of wind speed and rainrate
- Passive acoustic remote sensing can be used to study the spatial variability and intermittency of rainfall and provide regional maps of the surface wind field
- Advantages of passive acoustic technique over conventional meteorological buoy measurement: autonomous, low-cost, long residence time at sea, real-time data access, and excellent temporal and spatial resolutions
- Future

  1) regional map of wind and rain field

  2) understanding the data better by combining PAL with S/T data on Argo floats and data that characterize vertical and horizontal advection of water in the region