1984 Thanksgiving Day Storm in Southeast Alaska

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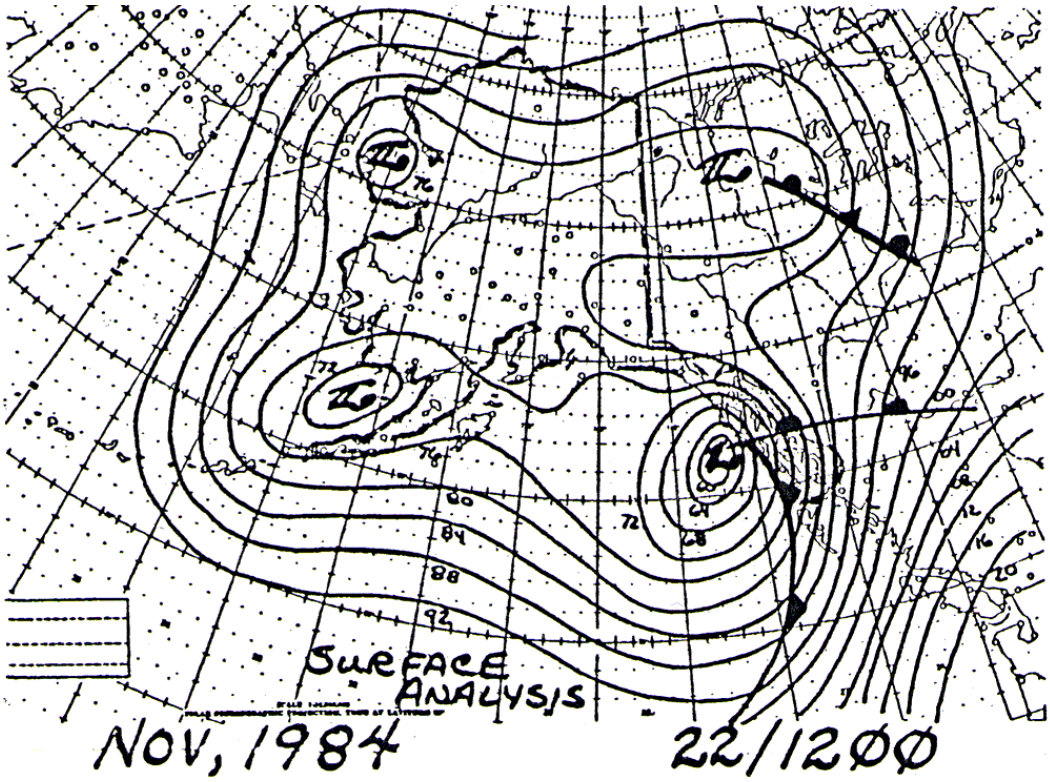
It has been said, in many different circumstances, that timing is crucial. For the big storm which struck Southeast Alaska on Thanksgiving Day, 1984, it made the difference between another strong storm and one which caused millions of dollars in damage; between a rainy, windy day and one in which houses ended up in the ocean.

The "Big Blow" had it's genesis in a low pressure system that moved out of eastern Siberia near Sakhalin Island on Friday, November 16. By Tuesday, this "parent" low had established itself in the eastern Bering Sea with a central pressure around 965 mb, had tapped a warm, moist air source in the subtropical west Pacific, and was beginning to spawn a series of intense storms that would eventually sweep from the Alaska Peninsula to British Columbia.

The first of this series entered south central Alaska near Kodiak Island on Tuesday, November 20. The second strayed a bit farther east crossing the coast near Yakutat on Wednesday, November 21, causing coastal flooding of the uninhabitated beaches of the Gulf of Alaska. A long power outage and downed trees in the Juneau area were only a foretaste of events to come.

The third storm in the sequence was just a wave 900 miles south of Kodiak Island during the morning of November 21. However, aided by jet stream winds exceeding 150 mph and abetted by a fresh shot of cold air from its parent, the storm intensified dramatically. By 22/06Z, the central pressure had dropped 20 mb. By 22/ 18Z, another 20 mb drop would occur.

Figure 1



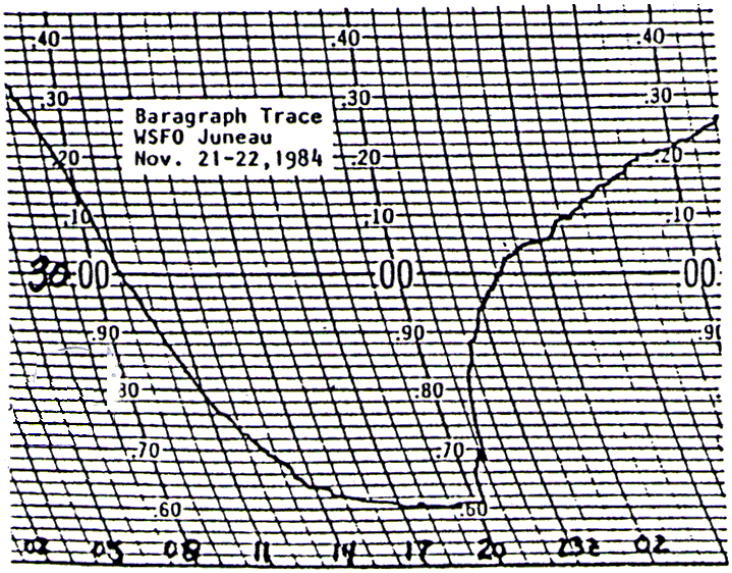
As the warm front associated with this storm neared locations in southern Southeast Alaska (see Figure 1), the intensified gradient (Table1 shows an 18.9 mb difference between Annette and Sitka at 22/12Z) caused storm and hurricane force winds. Although this gradient reintensified 6-12 hours later, as the storm center crossed over land, the winds over the southern third of the Panhandle never again achieved this range.

The low reached the outer coast of Southeast Alaska near Cape Spencer at approximately 1930Z and passed north of Juneau about an hour later. The winds in the inner channels of central Southeast Alaska (most of these oriented SE-NW) began building about 2 hours before land fall. The peak gusts at downtown Juneau occurred between land fall and the time the storm passed the city. Gusts over 90 mph were recorded at the Federal Building in Juneau with estimates exceeding 100 mph over Gastineau Channel waters. The gradient between Juneau and Annette at 2000Z, directly parallel with the topographic orientation, exceeded 23 mb.

Time	YXY-JNU	SGY-JNU	JNU-SIT	YAK-JNU	ANN-YZP	SIT-ANN	JNU-WRG	WRG-SIT	JNU-ANN	JNU-KTN
220400	-7,1		+0.9	-8.3	+3.0	-6.3			-5.4	-5.2
220500	-5.7		+1.3	-7.1	+2.5	-5.4			-4.1	-4.2
220600	-5.5		+3.0	-7.7	+2.4	-5.4			-2.4	-2.1
220700	-3.8		+3.7	-6.0	+1.1	-5.7			-2.0	-2.1

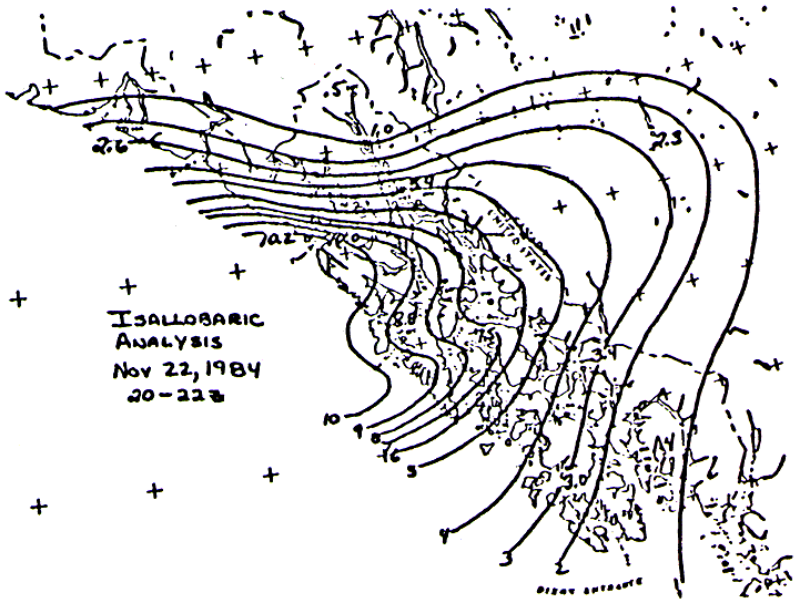
220800	-1.3		+4.4	-4.1	+0.5	-7.0			-2.6	-2.4
220900	-0.2		+7.4	-4.3	+0.8	-9.3			-1.9	-1.7
221000	+2.3		+8.8	-2.7	-0.3	-11.8			-3.0	-3.1
221100	+4.8		+9.4	-1.9	-1.1	-14.7			-5.3	-5.5
221200	+6.3		+11.5	-2.1	-1.5	-18.9			-7.4	-6.8
221300	+8.1		+7.0	-2.7	-2.8	-16.4			-9.4	-8.2
221400	+7.8		+6.1	-4.2	-2.8	-16.8			-10.7	-9.5
221500	+7.2		+5.4	-4.4	-3.5	-17.6	-6.1	+11.5	-12.2	-10.8
221600		+2.5	+4.4	-3.9	-4.2	-18.1	-6.4	+10.8	-13.7	-12.5
221700	+6.3	+2.2	+3.7	-3.0	-4.6	-20.5	-8.1		-16.8	-45.1
221800	+5.1	0.0	+4.1	-2.3	-4.2	23.9			-19.9	-17.9
221900	+5.8	+2.4	+2.4	-0.2	-3.6	-25.6	-15.6	+18.0	-23.2	-22.0
222000	+4.6	+0.6	-7.1	+0.3			-17.3	+10.2		-23.4
222100										
222300	-7.5		-7.8	-4.7	-1.7	-9.4	-11.3	+4.0	-17.2	-15.9

Figure 2



As the storm passed, tremendous pressure rises (see Figure 2 for an example of these as recorded at WFO Juneau) and the isallobaric wind they generate occurred. Figure 3 depicts 2 hour isallobars for 20-22Z interpolated from hourly observational values as given by the various National Weather Service reporting stations.

Figure 3



Using the pressure rises in Figure 3, calculated theoretical values of the isallobaric wind exceeding 150 mph can be derived. Even taking friction into account, such results show the tremendous potential associated with this forcing. The strongest winds reported at those stations unobstructed by topography to the west came after the low passed, and in association with rapid pressure rises. Gusts to 80 mph were measured at the Juneau airport and to 65 mph at the Sitka airport.

The conditions heretofore described are enough to cause damage. However, as stated in the opening paragraph, timing is crucial. The passage of the storm across Southeast Alaska, and the following pressure rises occurred simultaneously with the flow of water associated with the incoming of one of the highest tides of the year. On Thanksgiving Day, the height of this tide was expected to reach 20.3 feet at 2105Z at Juneau, and 12.5 feet at Sitka at 2038Z. The combination of low pressure and strong winds caused a tidal surge ranging from 2 to 3 feet above predicted values. The Alaska Region storm surge program calculated the surge to be 2.1 feet using data input by the Juneau forecaster on the day before the storm. Add to this, wind waves of 4 to 10 feet and it is obvious why waterfront areas were wrecked.

CONCLUSIONS

The Thanksgiving Day Storm was generally finished for most of Southeast Alaska by 2200-2300Z. In its wake, it left over 2 million dollars in damage and two people injured. Although not generally of such an intensity, fall storms such as this affecting the Panhandle occur fairly often, and this one was handled extremely well by forecasters at WSFO Juneau. What was spotlighted by this storm, however, for those of us dealing with coastal areas, is the necessity of watching tides when heavy weather is approaching. The direction and magnitude of the wind can inhibit or enhance the tide height. By taking these into account, we can, at times, provide much greater help to the public.

REFERENCES

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