Weather Forecasting In California Is Tricky, But Improving

By J. O. McKINNEY

Wherever you may live, the term "unusual weather," gets more than its share of use. It would lead us to suspect that unusual weather is the kind we most often have. That is particularly true of extreme Northern California. The reason that this area has more than its share of weather variations is due, primarily, to the topography, or the arrangement of mountains and valleys.

California probably has the most spectacular topography of any state in the Union. The Great Central Valley that extends from just south of Bakersfield northward to Redding is approximately 450 miles long and averages about 100 miles in width. The elevation of the valley floor ranges from only a few feet above sea level to nearly 500 feet at the extreme north and south ends. It is completely surrounded by mountains except for a gap in the coastal range in the San Francisco Bay area. The towering Sierra Nevadas, averaging nearly two miles in height and extending the entire length of the state, form the eastern wall of the Great Central Valley.

Into this natural "weather trap" flow the southwesterly onshore winds, created by low pressure centers that have, for the most part, migrated from the Asiatic coast, through the Aleutian Islands and on to the west coast of the United States or Canada. The intensity and pattern of storms that are created by this onshore flow depend largely upon the amount of moisture in the air mass and the distribution of this moisture. For example: The air mass may be well saturated from the surface to 20,000 feet, in which case precipitation would most likely cover all of the area coming under the influence of this flow. It is very seldom that the air mass is completely saturated however. The moisture is often confined to one or more layers of varying thickness and varying degrees of saturation. If only the very low levels are saturated, rainfall may be confined to the floor of the Great Central Valley. If the moisture is at middle levels only, the valley floors are likely to receive no rainfall at all while the foothills and mountains may receive varying amounts. There is an infinite amount of variation in storms due, primarily to the variation of moisture, temperature and wind velocity. It would be safe to say that there never have been two storms exactly alike.

Since the circulation in a low pressure system is counterclockwise, the onshore flow of air on the leading edge of the system is southwesterly. As it flows inland over the fairly low coastal range and through the gap in this range in the San Francisco Bay area, it is deflected northward up the Central Valley by the High Sierras in much the same way as a river would be deflected by a gigantic dike or levee.

At the northern end of the valley, the air begins an abrupt lift up the mountains, fanning out to the northward through numerous valleys and canyons. The rapid cooling and condensation caused by this lift, produces extremely heavy precipitation from Shasta Lake northward to the southern slopes of Mt. Shasta and northeastward up the Pit River Valley for some 60 miles. This area often receives the greatest seasonal rainfall in the state. During the season 1957-58, the sub-station at Volmers, just north of Shasta Lake, recorded more than 125 inches.

Majestic Mt. Shasta, towering to a height of 14,161 feet, stands at the northern extremity of the Sacramento watershed. It forms the connecting link between the Sierras to the south and the Cascades to the north. Big Springs, the headwaters of the Sacramento River, rise just one mile north of Mount Shasta City on the west slope of the mountain.

The south slope of Mt. Shasta, facing the moisture-laden southerly winds, is noted for heavy wintertime snow packs that nearly always remain the year around at the summit and often linger on the slopes above 10,000 feet throughout the summer. That was the primary reason for the recent development of the huge Mount Shasta Ski Bowl in that location.

After the air moves on northward, there is a definite downslope into the Shasta Valley. This downslope causes the air to warm by compression, resulting in the rapid decrease in precipitation and at times, the complete evaporation of the clouds before they have moved more than 20 miles northward. As a result, the Shasta Valley lies in a "rain shadow," or an area of little rainfall.

The southern extension of the Cascades forms the eastern rim of the Shasta Valley. As the air moves northeastward over these mountains, light to occasionally moderate precipitation falls on the western slopes and over the summit, but very little is recorded over the high plateau that extends from just north of Mt. Shasta into Southern Oregon.

When storm fronts move down from the Gulf of Alaska, approaching this area from the north or northwest, the moisture content is generally quite light due to the low temperature of the air mass. Much of the available moisture is condensed and falls out in the form of rain or snow as it passes over the Siskiyou Mountains that lie along the California-Oregon border. Thus a "rain shadow" is created over the valleys of extreme Northern California. Some of the higher mountains receive light rain or snow from these fronts.

Occasionally the southwesterly onshore flow does not extend far enough southward to enter the Great Central Valley but does flow inland through the Klamath River Gorge on the extreme north coast. This flow moves on inland to the Scott and Shasta valleys and over the Cascades to Klamath Falls, producing moderate to heavy rain or snow. Under these conditions, the area from Mt. Shasta southward often has fair weather.

Late spring frosts often occur on the first clear night following a storm. The storm is caused by the invasion of cold air. The storm front marks the leading edge of the invading cold air and it is in this frontal zone that most of the cloudiness and rainfall is found. Skies often clear rapidly in the

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