



Figure 3. The P-R sailplane on tow under the roll cloud on April 17, 1955. The view is NNW over the northern end of the Owens Valley from the BT towplane.

Photo: Betsy Woodward

suming so far discovered, is to attain at least 30,000 ft., and preferably 35, or 40,000 ft., then fly rapidly downwind with minimum loss of altitude to the updraft of the lee wave of another mountain range, and so on until one runs out of waves, mountains, or daylight. This kind of flight demands strong westerly flow across the whole Southwest such as occurred on 19 March 1952 when Dr. Kuettner made his memorable flight from Bishop to Williams, Arizona. He reached there with an altitude of 20,000 ft. but had to land as it was getting dark. (See the May-June, 1953 issue of *SOARING* for Dr. Kuettners' account of this flight.) The southeasterly direction from Bishop has usually appeared most promising for flights of long distances in the fall, winter and spring because, as the cold front moves across northern Nevada, the quadrant to the north and east is often obscured by cloud and rain or snow.

On most occasions of strong lee waves, however, the wind speed aloft decreases eastward of the Sierra and the direction becomes more southerly. Thus, while a sailplane may be carried to over 35,000 ft. over the Owens Valley, there may be no usable waves over the north-south trending mountain ranges of Nevada or southeastern California. Such was the case on all the flights made during the 1955 season. On 10 April 1955 (Figure 1) Larry Edgar at-

tempted a cross-country flight but was forced to land in Pahrump Valley, short of Las Vegas, when caught between no lift to the east and south and advancing showers from the west and north.

What other wave-hopping cross-country flights are possible if it is not advisable to head eastward toward Utah or Arizona? With southwesterly flow aloft one might progress northward along the Sierra to Minden or Reno, but in most cases this is toward bad weather. The more promising would be to work southward in a northwesterly flow pattern, and, if the flow is strong enough over Southern California, attain a maximum altitude on the Tehachapi Wave over the Mojave Desert from which an attempt could be made to reach lift in the lee of the San Gabriel Mountains; if not, a landing could be made at El Mirage Field. Wave flights in the latter region have been made by Paul Bikle, Duke Mancuso and others. (See references)

There has been hopeful talk of making a distance record by combined wave and thermal flying. One can dream of wave-soaring from Bishop, reaching the San Francisco Peaks near Flagstaff, Arizona, by noon with an altitude of 15,000 or 20,000 ft., and seeing growing cumuli stretching eastward toward New Mexico. But in reality this combination is unlikely to occur; lee waves form in stably stratified air with big horizontal temperature gradients (i.e. near frontal zones) whereas good thermals form in less stable air masses with steep lapse rates (big vertical temperature gradients). One should not rule out the possibility of such a combination, though; the

bridge between these two sources of vertical currents may be found in the cumulus cloud streets that form behind relatively shallow cold fronts with a low level (10, to 20,000 ft.) wind maximum that causes the convective circulations to be organized in long bands parallel to the wind direction. An account of one Diamond altitude and distance flight that did utilize both waves and thermals, originating at Bishop, is given by Sterling Starr in the July-August, 1957, issue of *SOARING*.

A most intriguing, but quite unexplored possibility for cross-country soaring flights is to take advantage of the known vertical motions near the cores of Jet Streams. (See Dr. Kuettners' 1955 article on this subject in *SOARING*) Once Bob Symons made a sailplane flight to Ely, Nevada, in 1½ hours by ascending on wave lift to 30,000 ft. or so, then heading downwind; it is not known whether he was able to use the more subtle circulation about the wind maxima to reduce his sinking speed. The main problems in using this source of lift are: (1) the relative rarity and transient nature of pronounced jet streams with sufficient vertical speeds to support a sailplane; and (2) the difficulty of staying in such a narrow zone of lift once it has been found. Cloud formations are helpful here: the long cirrus bands which form in the lee of the Sierra and trail sometimes for 200 or 300 miles downstream (as first pointed out by Bob Symons) indicate maxima in the horizontal wind speeds and vertical motion sufficient to cause cooling and condensation of water vapor. Whether this vertical motion is enough to allow a sailplane to stay in the jet stream remains to be seen. The techniques needed are on the frontier of soaring research and await discovery and development by pioneers.

METEOROLOGICAL FORECASTS AND BRIEFING

As in all past expeditions, the Weather Bureau will play an important role in this year's activities. George Kornbrust, the Meteorologist-in-Charge of the Bishop Airport Weather Bureau station has promised to help in any way that he can. The Bishop station receives hourly sequence reports giving the weather, surface winds, and cloud observations from all stations in the western region. Pibal ascents are made at Bishop at 1000 and 1600 PST. Although there is no Circuit "C" tele-

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