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IC 4.3: Microclimates Exercise

The Olympic Shadow Zone

Background

The eastern Strait of Juan de Fuca, the Admiralty Inlet Area, Island County, far western Skagit County, and the far southern portion of San Juan County are climatologically the driest areas of western Washington. The annual precipitation minimum, 12 to 20 inches, is centered from roughly Sequim to Port Townsend (far eastern Strait of Juan de Fuca to the far north end of the Admiralty Inlet area). Listed below are the annual precipitation normals for selected sites within the Olympic shadow zone (*source: NCDC*).

Location	County	Public Zone	Annual Precipitation
Sequim 2E	Clallam	514 – Eastern Strait of Juan de Fuca	**16.10 in.**
Port Angeles	Clallam	514 – Eastern Strait of Juan de Fuca	25.72 in.
Port Townsend	Jefferson	510 Admiralty Inlet Area	**19.42 in.**
Anacortes	Skagit	506 Western Skagit County	27.05 in.

For comparative purposes, the following are the normal annual precipitation for a few sites within western Washington.

Location	County	Public Zone	Annual Precipitation
Mount Vernon	Skagit	506 Western Skagit County	32.70 in.
Everett	Snohomish	507 Everett and Vicinity	37.54 in.
Seattle (Sea-Tac)	King	508 Seattle/Bremerton Area	37.07 in.
Bremerton	Kitsap	508 Seattle/Bremerton Area	53.96 in.
Forks 1E	Clallam	516 North Coast	121.73 in.

The differences in precipitation amounts occurring within the Olympic shadow zone become more pronounced or evident during specific synoptic scale events. During episodes in which there is strong, deep southerly or southwest flow, the precipitation shadowing effect becomes more pronounced to the lee of the Olympic range. Typically, this occurs with a strong, positive-tilt, 500 mb troughs, with the associated baroclinic or frontal zone oriented parallel or weakly perpendicular to the upper flow. On satellite imagery, the visible imagery in particular, a thinning of the cloud over or a clear slot will often be seen over the area in question. Often the clear slot or 'hole' will be roughly centered over Sequim (especially during strong, southwest wind regimes).

Operational Impacts

Model guidance typically grossly overestimates the probability of precipitation (PoP) for the Olympic shadow zone during moderate or strong south or southwest flow regimes. Consequently, the models have a tendency to over-predict the amount of precipitation that will occur in this area during the aforementioned condition. Forecasters, using model grids, will need to appropriately adjust the PoP, QPF, and sky cover grids for the Olympic shadow zone during southerly or southwest flow regimes. As long as the flow remains moderate or strong southerly, precipitation will be absent or non-measurable over this area. Essentially, there will be a strong precipitation, QPF, and (sometimes) sky cover gradient between this zone and adjacent areas.

This also has an important impact on aviation forecasting, and particularly affects the TAF for Port Angeles. During these situations, the forecaster should predict VFR conditions and omit mention of precipitation until the mean flow becomes westerly or with the passage of the cold or occluded front. Interestingly, MOS guidance is usually quite good in forecasting cloud ceilings for Port Angeles during these types of regimes.

Conclusion

During moderate or strong, deep southerly or southwest flow, there will be a pronounced precipitation shadow affecting the eastern Strait of Juan de Fuca, the Admiralty Inlet Area, Island County, far western Skagit County, and the far southern portion of San Juan County. Models tend to over-predict the PoP and QPF for this area. However, MOS guidance is generally quite good in predicting cloud ceilings for the MOS sites within this zone. Therefore, the operational forecasters should appropriately adjust their PoP, QPF, and Sky Cover grids during this type of scenario. Often, the model gridded forecasts grossly over-predict the PoP, Sky Cover, and QPF for the Olympic Shadow Zone. Precipitation within this zone often occurs with westerly or onshore flow or with the passage of the surface front or trough.

References

NCDC, revised 02-2002: Monthly Station Normals of Temperature, Precipitation, and Heating and Cooling Degrees Days 1971 – 2000, Climatology of the United States No. 81, Washington, 14-16.