ANNEXES

ANNEX I. TABLES OF PRECIPITABLE WATER IN A SATURATED PSEUDO-ADIABATIC ATMOSPHERE

As stated in Chapter 2, precipitable water is a term used mostly by hydrometeorologists for expressing the total mass of water vapour in a vertical column of the atmosphere. It represents the depth of liquid water that would accumulate at the base of the column if all its water vapour were condensed. The term is a misnomer since no natural process can condense or precipitate all the water vapour in the atmosphere, and substitute terms such as liquid equivalent of water vapour or liquid water equivalent are sometimes used.

The general formula for computing precipitable water, W, in cm, is:

$$W = \frac{\overline{q}\Delta p}{g\ell} \qquad \text{(A.1.1)}$$

where $\overline{q}$ is the mean specific humidity in g/kg of a layer of moist air; Δp is the depth of the layer in hPa; g is the acceleration of gravity in cm/s^2; and ℓ is the density of water, which is equal to 1 g/cm^3.

In most hydrometeorological work the atmosphere is assumed to contain the same amount of water vapour as saturated air with saturation pseudo-adiabatic temperature lapse rate. The precipitable water in various layers of the saturated atmosphere can be determined and listed in tables or in nomogram form. Table A.1.1 presents values of precipitable water (mm) between the 1 000-hPa surface and various pressure levels up to 200 hPa in a saturated pseudo-adiabatic atmosphere as a function of the 1 000-hPa dewpoint. Table A.1.2 lists similar values for layers between the 1 000-hPa surface, assumed to be at zero elevation, and various heights up to 17 km. Table A.1.3 gives values of precipitable water (mm) in the atmosphere between the indicated pressure and 300 hPa. Table A.1.4 provides mixing ratios along specified pseudo-adiabats for specified 1 000-hPa dewpoints at given elevations in metres above 1 000 hPa. These are used in the moisture adjustment for barrier discussed in section 2.3.4.2.

Table A.1.1. Precipitable water (mm) between 1 000-hPa surface and indicated pressure (hPa) in a saturated pseudo-adiabatic atmosphere as a function of the 1 000-hPa dew point (°C)

Pressure (hPa)	*Temperature (°C)*																														
	0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*
990	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	3
980	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	3	3	3	3	3	4	4	4	4	5	5	5
970	1	1	1	1	1	2	2	2	2	2	2	2	3	3	3	3	3	4	4	4	4	5	5	5	5	6	6	7	7	7	8
960	1	2	2	2	2	2	2	2	3	3	3	3	3	4	4	4	4	5	5	5	6	6	6	7	7	8	8	9	9	10	11
950	2	2	2	2	2	3	3	3	3	3	4	4	4	4	5	5	6	6	6	7	7	8	8	9	9	10	10	11	12	12	13
940	2	2	2	3	3	3	3	3	4	4	4	5	5	5	6	6	7	7	7	8	9	9	10	10	11	12	12	13	14	15	16
930	2	3	3	3	3	3	4	4	4	5	5	5	6	6	7	7	8	8	9	9	10	11	11	12	13	14	14	15	16	17	18
920	3	3	3	3	4	4	4	5	5	5	6	6	7	7	8	8	9	9	10	10	11	12	13	14	14	15	16	17	19	20	21
910	3	3	3	4	4	4	5	5	5	6	6	7	7	8	8	9	10	10	11	12	13	13	14	15	16	17	18	20	21	22	23
900	3	4	4	4	4	5	5	6	6	6	7	7	8	9	9	10	11	11	12	13	14	15	16	17	18	19	20	22	23	24	24
890	4	4	4	5	5	5	6	6	7	7	8	8	9	9	10	11	12	12	13	14	15	16	17	18	20	21	22	24	25	27	28
880	4	4	4	5	5	6	6	7	7	8	8	9	9	10	11	12	12	13	14	15	16	17	19	20	21	23	24	26	27	29	31
870	4	4	5	5	6	6	7	7	8	8	9	9	10	11	12	13	13	14	15	16	18	19	20	21	23	24	26	28	29	31	33
860	4	5	5	6	6	6	7	7	8	9	9	10	11	12	12	13	14	15	16	18	19	20	21	23	24	26	28	30	32	34	36
850	5	5	5	6	6	7	7	8	9	9	10	11	11	12	13	14	15	16	18	19	20	21	23	24	26	28	30	32	34	36	38
840	5	5	6	6	7	7	8	8	9	10	10	11	12	13	14	15	16	17	19	20	21	23	24	26	28	30	32	34	36	38	40
830	5	5	6	6	7	7	8	9	9	10	11	12	13	14	15	16	17	18	19	21	22	24	26	27	29	31	33	35	38	40	43
820	5	6	6	7	7	8	8	9	10	11	11	12	13	14	15	17	18	19	20	22	24	25	27	29	31	33	35	37	40	42	45
810	5	6	6	7	8	8	9	10	10	11	12	13	14	15	16	17	19	20	21	23	25	26	28	30	32	34	37	39	42	44	47
800	6	6	7	7	8	8	9	10	11	12	12	13	15	16	17	18	19	21	22	24	26	28	29	32	34	36	38	41	44	46	49
790	6	6	7	7	8	9	9	10	11	12	13	14	15	16	17	19	20	22	23	25	27	29	31	33	35	38	40	43	46	49	52
780	6	7	7	8	8	9	10	11	11	12	13	14	16	17	18	19	21	23	24	26	28	30	32	34	37	39	42	45	48	51	54
770	6	7	7	8	9	9	10	11	12	13	14	15	16	17	19	20	22	23	25	27	29	31	33	35	38	41	43	46	49	53	56
760	6	7	7	8	9	10	10	11	12	13	14	15	17	18	19	21	22	24	26	28	30	32	34	37	39	42	45	48	51	55	58
750	6	7	8	8	9	10	11	12	13	14	15	16	17	18	20	21	23	25	27	29	31	33	35	38	41	44	47	50	53	57	60
740	7	7	8	9	9	10	11	12	13	14	15	16	18	19	20	22	24	26	28	30	32	34	37	39	42	45	48	51	55	59	62
730	7	7	8	9	9	10	11	12	13	14	15	17	18	20	21	23	24	26	28	30	33	35	38	40	43	46	50	53	57	60	64
720	7	7	8	9	10	11	11	12	13	15	16	17	18	20	22	23	25	27	29	31	34	36	39	42	45	48	51	55	58	62	66
710	7	8	8	9	10	11	12	13	14	15	16	17	19	20	22	24	26	28	30	32	35	37	40	43	46	49	53	56	60	64	68
700	7	8	8	9	10	11	12	13	14	15	16	18	19	21	23	24	26	28	31	33	35	38	41	44	47	50	54	58	62	66	70

Table A.1.1. (Continued)

Pressure (hPa)	Temperature (°C)																														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
690	7	8	9	9	10	11	12	13	14	15	17	18	20	21	23	25	27	29	31	34	36	39	42	45	48	52	55	59	63	68	72
680	7	8	9	10	10	11	12	13	15	16	17	19	20	22	24	25	27	30	32	34	37	40	43	46	49	53	57	61	65	69	74
670	7	8	9	10	11	11	12	14	15	16	17	19	20	22	24	26	28	30	33	35	38	41	44	47	51	54	58	62	67	71	76
660	8	8	9	10	11	12	13	14	15	16	18	19	21	23	24	26	29	31	33	36	39	42	45	48	52	55	60	64	68	73	78
650	8	8	9	10	11	12	13	14	15	16	18	19	21	23	25	27	29	31	34	37	39	42	46	49	53	57	61	65	70	75	80
640	8	8	9	10	11	12	13	14	15	17	18	20	21	23	25	27	29	32	35	37	40	43	46	50	54	58	62	67	71	76	81
630	8	8	9	10	11	12	13	14	16	17	18	20	22	24	26	28	30	32	35	38	41	44	47	51	55	59	63	68	73	78	83
620	8	9	9	10	11	12	13	14	16	17	19	20	22	24	26	28	30	33	36	38	42	45	48	52	56	60	65	69	74	79	85
610	8	9	9	10	11	12	13	15	16	17	19	20	22	24	26	28	31	33	36	39	42	45	49	53	57	61	66	71	76	81	87
600	8	9	9	10	11	12	13	15	16	17	19	21	23	25	27	29	31	34	37	40	43	46	50	54	58	62	67	72	77	82	89
590	8	9	10	10	11	12	14	15	16	18	19	21	23	25	27	29	32	34	37	40	43	47	51	55	59	63	68	73	78	84	90
580	8	9	10	11	11	13	14	15	16	18	19	21	23	25	27	30	32	35	38	41	44	48	51	55	60	64	69	74	80	85	91
570	8	9	10	11	12	13	14	15	16	18	20	21	23	25	27	30	32	35	38	41	45	48	52	56	61	65	70	75	81	87	93
560	8	9	10	11	12	13	14	15	17	18	20	21	23	26	28	30	33	36	39	42	45	49	53	57	61	66	71	77	82	88	94
550	8	9	10	11	12	13	14	15	17	18	20	22	24	26	28	30	33	36	39	42	46	49	53	58	62	67	72	78	83	90	96
540	8	9	10	11	12	13	14	15	17	18	20	22	24	26	28	31	33	36	39	43	46	50	54	58	63	68	73	79	85	91	97
530	8	9	10	11	12	13	14	15	17	18	20	22	24	26	28	31	34	37	40	43	47	50	55	59	64	69	74	80	86	92	99
520	8	9	10	11	12	13	14	16	17	19	20	22	24	26	29	31	34	37	40	43	47	51	55	60	64	70	75	81	87	93	100
510	8	9	10	11	12	13	14	16	17	19	20	22	24	26	29	31	34	37	40	44	48	51	56	60	65	70	76	82	88	95	102
500	8	9	10	11	12	13	14	16	17	19	20	22	24	27	29	32	34	37	41	44	48	52	56	61	66	71	77	83	89	96	103
490	8	9	10	11	12	13	14	16	17	19	21	22	25	27	29	32	35	38	41	45	48	52	57	61	66	72	78	84	90	97	104
480	8	9	10	11	12	13	14	16	17	19	21	23	25	27	29	32	35	38	41	45	49	53	57	62	67	73	78	85	91	98	105
470	8	9	10	11	12	13	14	16	17	19	21	23	25	27	29	32	35	38	42	45	49	53	58	62	68	73	79	85	92	99	106
460	8	9	10	11	12	13	14	16	17	19	21	23	25	27	30	32	35	38	42	45	49	54	58	63	68	74	80	86	93	100	108
450	8	9	10	11	12	13	14	16	17	19	21	23	25	27	30	32	35	39	42	46	50	54	58	63	69	74	81	87	94	101	109
440	8	9	10	11	12	13	15	16	17	19	21	23	25	27	30	33	35	39	42	46	50	54	59	64	69	75	81	88	95	102	110
430	8	9	10	11	12	13	15	16	17	19	21	23	25	27	30	33	36	39	42	46	50	55	59	64	70	76	82	88	96	103	111
420	8	9	10	11	12	13	15	16	18	19	21	23	25	27	30	33	36	39	43	46	50	55	60	65	70	76	82	89	96	104	112
410	8	9	10	11	12	13	15	16	18	19	21	23	25	27	30	33	36	39	43	47	51	55	60	65	71	77	83	90	97	105	113
400	8	9	10	11	12	13	15	16	18	19	21	23	25	28	30	33	36	39	43	47	51	55	60	65	71	77	84	90	98	105	114
390	8	9	10	11	12	13	15	16	18	19	21	23	25	28	30	33	36	39	43	47	51	56	60	66	71	77	84	91	98	106	115
380	8	9	10	11	12	13	15	16	18	19	21	23	25	28	30	33	36	39	43	47	51	56	61	66	72	78	85	92	99	107	115
370	8	9	10	11	12	13	15	16	18	19	21	23	25	28	30	33	36	40	43	47	51	56	61	66	72	78	85	92	100	108	116
360	8	9	10	11	12	13	15	16	18	19	21	23	25	28	30	33	36	40	43	47	51	56	61	66	72	79	85	93	100	108	117
350	8	9	10	11	12	13	15	16	18	19	21	23	25	28	30	33	36	40	43	47	52	56	61	67	73	79	86	93	101	109	118
340	8	9	10	11	12	13	15	16	18	19	21	23	25	28	30	33	36	40	43	47	52	56	61	67	73	79	86	93	101	109	118
330	8	9	10	11	12	13	15	16	18	19	21	23	25	28	30	33	36	40	43	47	52	56	61	67	73	79	86	94	102	110	119
320	8	9	10	11	12	13	15	16	18	19	21	23	25	28	30	33	36	40	44	48	52	57	62	67	73	80	87	94	102	111	120
310	8	9	10	11	12	13	15	16	18	19	21	23	25	28	30	33	36	40	44	48	52	57	62	67	73	80	87	94	102	111	120
300	8	9	10	11	12	13	15	16	18	19	21	23	25	28	30	33	36	40	44	48	52	57	62	67	74	80	87	95	103	111	121
290	8	9	10	11	12	13	15	16	18	19	21	23	25	28	30	33	36	40	44	48	52	57	62	68	74	80	87	95	103	112	121
280	8	9	10	11	12	13	15	16	18	19	21	23	25	28	30	33	36	40	44	48	52	57	62	68	74	80	88	95	103	112	121
270	8	9	10	11	12	13	15	16	18	19	21	23	25	28	30	33	36	40	44	48	52	57	62	68	74	81	88	95	104	112	122
260	8	9	10	11	12	13	15	16	18	19	21	23	25	28	30	33	36	40	44	48	52	57	62	68	74	81	88	96	104	113	122
250	8	9	10	11	12	13	15	16	18	19	21	23	25	28	30	33	36	40	44	48	52	57	62	68	74	81	88	96	104	113	122
240	8	9	10	11	12	13	15	16	18	19	21	23	25	28	30	33	36	40	44	48	52	57	62	68	74	81	88	96	104	113	123
230	8	9	10	11	12	13	15	16	18	19	21	23	25	28	30	33	36	40	44	48	52	57	62	68	74	81	88	96	104	113	123
220	8	9	10	11	12	13	15	16	18	19	21	23	25	28	30	33	36	40	44	48	52	57	62	68	74	81	88	96	104	113	123
210	8	9	10	11	12	13	15	16	18	19	21	23	25	28	30	33	36	40	44	48	52	57	62	68	74	81	88	96	105	114	123
200	8	9	10	11	12	13	15	16	18	19	21	23	25	28	30	33	36	40	44	48	52	57	62	68	74	81	88	96	105	114	123

Table A.1.2. Precipitable water (mm) between 1 000-hPa surface and indicated height (m) above that surface in a saturated pseudo-adiabatic atmosphere as a function of the 1 000-hPa dew point (°C)

Height (m)	1 000 hPa Temperature (°C)																														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
200	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	3	3	3	3	3	4	4	4	4	4	5	5	5	6	6
400	2	2	2	2	2	3	3	3	3	3	4	4	4	4	5	5	5	5	6	6	6	7	7	8	8	9	9	10	10	11	12
600	3	3	3	3	3	4	4	4	5	5	5	6	6	6	7	7	7	8	8	9	10	10	11	11	12	13	14	15	15	16	17
800	3	3	4	4	4	5	5	5	6	6	7	7	8	8	9	9	10	10	11	12	13	13	14	15	16	17	18	19	20	21	22
1 000	4	4	4	5	5	6	6	6	7	7	8	9	9	10	10	11	12	13	13	14	15	16	17	18	20	21	22	23	25	26	23
1 200	4	5	5	6	6	7	7	8	8	9	9	10	11	11	12	13	14	15	16	17	18	19	20	21	25	24	26	27	29	31	32
1 400	5	5	6	6	7	7	8	8	9	10	10	11	12	13	14	15	16	17	18	19	20	22	23	24	26	28	29	31	33	35	37
1 600	5	6	6	7	7	8	9	9	10	11	11	12	13	14	15	16	17	19	20	21	23	24	25	27	29	31	33	35	37	39	41
1 800	6	6	7	7	8	9	9	10	11	12	12	13	14	15	17	18	19	20	22	23	25	26	28	30	32	34	36	39	41	43	46
2 000	6	7	7	8	9	9	10	11	11	12	13	14	16	17	18	19	21	22	24	25	27	29	31	33	35	37	39	42	44	47	50
2 200	7	7	8	8	9	10	10	11	12	13	14	15	16	18	19	20	22	24	25	27	29	31	33	35	37	40	42	45	48	51	54
2 400	7	8	8	9	10	10	11	12	13	14	15	16	17	19	20	22	23	25	27	29	31	33	35	37	40	43	45	48	51	54	57
2 600	7	8	8	9	10	11	11	12	13	14	16	17	18	20	21	23	24	26	28	30	32	35	37	40	42	45	48	51	55	58	61
2 800	7	8	9	9	10	11	12	13	14	15	16	18	19	21	22	24	26	27	30	32	34	36	39	42	45	48	51	54	58	61	65
3 000	8	8	9	10	11	11	12	13	14	15	17	18	20	21	23	25	27	29	31	33	35	38	41	44	47	50	53	57	61	64	68
3 200	8	8	9	10	11	12	13	14	15	16	17	19	20	22	24	26	28	30	32	34	37	40	42	45	49	52	56	59	63	67	71
3 400	8	8	9	10	11	12	13	14	15	16	18	19	21	23	24	26	29	31	33	36	38	41	44	47	51	54	58	62	66	70	74
3 600	8	9	9	10	11	12	13	14	15	17	18	20	22	23	25	27	29	32	34	37	39	42	45	49	52	56	60	64	68	73	77
3 800	8	9	10	10	11	12	13	14	16	17	19	20	22	24	26	28	30	32	35	38	41	44	47	50	54	58	62	66	70	75	80
4 000	8	9	10	11	11	12	14	15	16	17	19	21	22	24	26	28	31	33	36	39	42	45	48	52	56	60	64	68	73	78	83
4 200	8	9	10	11	12	13	14	15	16	18	19	21	23	25	27	29	31	34	37	40	43	46	49	53	57	61	66	70	75	80	85
4 400	8	9	10	11	12	13	14	15	16	18	20	21	23	25	27	29	32	34	37	40	44	47	51	54	58	63	67	72	77	82	87
4 600	8	9	10	11	12	13	14	15	17	18	20	22	24	25	28	30	32	35	38	41	44	48	52	56	60	64	69	74	79	84	90
4 800	8	9	10	11	12	13	14	15	17	18	20	22	24	26	28	30	33	36	39	42	45	49	53	57	61	65	70	75	81	86	92
5 000	8	9	10	11	12	13	14	16	17	19	20	22	24	26	28	31	33	36	40	42	46	50	54	58	62	67	72	77	82	88	94
5 200	8	9	10	11	12	13	14	16	17	19	20	22	24	26	29	31	34	37	40	43	47	50	55	59	63	68	73	78	84	90	96
5 400	8	9	10	11	12	13	14	16	17	19	20	22	24	26	29	31	34	37	41	44	47	51	56	60	64	69	74	80	86	92	98
5 600	8	9	10	11	12	13	14	16	17	19	21	22	24	27	29	32	35	38	41	44	48	52	57	60	65	70	76	81	87	93	100
5 800	8	9	10	11	12	13	14	16	17	19	21	22	25	27	29	32	35	38	42	45	48	52	57	61	66	71	77	82	88	95	101
6 000	8	9	10	11	12	13	15	16	17	19	21	23	25	27	30	32	35	38	42	45	49	53	58	62	67	72	78	84	90	96	103
6 200	8	9	10	11	12	13	15	16	17	19	21	23	25	27	30	32	35	38	42	45	49	54	58	63	68	73	79	85	91	93	104
6 400	8	9	10	11	12	13	15	16	18	19	21	23	25	27	30	33	35	39	42	46	50	54	59	63	68	74	80	86	92	99	106
6 600	8	9	10	11	12	13	15	16	18	19	21	23	25	27	30	33	36	39	42	46	50	54	60	64	69	74	80	87	93	100	107
6 800	8	9	10	11	12	13	15	16	18	19	21	23	25	27	30	33	36	39	42	46	50	55	60	65	70	75	81	87	94	101	108
7 000	8	9	10	11	12	14	15	16	18	19	21	23	25	28	30	33	36	39	43	46	51	55	60	65	70	76	82	88	95	102	110
7 200	8	9	10	11	12	14	15	16	18	19	21	23	25	28	30	33	36	39	43	47	51	55	61	65	71	76	82	89	96	103	111
7 400	8	9	10	11	12	14	15	16	18	19	21	23	25	28	30	33	36	39	43	47	51	56	61	66	71	77	83	90	97	104	112
7 600	8	9	10	11	12	14	15	16	18	19	21	23	25	28	30	33	36	39	43	47	51	56	61	66	72	77	83	90	98	105	113
7 800	8	9	10	11	12	14	15	16	18	19	21	23	25	28	30	33	36	39	43	47	51	56	61	66	72	78	84	91	98	106	114
8 000	8	9	10	11	12	14	15	16	18	19	21	23	26	28	30	33	36	39	43	47	52	56	61	67	72	78	85	92	99	107	115
8 200	8	9	10	11	12	14	15	16	18	19	21	23	26	28	30	33	36	39	43	47	52	57	62	67	73	78	85	92	100	108	115
8 400	8	9	10	11	12	14	15	16	18	19	21	23	26	28	30	33	36	39	43	47	52	57	62	67	73	79	85	92	100	108	116
8 600	8	9	10	11	12	14	15	16	18	19	21	23	26	28	30	33	36	39	43	47	52	57	62	68	73	79	86	93	101	109	117
8 800	8	9	10	11	12	14	15	16	18	19	21	23	26	28	30	33	36	39	43	47	52	57	62	68	73	79	86	93	101	109	118
9 000	8	9	10	11	12	14	15	16	18	19	21	23	26	28	31	33	36	40	43	47	52	57	62	68	74	80	86	94	102	110	118
9 200	8	9	10	11	12	14	15	16	18	19	21	23	26	28	31	33	36	40	43	48	52	57	62	68	74	80	87	94	102	110	119
9 400						14	15	16	18	19	21	23	26	28	31	33	36	40	44	48	52	57	62	68	74	80	87	94	102	110	119
9 600						14	15	16	18	19	21	23	26	28	31	33	36	40	44	48	52	57	63	68	74	80	87	94	102	111	220
9 800						14	15	16	18	19	21	23	26	28	31	33	36	40	44	48	52	57	63	68	74	80	87	95	103	111	220
10 000						14	15	16	18	19	21	23	26	28	31	33	37	40	44	48	52	57	63	68	74	80	87	95	103	112	222
11 000											21	23	26	28	31	33	37	40	44	48	52	57	63	68	74	81	88	96	104	113	222
12 000																33	37	40	44	48	52	57	63	68	74	81	88	96	105	114	123
13 000																					52	57	63	68	74	81	88	97	105	114	124
14 000																					52	57	63	68	74	81	88	97	105	115	124
15 000																										81	88	97	106	115	124
16 000																										81	88	97	106	115	124
17 000																											89	97	106	115	124

TABLE A.1.3. Precipitable water (mm) in column of air above specified heights (m) as a function of the 1 000 hPa temperature (°C) (revised May 1981)

Height above MSL (m)	*Temperature (°C)*																				
	0.0	*0.5*	*1.0*	*1.5*	*2.0*	*2.5*	*3.0*	*3.5*	*4.0*	*4.5*	*5.0*	*5.5*	*6.0*	*6.5*	*7.0*	*7.5*	*8.0*	*8.5*	*9.0*	*9.5*	*10.0*
0 (1000 hPa)	8.1	8.7	9.2	9.7	10.3	10.8	11.4	11.9	12.5	13.1	13.7	14.3	15.0	15.7	16.4	17.0	17.7	18.4	19.2	20.0	21.0
100	7.5	8.1	8.6	9.2	9.8	10.3	10.8	11.4	11.9	12.5	13.1	13.7	14.3	14.9	15.5	16.1	16.8	17.4	18.2	19.0	20.0
200	7.0	7.5	8.1	8.6	9.2	9.8	10.3	10.8	11.3	11.9	12.4	13.0	13.6	14.1	14.7	15.3	15.9	16.6	17.3	18.1	19.1
300	6.5	7.0	7.5	8.0	8.6	9.2	9.7	10.2	10.7	11.3	11.8	12.3	12.9	13.4	14.0	14.5	15.1	15.8	16.5	17.3	18.2
400	6.1	6.5	7.0	7.5	8.1	8.6	9.1	9.6	10.1	10.7	11.2	11.7	12.3	12.8	13.3	13.8	14.4	15.0	15.7	16.5	17.3
500	5.7	6.1	6.5	7.0	7.6	8.1	8.6	9.1	9.6	10.1	10.6	11.1	11.7	12.2	12.7	13.2	13.8	14.4	15.0	15.7	16.5
600	5.3	5.7	6.1	6.6	7.1	7.6	8.1	8.6	9.1	9.6	10.0	10.5	11.1	11.6	12.1	12.6	13.2	13.7	14.3	15.0	15.8
700	4.9	5.3	5.7	6.2	6.7	7.2	7.7	8.2	8.6	9.1	9.5	10.0	10.5	11.0	11.5	12.0	12.6	13.1	13.7	14.4	15.1
800	4.5	4.9	5.3	5.8	6.3	6.8	7.2	7.7	8.1	8.6	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.1	13.8	14.5
900	4.2	4.6	4.9	5.4	5.9	6.4	6.8	7.2	7.6	8.1	8.5	9.0	9.4	9.9	10.4	10.9	11.4	11.9	12.5	13.1	13.8
1 000	3.9	4.3	4.6	5.0	5.5	5.9	6.3	6.8	7.2	7.6	8.0	8.5	8.9	9.4	9.9	10.3	10.8	11.3	11.8	12.4	13.0
1 100	3.6	4.0	4.3	4.7	5.1	5.5	5.9	6.4	6.8	7.2	7.6	8.0	8.4	8.9	9.4	9.8	10.3	10.8	11.3	11.8	12.4
1 200	3.4	3.7	4.0	4.4	4.8	5.2	5.6	6.0	6.4	6.7	7.1	7.6	8.0	8.4	8.9	9.3	9.8	10.2	10.7	11.3	11.9
1 300	3.1	3.4	3.7	4.2	4.5	4.9	5.2	5.6	6.0	6.3	6.7	7.1	7.5	8.0	8.4	8.8	9.3	9.7	10.2	10.8	11.3
1 400	2.9	3.2	3.5	3.9	4.3	4.6	4.9	5.3	5.7	6.0	6.3	6.7	7.1	7.5	8.0	8.4	8.8	9.2	9.7	10.2	10.7
1 500	2.7	3.0	3.3	3.7	4.0	4.3	4.6	4.9	5.3	5.7	6.0	6.3	6.7	7.1	7.5	7.9	8.3	8.7	9.1	9.6	10.2
1 600	2.5	2.8	3.1	3.4	3.7	4.0	4.3	4.6	5.0	5.4	5.7	6.0	6.4	6.7	7.1	7.5	7.9	8.3	8.7	9.2	9.7
1 700	2.3	2.6	2.9	3.2	3.4	3.7	4.0	4.3	4.7	5.0	5.3	5.6	6.0	6.3	6.7	7.0	7.4	7.8	8.2	8.7	9.2
1 800	2.1	2.4	2.7	3.0	3.2	3.5	3.8	4.1	4.4	4.7	5.0	5.3	5.6	6.0	6.3	6.6	7.0	7.4	7.8	8.2	8.7
1 900	1.9	2.2	2.4	2.7	2.9	3.2	3.5	3.8	4.1	4.4	4.7	5.0	5.3	5.7	6.0	6.3	6.6	7.0	7.4	7.8	8.2
2 000	1.7	1.9	2.2	2.4	2.7	2.9	3.2	3.5	3.8	4.1	4.4	4.7	5.0	5.3	5.6	5.9	6.2	6.5	6.9	7.3	7.7
2 100	1.5	1.7	1.9	2.2	2.4	2.7	3.0	3.3	3.5	3.8	4.1	4.4	4.7	5.0	5.3	5.6	5.9	6.2	6.5	6.9	7.3
2 200	1.4	1.6	1.7	2.0	2.2	2.4	2.7	3.0	3.3	3.5	3.8	4.1	4.4	4.7	5.0	5.3	5.6	5.9	6.2	6.5	6.9
2 300	1.3	1.4	1.6	1.8	2.0	2.2	2.5	2.8	3.0	3.2	3.5	3.8	4.1	4.4	4.6	4.9	5.2	5.5	5.9	6.2	6.6
2 400	1.2	1.3	1.5	1.6	1.8	2.0	2.3	2.5	2.8	3.0	3.3	3.6	3.8	4.0	4.3	4.6	4.9	5.2	5.5	5.8	6.2

TABLE A.1.3. (Continued)

Height above MSL (m)	*Temperature (°C)*																			
	10.5	*11.0*	*11.5*	*12.0*	*12.5*	*13.0*	*13.5*	*14.0*	*14.5*	*15.0*	*15.5*	*16.0*	*16.5*	*17.0*	*17.5*	*18.0*	*18.5*	*19.0*	*19.5*	*20.0*
0 (1000 hPa)	22.1	23.3	24.6	25.9	27.2	28.5	29.8	31.2	32.6	34.1	35.6	37.2	38.8	40.5	42.3	44.2	46.2	48.3	50.4	52.6
100	21.1	22.3	23.5	24.8	26.0	27.2	28.5	29.8	31.2	32.7	34.1	35.6	37.2	38.9	40.7	42.6	44.6	46.6	48.7	50.8
200	20.1	21.2	22.4	23.6	24.8	26.0	27.3	28.5	29.8	31.3	32.7	34.1	35.6	37.3	39.1	41.0	43.0	44.9	46.9	49.1
300	19.1	20.2	21.4	22.5	23.7	24.9	26.2	27.4	28.6	29.9	31.3	32.7	34.3	35.9	37.6	39.5	41.4	43.3	45.3	47.4
400	18.2	19.3	20.4	21.5	22.7	23.9	25.1	26.2	27.4	28.7	30.0	31.4	32.9	34.5	36.1	38.0	39.8	41.7	43.7	45.7
500	17.4	18.5	19.5	20.6	21.8	23.0	24.1	25.2	26.3	27.5	28.9	30.3	31.7	33.2	34.8	36.6	38.3	40.2	42.2	44.1
600	16.7	17.7	18.7	19.7	20.9	22.0	23.1	24.2	25.3	26.4	27.7	29.1	30.4	31.9	33.5	35.3	37.0	38.8	40.7	42.6
700	15.9	16.8	17.8	18.8	19.9	21.1	22.2	23.3	24.4	25.4	26.6	27.9	29.2	30.8	32.4	34.0	35.7	37.5	39.3	41.1
800	15.2	16.0	16.9	17.9	19.0	20.1	21.2	22.3	23.4	24.5	25.6	26.8	28.1	29.5	31.1	32.7	34.3	36.1	37.9	39.7
900	14.5	15.3	16.1	17.1	18.1	19.2	20.3	21.4	22.5	23.6	24.7	25.8	27.1	28.5	30.0	31.5	33.1	34.9	36.6	38.3
1 000	13.8	14.5	15.3	16.3	17.3	18.3	19.4	20.4	21.5	22.5	23.6	24.7	26.0	27.4	28.9	30.3	31.8	33.6	35.3	37.0
1 100	13.1	13.8	14.6	15.5	16.5	17.5	18.5	19.5	20.5	21.5	22.6	23.7	25.0	26.4	27.8	29.2	30.6	32.3	33.9	35.6
1 200	12.5	13.2	13.9	14.8	15.7	16.7	17.6	18.6	19.6	20.6	21.7	22.7	23.9	25.2	26.6	28.0	29.5	31.1	32.6	34.3
1 300	11.9	12.6	13.3	14.1	14.9	15.8	16.8	17.7	18.7	19.7	20.8	21.8	23.0	24.2	25.6	26.9	28.4	29.9	31.3	33.1
1 400	11.3	12.0	12.7	13.4	14.2	15.1	16.0	16.9	17.8	18.8	19.8	20.8	21.9	23.2	24.6	25.9	27.4	28.8	30.1	31.9
1 500	10.8	11.4	12.0	12.7	13.5	14.3	15.2	16.1	17.0	17.9	18.9	20.0	21.0	22.3	23.6	24.9	26.3	27.7	29.1	30.7
1 600	10.2	10.8	11.4	12.0	12.8	13.6	14.5	15.4	16.3	17.1	18.0	19.1	20.2	21.4	22.7	24.0	25.3	26.7	28.1	29.6
1 700	9.7	10.2	10.8	11.4	12.2	13.0	13.8	14.7	15.6	16.4	17.3	18.3	19.4	20.4	21.6	22.9	24.2	25.6	27.0	28.5
1 800	9.2	9.7	10.3	10.9	11.6	12.4	13.2	14.0	14.9	15.7	16.5	17.5	18.5	19.5	20.7	21.9	23.2	24.6	26.0	27.4
1 900	8.7	9.2	9.8	10.4	11.1	12.9	12.6	13.4	14.2	15.0	15.8	16.7	17.6	18.7	19.8	21.1	22.3	23.7	25.0	26.4
2 000	8.2	8.7	9.3	9.9	10.6	11.4	12.1	12.8	13.5	14.3	15.1	16.0	17.0	18.0	19.1	20.4	21.5	22.7	24.0	25.4
2 100	7.8	8.3	8.8	9.4	10.1	10.8	11.5	12.2	12.9	13.7	14.5	15.3	16.3	17.3	18.4	19.6	21.7	21.9	23.1	24.5
2 200	7.4	7.9	8.4	9.0	9.6	10.3	11.0	11.7	12.4	13.1	13.8	14.6	15.6	16.6	17.7	18.8	19.9	21.1	22.3	23.6
2 300	7.0	7.5	8.0	8.6	9.2	9.9	10.5	11.2	11.9	12.5	13.2	14.0	14.8	15.8	16.8	17.9	19.0	20.2	21.4	22.7
2 400	6.6	7.1	7.6	8.2	8.8	9.5	10.1	10.7	11.4	12.0	12.7	13.5	14.3	15.1	16.0	17.0	18.1	19.3	20.5	21.8

TABLE A.1.3. (Continued)

Height above MSL (m)	*Temperature (°C)*																			
	20.5	*21.0*	*21.5*	*22.0*	*22.5*	*23.0*	*23.5*	*24.0*	*24.5*	*25.0*	*25.5*	*26.0*	*26.5*	*27.0*	*27.5*	*28.0*	*28.5*	*29.0*	*29.5*	*30.0*
0 (1000 hPa)	54.8	57.1	59.5	62.1	64.9	67.9	71.0	74.3	77.5	80.8	84.3	88.0	91.9	95.9	100.	104.5	109.1	113.9	118.9	124.2
100	52.9	55.3	57.6	60.2	62.9	65.9	68.8	72.0	75.2	78.6	82.0	85.6	89.4	93.4	97.5	101.8	106.3	111.1	115.8	121.0
200	51.2	53.5	55.8	58.3	61.0	63.8	66.7	69.8	72.9	76.3	79.7	83.2	86.9	90.9	94.9	99.2	103.6	108.2	112.7	117.8
300	49.5	51.7	54.1	56.5	59.1	61.9	64.7	67.7	70.7	74.4	77.5	80.9	84.6	88.5	92.5	96.7	100.9	105.3	109.9	114.9
400	47.8	50.0	52.4	54.8	57.3	60.0	62.7	65.7	68.7	72.0	75.3	78.7	82.3	86.2	90.1	94.2	98.4	102.7	107.2	112.1
500	46.2	48.4	50.8	53.1	55.5	58.1	60.8	63.7	66.6	69.9	73.2	76.6	80.1	84.0	87.8	91.8	95.9	100.1	104.6	109.4
600	44.7	46.8	49.1	51.4	53.8	56.3	58.9	61.8	64.7	68.0	71.3	74.6	78.1	81.9	85.6	89.4	93.4	97.6	102.0	106.7
700	43.1	45.2	47.6	49.8	52.1	54.6	57.1	60.0	62.9	66.1	69.3	72.6	76.0	79.7	83.3	87.0	91.0	95.1	99.6	104.1
800	41.6	43.7	46.0	48.2	50.5	52.9	55.3	58.1	61.0	64.2	67.4	70.7	74.1	77.5	81.0	84.6	88.6	92.7	97.2	101.5
900	40.2	42.3	44.5	46.6	48.8	51.2	53.6	56.3	59.1	62.3	65.5	68.8	72.0	75.3	78.7	82.3	86.2	90.2	94.7	99.0
1 000	38.8	40.8	43.0	45.1	47.3	49.5	51.8	54.5	57.3	60.4	63.6	66.9	70.0	73.1	76.4	80.0	83.8	87.9	92.4	96.5
1 100	37.4	39.3	41.4	43.6	45.7	47.9	50.1	52.7	55.4	58.5	61.8	65.1	68.1	71.0	74.3	77.8	81.7	85.7	90.2	94.1
1 200	36.0	37.9	39.9	42.2	44.3	46.4	48.4	51.0	53.7	56.7	60.0	63.2	66.3	69.0	72.2	75.7	79.5	83.5	88.0	91.7
1 300	34.8	36.6	38.6	40.8	42.8	44.9	46.9	49.4	52.0	55.0	58.1	61.3	64.3	67.0	70.2	73.6	77.2	81.3	85.7	89.4
1 400	33.6	35.3	37.3	39.5	41.5	43.4	45.3	47.8	50.4	53.4	56.4	59.5	62.4	65.1	68.2	71.5	75.1	79.1	83.5	87.2
1 500	32.2	34.0	36.0	38.1	40.0	41.9	43.8	46.2	48.7	51.8	54.8	57.8	60.7	63.3	66.3	69.5	73.1	77.0	81.3	84.9
1 600	31.1	32.8	34.6	36.7	38.6	40.4	42.3	44.7	47.2	50.3	53.2	56.2	59.0	61.6	64.5	67.6	71.2	75.0	79.2	82.7
1 700	30.0	31.6	33.4	35.4	37.3	39.1	41.0	43.3	45.7	48.7	51.6	54.5	57.3	59.9	62.7	65.8	69.3	73.0	77.0	80.4
1 800	28.9	30.5	32.2	34.2	36.1	37.9	39.7	42.0	44.4	47.2	50.0	52.8	55.6	58.2	61.0	64.1	67.5	71.1	75.0	78.2
1 900	27.9	29.5	31.2	33.1	34.9	36.7	38.5	40.7	43.0	45.8	48.5	51.2	53.9	56.6	59.4	62.5	65.8	69.2	72.8	76.0
2 000	26.8	28.4	30.1	32.0	33.8	35.5	37.3	39.5	41.8	44.4	47.0	49.6	52.3	55.0	57.8	60.9	64.1	67.5	70.9	73.8
2 100	25.9	27.5	29.0	30.8	32.5	34.4	36.2	38.3	40.5	43.0	45.5	48.1	50.7	53.5	56.3	59.3	62.5	65.7	69.0	71.9
2 200	25.0	26.5	27.9	29.6	31.3	33.2	35.0	37.1	39.3	41.8	44.2	46.6	49.2	51.8	54.7	57.7	60.8	63.9	67.2	70.1
2 300	24.0	25.5	26.9	28.6	30.2	32.1	34.0	36.0	37.2	40.0	42.6	45.2	47.8	50.5	53.2	56.1	59.1	62.2	65.4	68.4
2 400	23.1	24.5	26.0	27.6	29.3	31.1	33.0	35.0	37.1	39.3	41.6	44.0	46.5	49.1	51.8	54.6	57.5	60.5	63.6	66.8

TABLE A.1.4. Mixing ratios along pseudo-adiabats for specified 1 000-hPa dew points and elevations in meters above the 1 000-hPa level

Height above 1000 hPa level (m)	*Dewpoint (°C)*																				
	10	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*
0	7.7	8.2	8.8	9.4	10.1	10.8	11.5	12.3	13.1	14.0	14.9	15.9	16.9	18.0	19.1	20.3	21.6	23.0	24.4	25.9	27.6
100	7.5	8.0	8.6	9.2	9.9	10.6	11.3	12.1	12.9	13.8	14.7	15.7	16.7	17.8	18.9	20.1	21.4	22.7	24.1	25.8	27.3
200	7.4	7.9	8.5	9.1	9.7	10.4	11.1	11.8	12.8	13.5	14.4	15.4	16.4	17.5	18.6	19.8	21.1	22.5	23.9	25.4	27.1
300	7.2	7.7	8.3	8.9	9.5	10.2	10.9	11.6	12.4	13.3	14.2	15.2	16.2	17.3	18.4	19.6	20.9	22.2	23.6	25.1	26.8
400	7.0	7.5	8.1	8.7	9.3	10.0	10.7	11.4	12.2	13.1	14.0	15.0	16.0	17.0	18.1	19.3	20.6	22.0	23.4	24.9	26.5
500	6.8	7.3	7.8	8.5	9.1	9.8	10.5	11.2	12.0	12.8	13.7	14.7	15.7	16.8	17.9	19.1	20.4	21.7	23.1	24.6	26.2
600	6.7	7.2	7.7	8.3	8.9	9.6	10.3	11.0	11.8	12.6	13.5	14.5	15.5	16.6	17.7	18.9	20.1	21.5	22.9	24.4	26.0
700	6.5	7.0	7.5	8.1	8.7	9.4	10.1	10.8	11.6	12.4	13.3	14.3	15.3	16.3	17.4	18.6	19.9	21.2	22.6	24.1	25.7
800	6.3	6.8	7.3	7.9	8.5	9.1	9.8	10.5	11.3	12.2	13.1	14.0	15.0	16.1	17.2	18.4	19.6	21.0	22.4	23.9	25.4
900	6.1	6.6	7.2	7.7	8.3	8.9	9.6	10.3	11.1	11.9	12.8	13.8	14.8	15.8	16.9	18.1	19.4	20.7	22.1	23.6	25.2
1 000	6.0	6.5	7.0	7.5	8.1	8.8	9.5	10.2	10.9	11.7	12.6	13.6	14.6	15.6	16.7	17.9	19.1	20.5	21.9	23.4	24.9
1 100	5.8	6.3	6.8	7.4	8.0	8.6	9.3	10.0	10.7	11.5	12.4	13.3	14.3	15.4	16.5	17.7	18.9	20.2	21.6	23.1	24.6
1 200	5.7	6.1	6.6	7.2	7.8	8.4	9.1	9.8	10.5	11.3	12.2	13.1	14.1	15.1	16.2	17.4	18.6	20.0	21.4	22.9	24.4
1 300	5.5	6.0	6.5	7.0	7.8	8.2	8.9	9.6	10.3	11.1	12.0	12.9	13.9	14.9	16.0	17.2	18.4	19.7	21.1	22.6	24.1
1 400	5.3	5.8	6.3	6.8	7.4	8.0	8.7	9.4	10.1	10.9	11.8	12.7	13.8	14.6	15.7	16.9	18.1	19.5	20.9	22.3	23.8
1 500	5.2	5.8	6.1	6.8	7.2	7.8	8.5	9.2	9.9	10.7	11.6	12.5	13.4	14.4	15.5	16.7	17.9	19.2	20.6	22.1	23.6
1 600	5.0	5.5	6.0	6.5	7.0	7.6	8.3	9.0	9.7	10.5	11.4	12.3	13.2	14.2	15.3	16.5	17.7	19.0	20.3	21.7	23.3
1 700	4.9	5.3	5.8	6.3	6.9	7.5	8.1	8.8	9.5	10.3	11.2	12.1	13.0	14.0	15.0	16.2	17.4	18.7	20.1	21.6	23.1
1 800	4.7	5.1	5.6	6.1	6.7	7.3	7.9	8.6	9.3	10.1	10.9	11.8	12.7	13.7	14.8	16.0	17.2	18.5	19.8	21.2	22.8
1 900	4.8	5.0	5.5	6.0	6.5	7.1	7.7	8.4	9.1	9.9	10.7	11.6	12.5	13.5	14.6	15.7	16.9	18.2	19.6	21.0	22.5
2 000	4.4	4.8	5.3	5.8	6.3	6.9	7.5	8.2	8.9	9.7	10.5	11.4	12.3	13.3	14.3	15.5	16.7	18.0	19.3	20.7	22.3