Table 3.1. Computation of orographic precipitation over leg 10 of Blue Canyon, California, test area for the 6-hour period 2 p.m. – 8 p.m., 22 December 1955 (hand computation, using 3 p.m. 22 December 1955 sounding at Oakland, California, as inflow data and assuming a nodal surface of 350 hPa)

Inflow data																$\Delta\overline{w}_{LT}$		$\Delta\overline{w}_{UT}$	
P (hPa)	T (°C)	RH (%)	V (kn)	$\overline{V}$ (kn)	$\overline{V}_{\Delta P}$	w_S (g/kg)	w_I	P_C	P_{LT}	w_{LT}	P_{UT}	w_{UT}	$\overline{w}_I$	$\overline{w}_{LT}$	$\overline{w}_{UT}$	$\overline{w}_I - \overline{w}_{LT}$	$\overline{V}_{\Delta P}\Delta\overline{w}_{LT}$	$\overline{w}_I - \overline{w}_{UT}$	$\overline{V}_{\Delta P}\Delta\overline{w}_{UT}$
500	–12.3	77	61.8			2.96	2.28	475	494	2.28	495	2.28							
				59.6	2 980								2.70	2.70	2.70	0.00	0	0.00	0
550	–8.1	82	57.4			3.80	3.12	529	537	3.12	536	3.12							
				62.7	3 135								3.61	3.53	3.52	0.08	251	0.09	282
600	–4.2	88	67.9			4.65	4.09	543	575	4.09	574	3.92							
				62.8	3 140								4.64	4.22	4.20	0.42	1 319	0.44	1 382
650	–0.6	92	57.6			5.64	5.19	638	604	5.19	602	4.47							
				55.1	2 755								5.72	4.73	4.69	0.99	2 727	1.03	2 838
700	1.6	94	52.6			6.64	6.24	692	630	6.24	628	4.90							
				49.8	2 490								6.69	5.18	5.11	1.51	3 760	1.56	3 864
750	5.3	95	47.0			7.50	7.13	742	656	7.13	654	5.36							
				50.1	2 505								7.55	5.51	5.45	2.04	5 110	2.10	5 261
800	7.9	95	51.1			8.38	7.96	792	672	7.96	649	5.54							
				51.4	1 285								8.20	5.75	5.57	2.45	3 148	2.63	3 180
825	9.1	96	49.6			8.79	8.44	817	688	8.44	672	5.60							
				49.2	295								8.50	5.92	5.61	2.58	761	2.89	153
831	9.4	96	48.7			8.92	8.56	823	693	8.56	673	5.62							
				47.2	897								8.75	6.09	5.69	2.66	2 386	3.06	2 745
850	10.3	96	45.7			9.30	8.93	843	703	8.93	680	5.76							
				44.2	1 105								9.13	6.34	5.84	2.79	3 083	3.27	3 613
875	11.4	96	42.7			9.71	9.32	868	718	9.32	694	5.95							
				42.7	1 068								9.44	6.51	6.00	2.95	3 151	3.46	3 695
900	12.5	94	42.7			10.20	9.59	888	732	9.59	705	6.05							
				41.9	1 048								9.69	6.59	6.06	3.10	3 249	3.63	3 804
925	13.4	93	41.1			10.52	9.79	911	746	9.79	717	6.07							
				37.6	940								9.81	6.64	6.09	3.17	2 980	3.72	3 497
950	14.2	91	34.1			10.80	9.83	929	760	9.83	721	6.10							
				29.9	748								9.63	6.57	5.94	3.06	2 289	3.69	2 760
975	15.0	85	25.7			11.10	9.43	941	776	9.43	740	5.78							
				19.4	485								9.42	6.42	5.76	3.00	1 455	3.66	1 775
1 000	15.5	84	13.1			11.20	9.41	961	790	9.41	753	5.73							
				11.1	56								9.55	6.48	5.80	3.07	172	3.75	210
1 005	15.7	84	9.1			11.27	9.69	971	793	9.69	754	5.87							

Legend: RH = Relative humidity
w_S = Saturation mixing ratio
w_I = Mixing ratio at inflow
P_C = Condensation pressure
LT = Lower precipitation trajectory
UT = Upper precipitation trajectory

	LT	UT
I =	35 841	39 979
6-hour volume (mm × nmi^2) = 0.0612 × I =	2 193	2 447
Unit-width horizontal area (nmi^2) =	46.8	50.3
6-hour average rainfall (mm) =	47	49

6-hour average rainfall over last leg (mm) = $\frac{2\,447 - 2\,193}{50.3 - 46.8} = 73$

Rain drift is used below the freezing level; snow drift, above. By coincidence, the lower trajectory (Figure 3.6) reaches the freezing level approximately where the latter intersects a streamline. The upper trajectory, however, reaches the freezing level between the 850- and 825-hPa inflow streamlines. Hence, a streamline passing through the intersection of this trajectory and the 0°C line is constructed. This streamline intersects the inflow vertical at 831 hPa. Since the snow drift in the 831- to 825-hPa layer is 0.65 nmi (Table 3.2), the total drift measured from the outflow vertical to the 825-hPa streamline would be 2.95 + 0.65 = 3.60 nmi, which would take the trajectory below the freezing level. Hence, total drift was assumed to be 3.47 nmi, which means that the drift within this layer was assumed to be 0.52 nmi rather than 0.65 nmi. Since the snow in this layer is probably very wet, the falling rate is likely to be between that for snow and that for rain, and the above assumption appears warranted.

3.2.3.6 Precipitation computation

After constructing the precipitation trajectories, compute the total volume of precipitation under each trajectory, layer by layer. Subtract the total volume under one trajectory from the volume under the next higher one, and divide the difference by the horizontal area of the ground on which this volume falls to obtain the average depth over this area.

If Equation 3.10 for rainfall rate is multiplied by the area XY it yields the 1-hour rainfall volume. The Y in the numerator and denominator cancel one another, and if area width X is taken as 1 nmi, the 1-hour volume $R(XY)$ or Vol$_{1\text{ hour}}$ under a particular trajectory is approximately:

$$\mathrm{Vol}_{1\text{ hour}} \approx 0.0102\overline{V}_1\Delta P_1(\overline{W}'_1 - \overline{W}') \qquad (3.12)$$

where $\overline{W}'$ is the mean outflow mixing ratio at the trajectory (see $\overline{q}$ in Figure 3.3).