East of Berry Summit on Highway 299 – Microclimate

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Figure 1: Berry Summit – Located at black circle on inset map in Northwestern California

Background:

Berry Summit is located on highway 299 between Eureka, CA and Willow Creek, CA at the north end of the South Fork Mountain Range at 2871 feet. The South Fork Mountains are the first major mountain range, after the smaller King Range near Cape Mendocino, which moisture encounters as it moves inland. The range is oriented NNW to SSE which is perpendicular to the typical SW to NE flow when mid-latitude cyclones impact the Northwest California coast. Thus orographic enhancement is substantial along this ridgeline. Additionally the ridgeline is often the divide between warmer Pacific Ocean air to the west and cooler continental air to the east.

Forecast Challenge:

Highway 299 is the primary east-west highway through the Eureka CWA. Thus accurate forecasts of snow and wind hazards are needed for Caltrans (California Department of Transportation) to prepare for instituting chain requirements and clearing roadways. With the ridge often located on the transition zone between cool continental air and warm maritime climates, snow levels and snow totals can be quite a challenge with cold air trapped on the east side of the ridgeline. Local residents have said that snow is heaviest approximately a half mile east of the ridgeline to approximately 3 miles east of the ridgeline. This would suggest the heaviest snow falls between 2600 and 2000 feet in elevation rather than at the peak of the ridgeline.

Methodology:

No concrete data is collected within the area of perceived heaviest snowfall on the backside of the ridgeline. This makes it very difficult to forecast any snow accumulation in this area. The only near real-time evidence that snow may be falling in this region is currently from Caltrans snow chain requirements. Additionally, the microclimate is only 3 miles long and would be contained in only 2 to 3 grid points, thus increasing the forecasting challenge. It can be assumed that similar conditions spread north and south east of the ridgeline in other adjacent valleys, but this is not known. At this time no methodology has been implemented to solve this microclimate issue. However a few ideas have been proposed.

The first requirement to accurately forecast for this area is to have good data. This would require either a weather station or spotter in the area of concern, which is not currently available. Only a few people live in this short stretch of mountain road and ideally one of them could be recruited as a spotter. However another option of mobile spotters, people who regularly (ideally daily) travel over the pass, seems more plausible and easier to recruit.

The second issue after acquiring accurate data is to implement a forecasting methodology. A study will have to be conducted to determine the right conditions when cold air becomes trapped in this area. Theoretically this will be similar to other interior valleys where cold air becomes trapped, in this case on the east side of the ridgeline, as warmer moist air flows into the ridge from the west caused by the approach of a midlatitude cyclone. At the same time, lower level winds east of the ridgeline would remain light from the east reinforcing the cooler continental airmass. If this is true, a simple edit area could be created where snow levels could be lowered within GFE when conditions are anticipated to result in trapped cold air and thus increased snowfall in the microclimate.