

Monitoring Freezing Levels across California: Quantifying the Impacts of ARs and the Recent El Niño

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NOAA's Hydrometeorology Testbed (hmt.noaa.gov) was sponsored by the California Department of Water Resources (CA-DWR) to design, build, deploy, operate, and maintain a network of ten FM-CW precipitation profiling radars (a.k.a. snow-level radars) mostly near major watersheds across California. HMT has also operated an S-band profiling radar (S-PROF) at a coastal mountain site for more than a decade. In this paper we use freezing-level measurements from these radars to investigate possible inter-annual variability in this important variable. Higher freezing levels increase the mountainous areas that are exposed to rain thereby increasing runoff that could lead to dangerous flooding. Lower freezing levels allow snowpack to accumulate over a wider range of elevations thereby decreasing runoff and allowing beneficial water storage for future use. A satellite based climatology will be used to determine the days during which an atmospheric river (AR) made landfall in California. Other measurements available from HMT's extensive observing network in California (e.g., wind profilers, surface meteorology, and GPS integrated water vapor) will help verify when AR conditions existed at one of the radar sites and when polar cold frontal passage occurred. We will also investigate how the strong El Niño present during the winter of 2015-16 impacted freezing levels across California. Although few winter storms occurred in each of the preceding three drought years, enough cases will be compiled to allow comparison between the latest strong El Niño winter and the three preceding winters that were weakly forced by ENSO.