

**Pacific Northwest Heavy Rain and Snow- November 19-21, 2012**  
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**Overview:** The period of November 19<sup>th</sup>-21<sup>st</sup> 2012 was a record breaking event for the Pacific Northwest. Several factors came together to make such an event occur. First, an atmospheric river derived from the southern Pacific resulted in higher than normal precipitable water values (Fig 1). In fact, the Medford, OR sounding revealed the precipitable water on the 19<sup>th</sup> was 0.90, which 2 standard deviations above the mean; the Salem, OR sounding had precipitable water values of 0.89 which is just above the 75<sup>th</sup> percentile. Thus, there was a copious amount of moisture available in the region to support such a unique and record breaking event.

On November 19<sup>th</sup>, a large trough began to move toward the Pacific Northwest coast – as an impressive vorticity maximum moved onshore in the northwestern portions of Washington (Fig 2a). During this time frame, the surface map showed an occluded system analyzed with a warm front pushing onto the Washington and Oregon coast (Fig 2b). As an aside, this warm front likely led to a high temperature record in Troutdale, OR. Initially, radar showed a stream of showers and periods of heavy rain, along with snow in the higher elevations, moving south from Oregon and into northern California. Rainfall totals of over 4-inches were recorded in both of these regions; however, by the afternoon of the 19<sup>th</sup>, a more organized band of rain moved over Seattle and migrated south. This band created six inches of rain in Nehalem, OR.

By November 20<sup>th</sup>, the original occluded system deteriorated and another surface low formed just off the Oregon coast. This newly formed low also had an occluded system associated with it, which moved toward the West coast. However, the precipitation was not nearly as organized with this system as on the 19<sup>th</sup>. In contrast, most of the activity was concentrated further south in central California, with snow being reported in the higher elevations of the Sierras. Multiple bands moved ashore on the 20<sup>th</sup>, but again they were not as organized or intense as the previous day. Most of the activity was concentrated along the Washington and Oregon coast.

On November 21<sup>st</sup>, the 500 mb low began to move over the coast in the morning and progress further inland during day. This was clearly visible on radar as the circulation moved right over Seattle and then eastward. Most of the precipitation stayed in Washington and dwindled as the day went on.

**Impacts:** Although this system did make its way over the Cascades and Sierras, this was mostly a heavy rainfall event. However, there was some snowfall over the Cascades, Sierras, and Northern Rockies (Table 1). There were also quite a few impacts from this system. Several rainfall records and a high temperature record were broken. Troutdale reached 63 degrees on the 19<sup>th</sup>, which broke the previous record of 62 degrees set in 1995. The Weather Forecast Office in Seattle broke a 24 hr rainfall record with 2.6 inches, where the previous record was 1.6 inches set in 2003. Many roads were closed and even sewage systems began to overflow in Washington. Multiple cars were struck by falling trees, and there were even mudslides associated with this storm. Thousands of people were out of power in both Washington and Oregon. Unfortunately, one person died when a tree fell on top of him during a hunting trip.

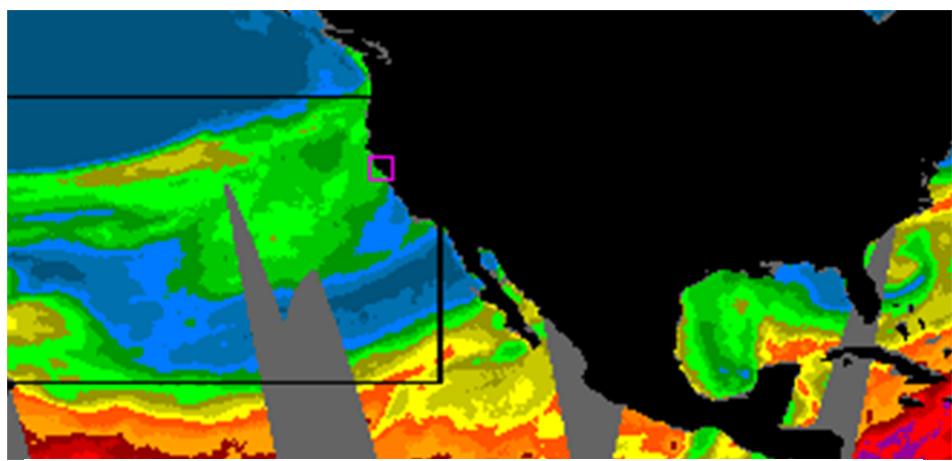


Figure 1: An image of an atmospheric river providing abundant moisture for the heavy rainfall event on November 19 (<http://jasoncordeira.weebly.com/ssmi-a>)

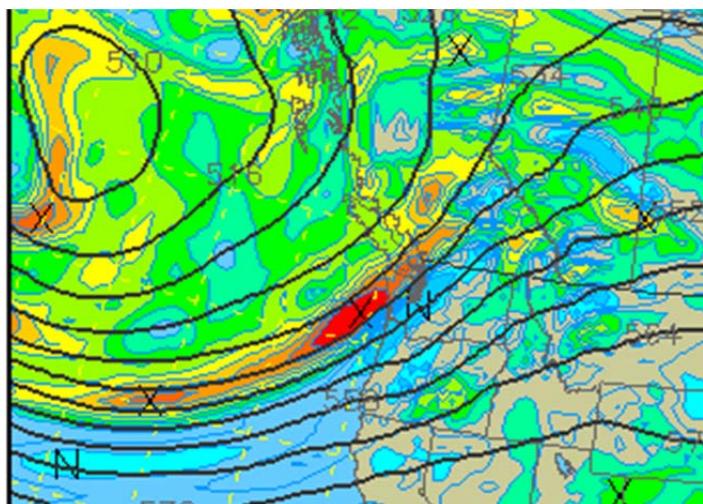


Figure 2a: 500 mb vorticity map from November 20th at 00Z.  
(<http://locust.mmm.ucar.edu>)

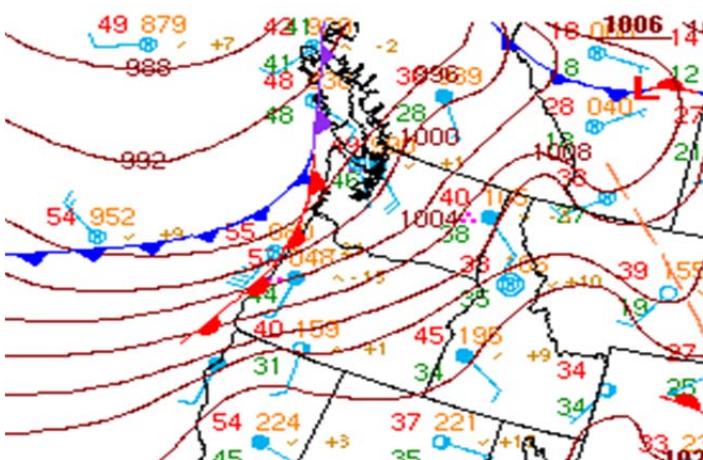


Figure 2b: Surface map from November 19 at 15Z ([www.hpc.ncep.noaa.gov](http://www.hpc.ncep.noaa.gov))

Selected Storm Total Rainfall Accumulations (in)		Selected Wind Gusts (mph)		Selected Storm Total Snowfall (in)	
Brookings 4.2 ENE, OR	12.12	Naselle Ridge (2000 ft)	114	Flattop Mtn, MT	14.0
Harbor 3 NE, OR	9.84	Abernathy Mtn	111	Soda Springs 1.5 SSW, CA	12.0
Smith River 1.1 SSE, CA	7.85	Mount Hebo, OR	106	Ketchum 22 NW, ID	9.0
Lees Camp, OR	7.90	Megler Tower (1189 ft)	101	Chewelah 8 E, WA	9.0
Nehalem, WA	7.75	Yaquina Head	98	Colburn 4 WSW, ID	8.0
	7.03	Astoria 5 W	92	Arco 33 WNW, ID	6.0
		Garibaldi	90	Curlew Lake State 11 SE, WA	6.0

Table 1: Selected rainfall totals and wind gusts from storm (Source: HPC Storm Summary)