EOSAEL 92
THE CLIMATOLOGY MODULE
CLIMAT

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Chapter 1

Introduction

The meteorological data base for 795 stations, provided by the U.S. Air Force Environmental Technical Applications Center at Scott Air Force Base, Illinois, was divided into 74 nonoverlapping climatic regions (4 in Central Europe; 6 in the Mideast; 3 each in Korea, Alaska, and Central America; 2 in Scandinavia; 4 in Mexico; 6 in South America; 3 in India; 1 in Southeast Asia; 12 in Southern Europe; and 27 in Canada and the continental United States of America).

The 3-h observations recorded during approximately an 11-yr period from most of these stations were used to compute the climatology data for 4 periods during a standard day for each season for each of the 74 climatic regions. The recording period for each station contained consecutive years beginning no earlier than 1965 and ending no later than 1986. The climatology module (CLIMAT) contains conditional statistics based upon prevailing meteorological conditions. The seasons were determined from time changes in these conditional statistics.

1.1 Names of Things

There is one module, CLIMAT. It is composed of one subroutine, CLIMAT. No additional subroutines or functions are required for this module.

The PRECLI program must be executed to convert the 74 sequential CLIDATS data files to the 74 random access CLIDATR data files that CLIMAT processes. PRECLI is executed only once and the execution must precede the first use of the Electro-Optical Systems Atmospheric Effects Library (EOSAEL) with a call to CLIMAT.

The climatology data in the CLIDATR data files will be accessed by referencing input/output unit NCLIMT.

1.2 Availability

EOSAEL92 is available to U.S. Government Agencies, specified allied organizations, and their

authorized contractors at no cost. U.S. Government agencies needing EOSAEL92 should send a letter of request, signed by a branch chief or division director, to US Army Research Laboratory ARL. Contractors should have their Government contract monitor send the letter of request. Allied organizations must request EOSAEL92 through their national representative.

Please include, within security restrictions, your intended use(s). Also, indicate what type of nine-track tape your computer can read. We can make "ASCII" tapes, and UNIX "tar" format tapes in either 1600 or 6250 bpi. We can also make SUN cartridge tapes We can't supply EOSAEL92 on other media. Documentation for the modules is included.

The EOSAEL92 point of contact at ARL is Dr. Alan Wetmore.

1.2.1 Mailing Address

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Chapter 2

Background

The CLIMAT model was developed to be used with EOSAEL and to provide the EOSAEL user with reasonable values of climatological varibles for various land regions of the earth. Not all land areas are included in CLIMAT, and there is no plan for including all the land areas. CLIMAT was developed by Elton P. Avara and Bruce T. Miers of the US Army Atmospheric Sciences Laboratory (ASL) White Sands Missile Range, NM.

The original model contained climatology data for only 10 regions in Central Europe and the Mideast. CLIMAThas grown with each release of EOSAEL to the present 74 regions.

2.1 General Climatology

The purpose of a climatological classification system is to obtain an efficient arrangement of information in a simplified and generalized form. Climatology data or statistics can be organized to describe the major types of climate in quantitative terms. No single classification can serve all purposes satisfactorily; therefore, many different schemes have been developed. Most climatic classifications are concerned with relationships between temperature, rainfall, and vegetation.

The meteorological measurements necessary to develop an electro-optical climatology are not made on a routine basis, but are made at great expense (compared to routine measurements), at few locations, and over limited time intervals. Therefore, a climatological system must be developed from the data at hand and the limited insight that the special measurements provide. Microphysical properties (for example, composition, size distribution, and shape) of atmospheric aerosols must be inferred from visibility, weather obscuration type (such as rain, snow, and fog), and cloud information. The climatological areas presented in this report were developed with these criteria and subjective judgment.

A great deal of effort and investment has gone into creating the climatology for each region of the world. We did studies for regions in the Mideast and South West Asia shown in figure 2.2 [3], Central America shown in figure 2.3 [4], Alaska shown in figure 2.4 [5], Korea shown in figure 2.5 [6], Mexico shown in figure 2.6 [7], Central and Northern Europe shown in figures 2.7 and 2.8 [8], India and Southeast Asia shown in figures 2.9 and 2.10 [9],

Figure 2.1: Regions of the World for which CLIMAT abstracts have been built.

South America shown in figure 2.11 [10], and the Northern Mediterranean Area and Southern Europe shown in figure 2.7 [11]. Then we did climatology for the continental United States shown in figure 2.12 and for Canada shown in figure 2.13. Some regions of the world have not yet had climatologies produced.

2.2 The CLIMAT Climatology Model

The CLIMAT model is based on conditional statistics or separate statistics for each of several meteorological conditions. Twenty-two meteorological conditions or classes were determined based upon obscuration type, visibility, ceiling height, and absolute humidity. Table 2.1 lists these classes.

The CLIMAT classes are not mutually exclusive as an observation could simultaneously report fog, rain, and snow causing it to be counted in each of three classes. The 22 classes should not be combined as though they are independent to make new classes.

For each observation within each class, the meteorological parameters (temperature, dew-point, absolute humidity, relative humidity, visibility, sea-level pressure, wind speed, wind direction, cloud height, cloud cover or amount, and Pasquill stability category) were used to compute climatological statistics (table 2.2) for four seasons and four time periods during

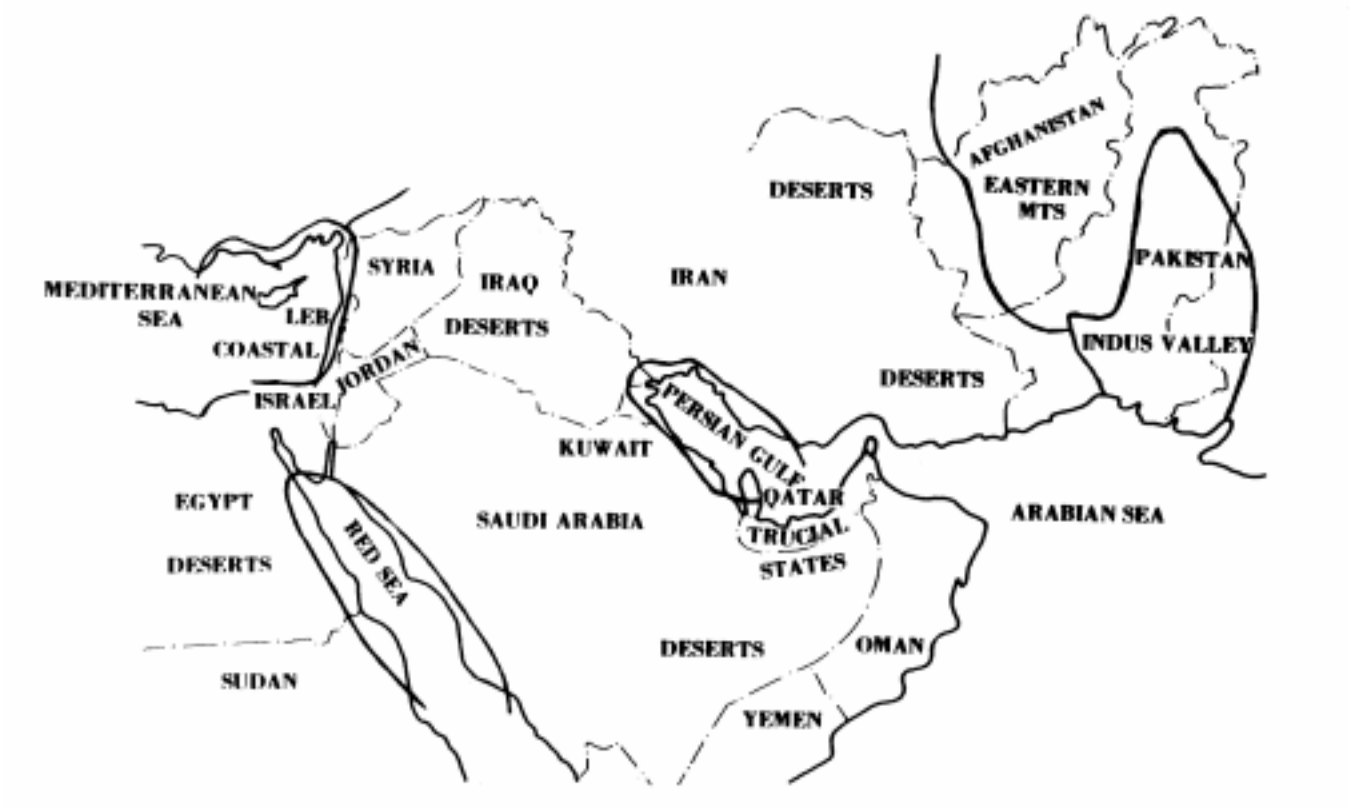

Figure 2.2: Regions in the Mideast.

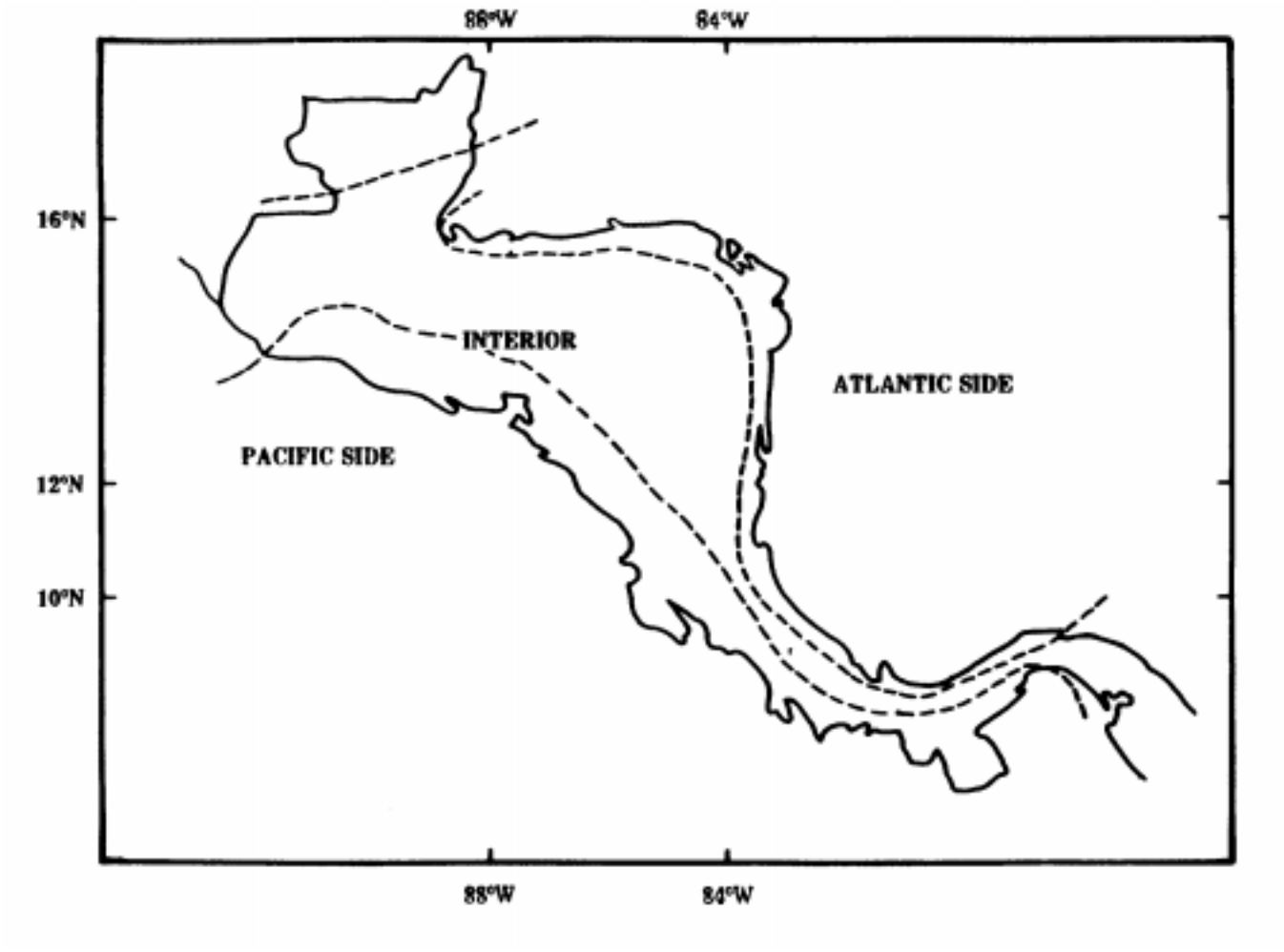

Figure 2.3: Regions in Central America.

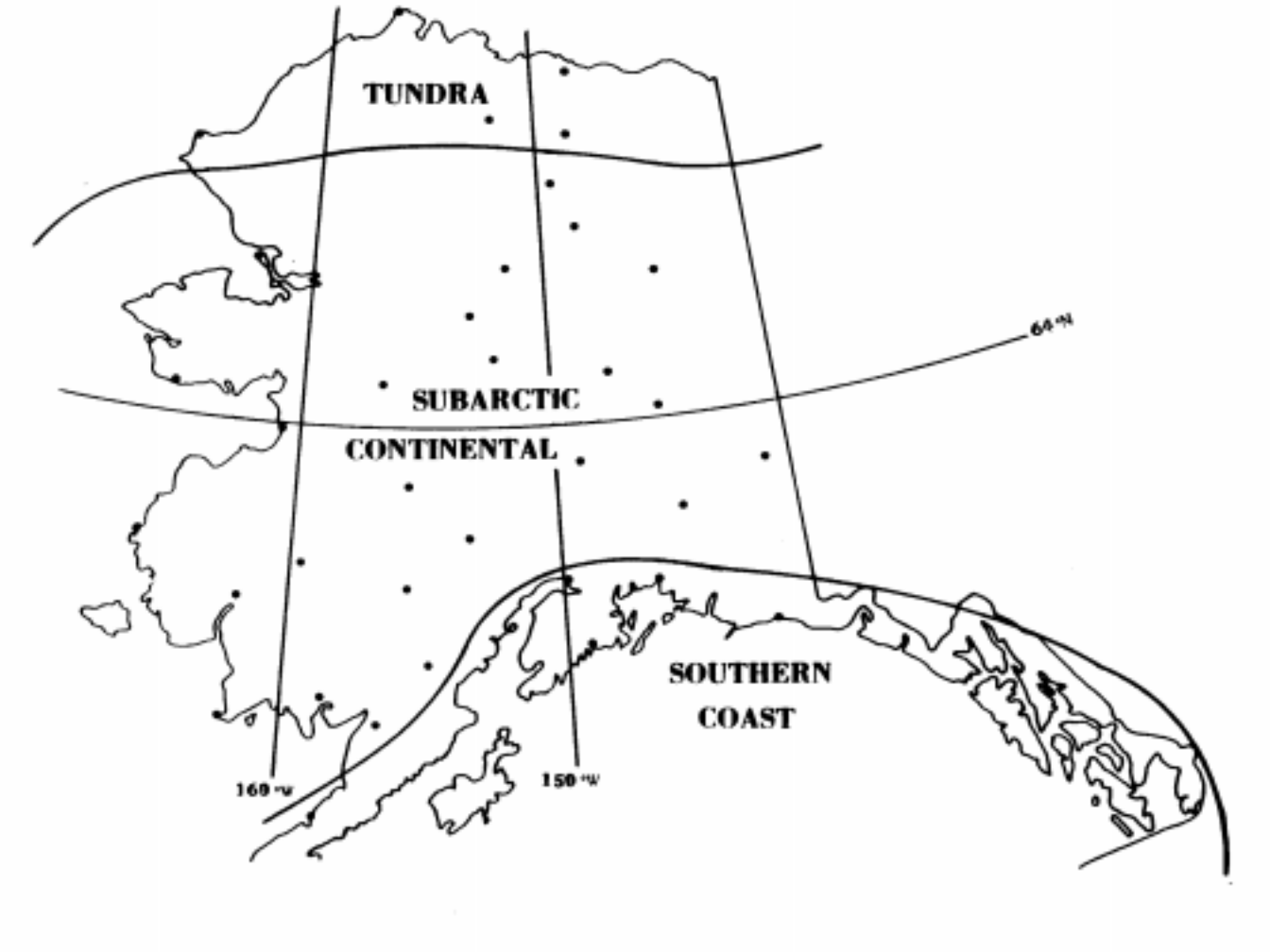

Figure 2.4: Regions in Alaska.

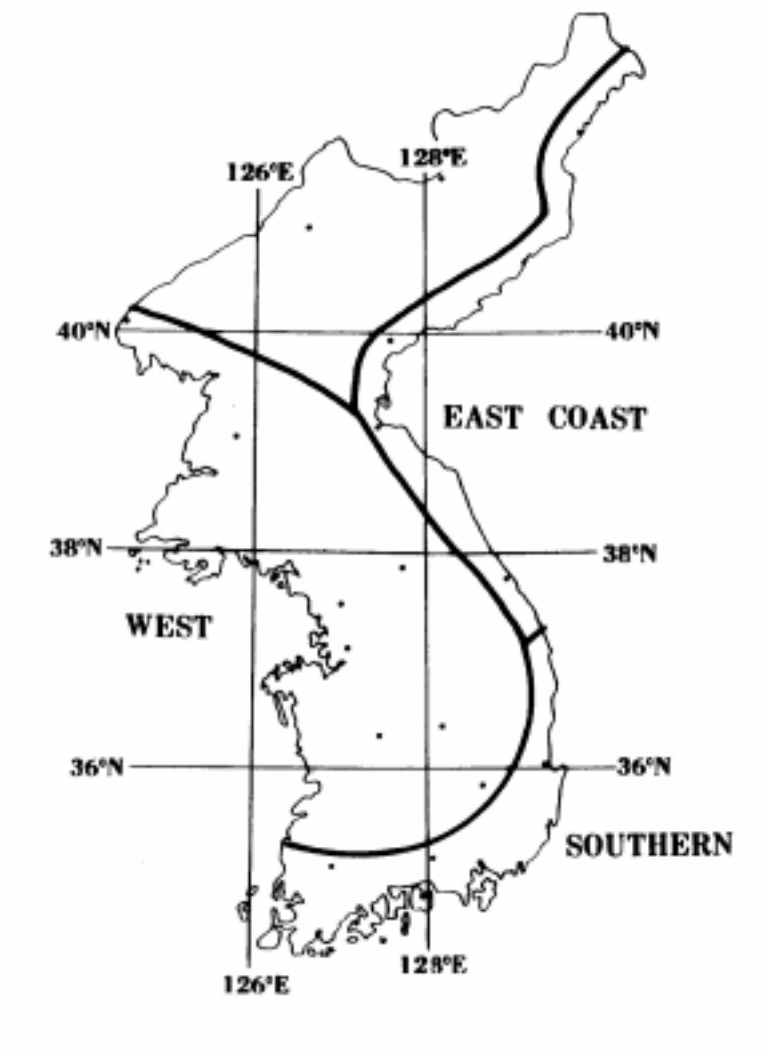

Figure 2.5: Regions in Korea.

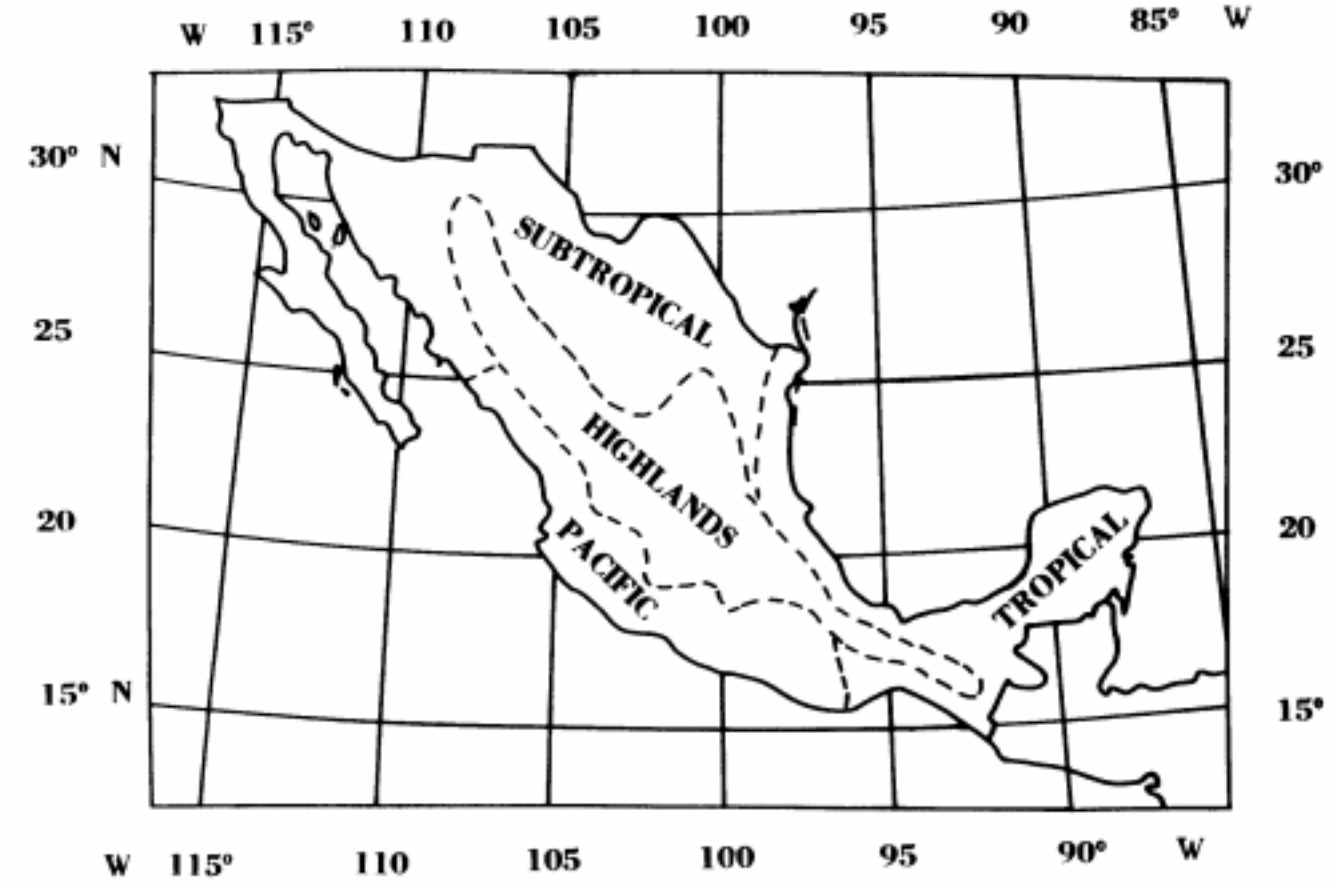

Figure 2.6: Regions in Mexico.

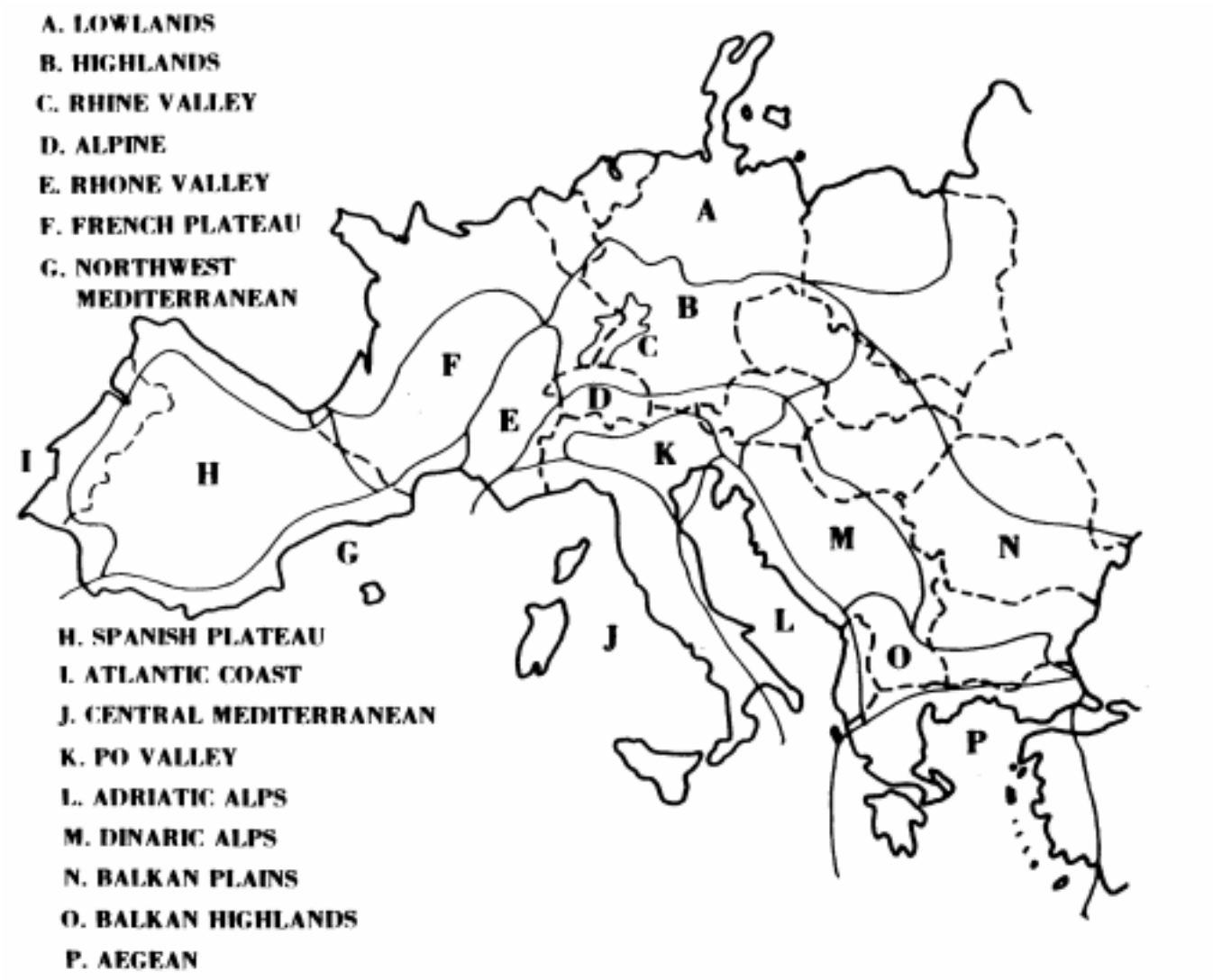

Figure 2.7: Regions in Europe.

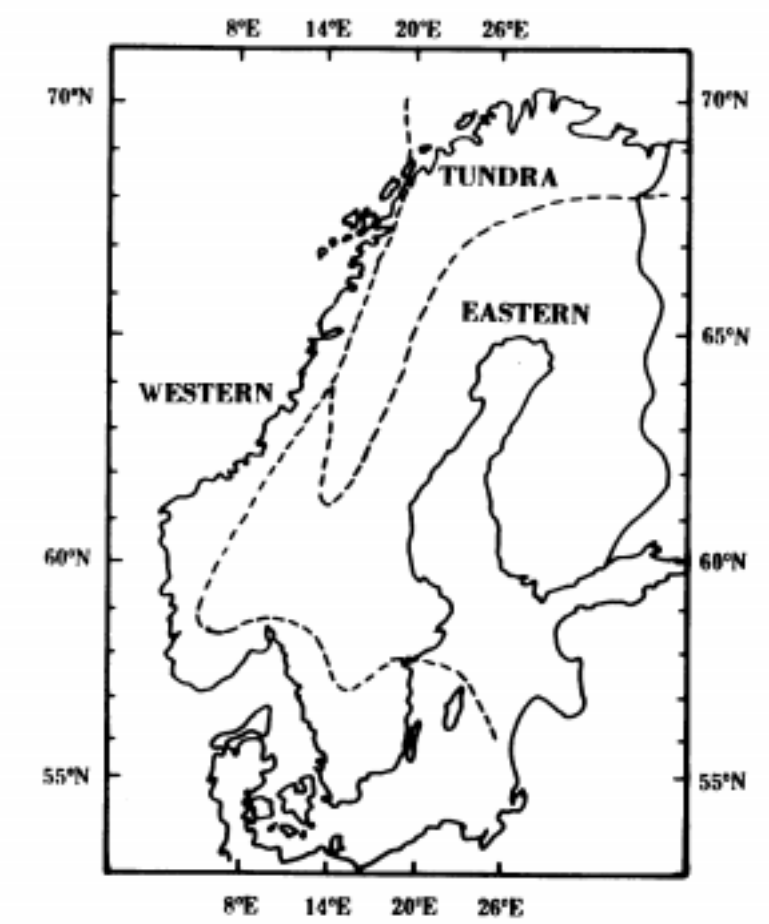

Figure 2.8: Regions in Scandinavia.

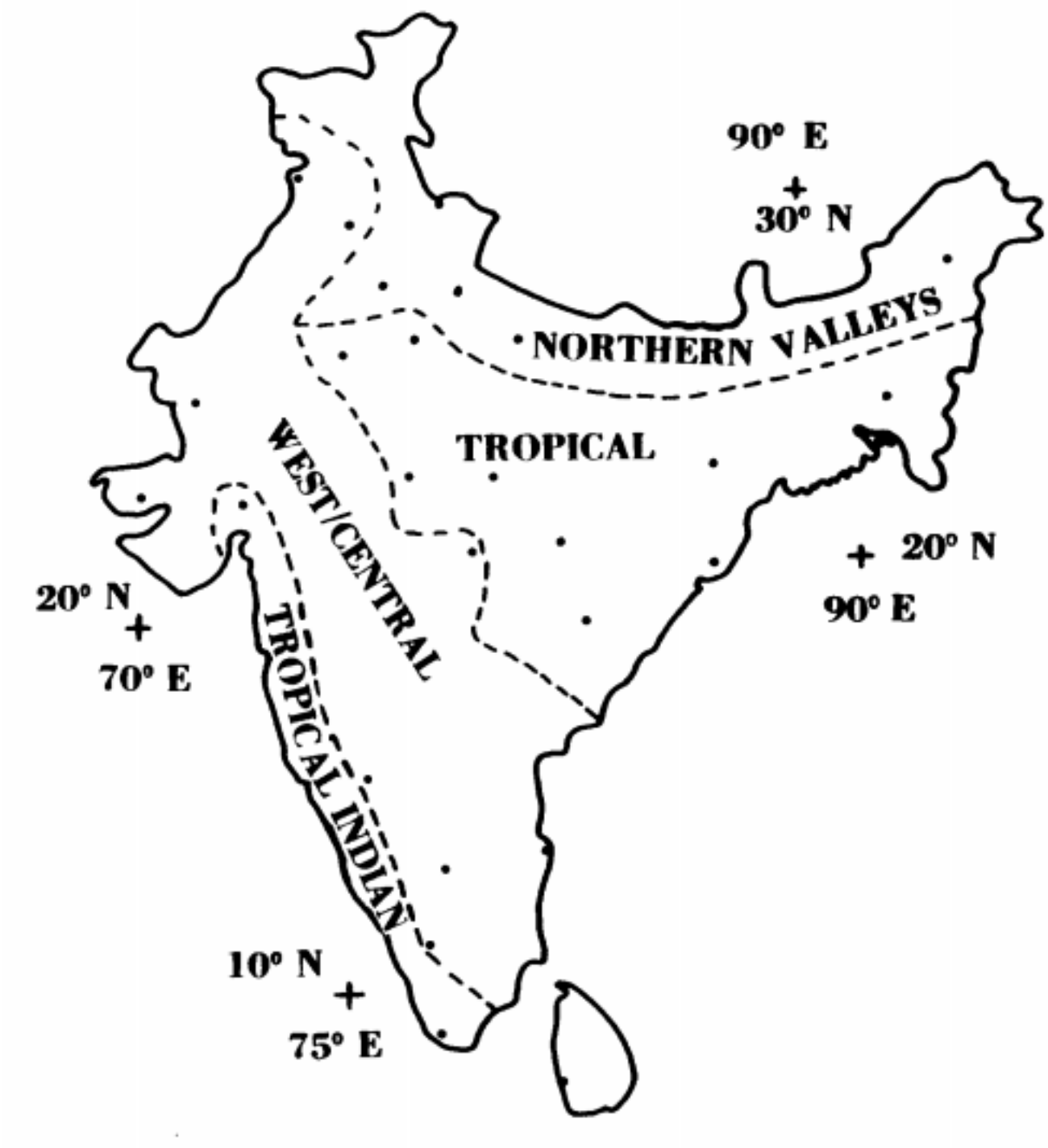

Figure 2.9: Regions in the Indian subcontinent.

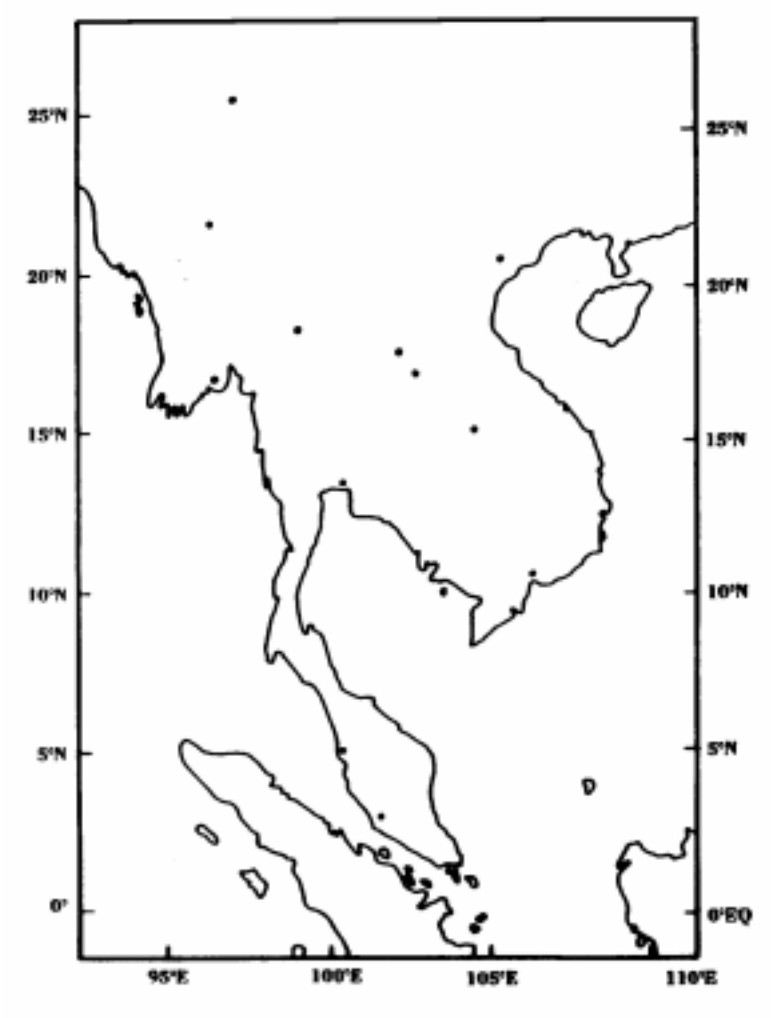

Figure 2.10: Regions in Southeast Asia.

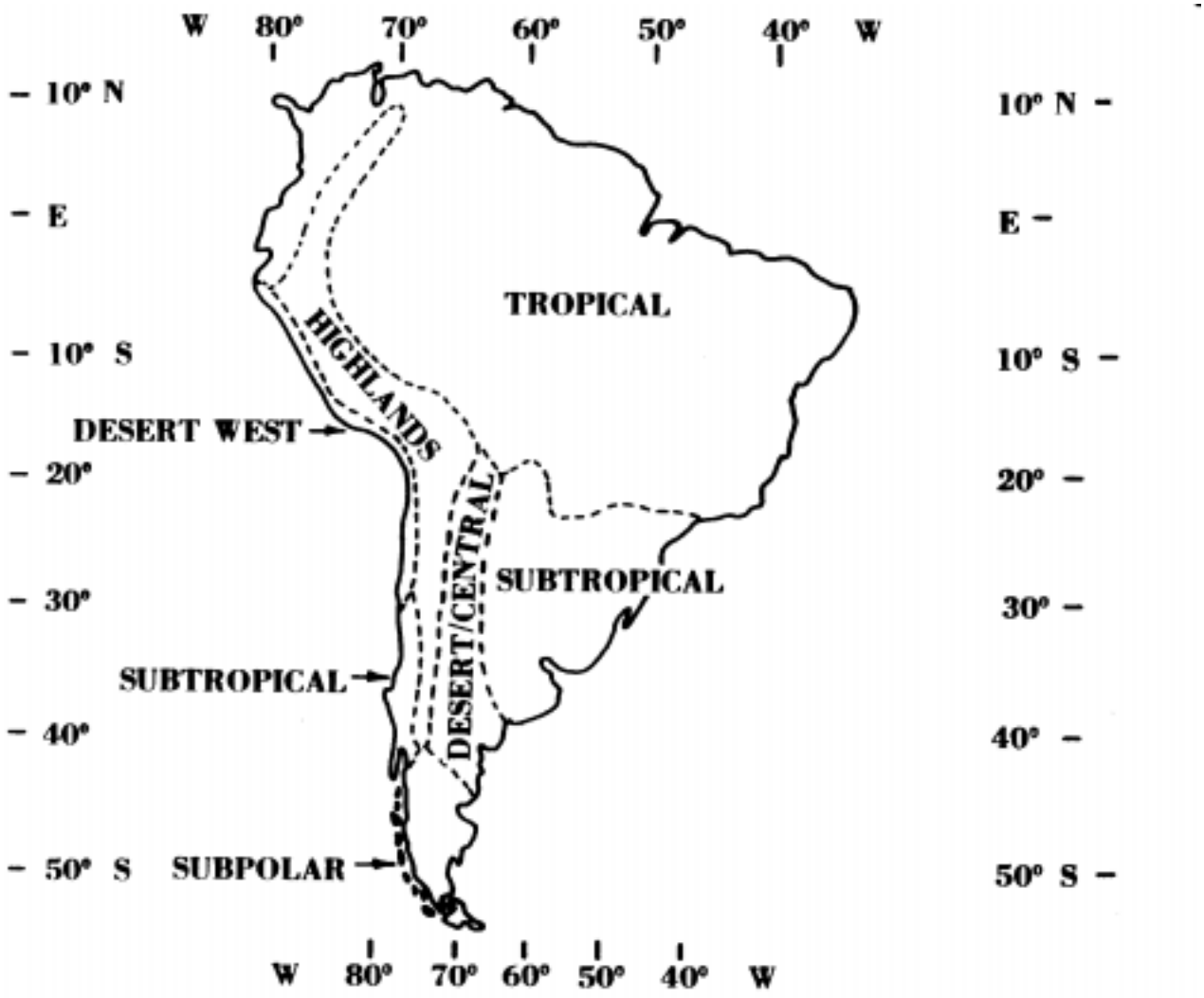

Figure 2.11: Regions in South America.

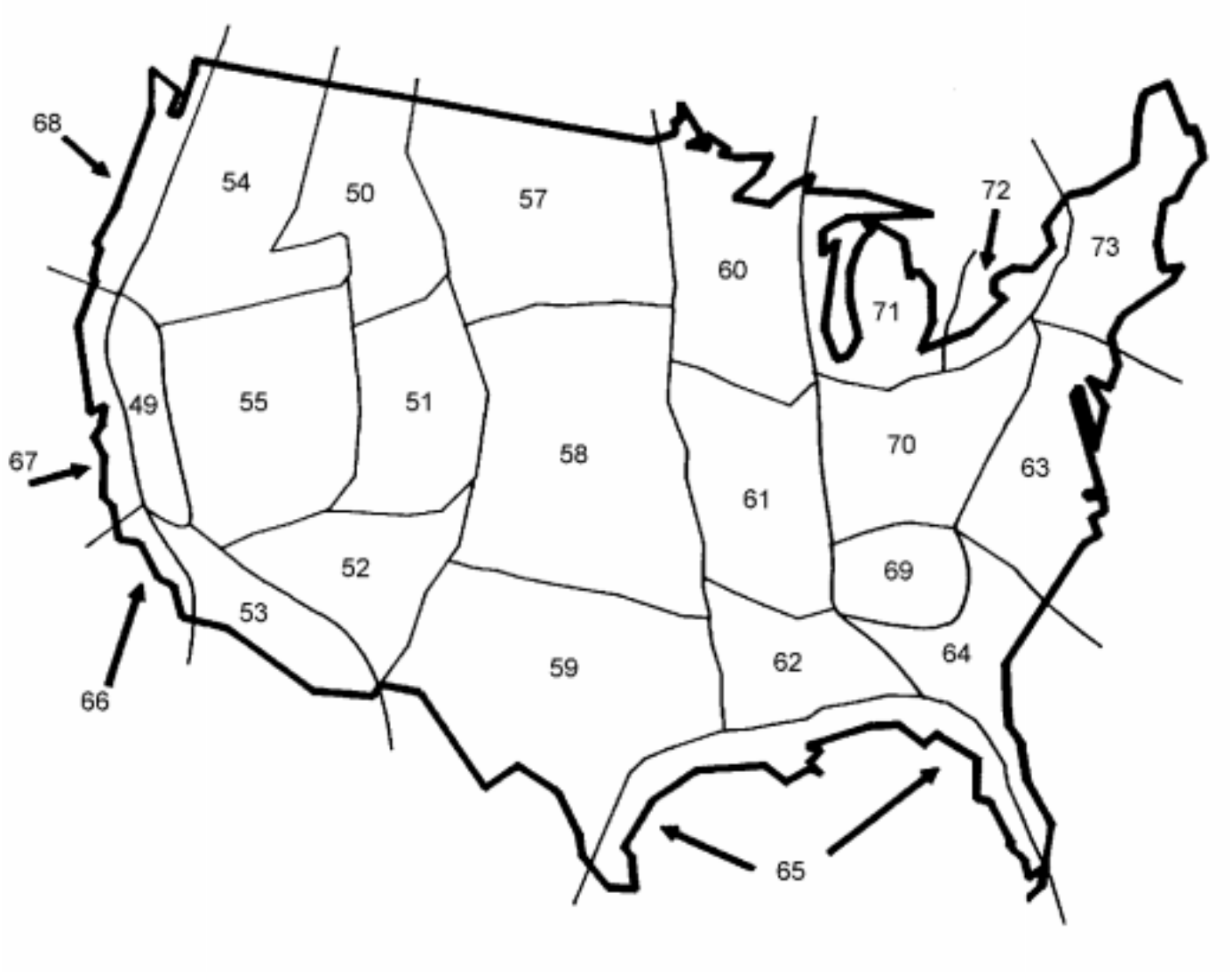

Figure 2.12: Regions in the continental United States.

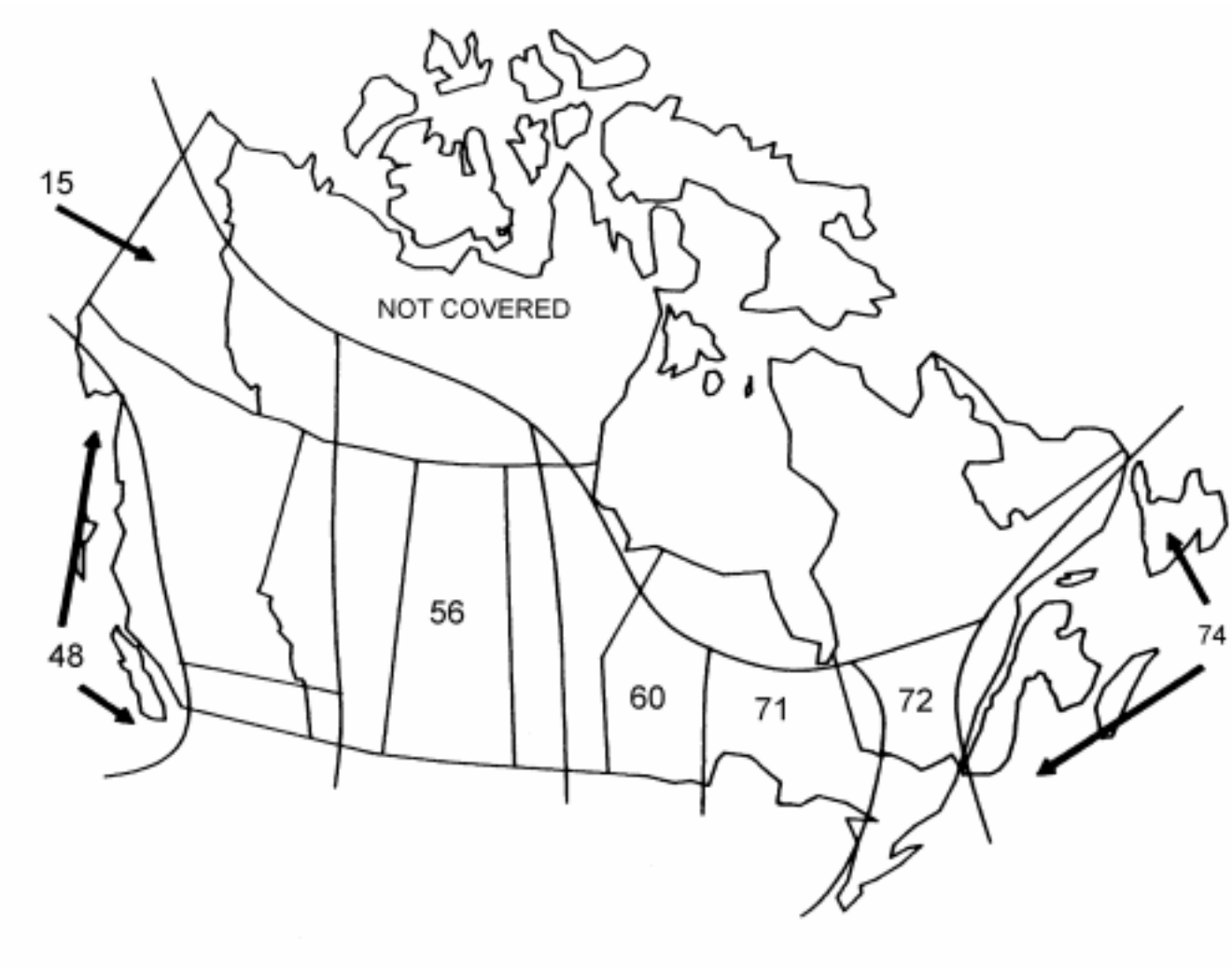

Figure 2.13: Regions in Canada.

the day (table 2.3) for each of the climatological regions (table 2.4). Table 2.5 presents the number of meteorological observations used within each season and each daily time period for each region.

Table 2.1: Meteorological condition classification

Class	Description	Class	Description
1 -	Fog, haze, and mist with visibility < 1 km.	2 -	Fog, haze, and mist with visibility $\geq 1, < 3$ km.
3 -	Fog, haze, and mist with visibility $\geq 3, < 7$ km.	4 -	Fog, haze, and mist with visibility ≥ 7 km.
5 -	Dust with visibility < 3 km.	6 -	Dust with visibility ≥ 3 km.
7 -	Drizzle, rain, and thunderstorms with visibility < 1 km.	8 -	Drizzle, rain, and thunderstorms with visibility $\geq 1, < 3$ km.
9 -	Drizzle, rain, and thunderstorms with visibility $\geq 3, < 7$ km.	10 -	Drizzle, rain, and thunderstorms with visibility ≥ 7 km.
11 -	Snow with visibility < 1 km.	12 -	Snow with visibility $\geq 1, < 3$ km.
13 -	Snow with visibility $\geq 3, < 7$ km.	14 -	Snow with visibility ≥ 7 km.
15 -	No sensible weather and absolute humidity < 10 gm/cu.m.	16 -	No sensible weather and absolute humidity ≥ 10 gm/cu.m.
17 -	visibility < 1 km and ceiling height < 300 m.	18 -	visibility < 3 km and ceiling height < 1000 m.
19 -	Ceiling height < 300 m.	20 -	Ceiling height < 1000 m.
21 -	No ceiling.	22 -	All conditions combined.

WARNING: These classes are not mutually exclusive. They should not be combined to make new classes.

Table 2.2: CLIMAT meteorological parameters and statistics

Meteorological Parameter	Mean	Standard Deviation	Percent Occurrence
Temperature (C)	X		
Dew-point (C)	X		
Absolute humidity (g/cu m)	X		
Relative humidity (%)	X		
Visibility (km)	X		
Sea-level pressure (mbar)	X		
Windspeed (m/s)	X	X	
Wind direction (30° intervals)			X
Cloud height (km)	X		
Cloud cover (%)	X	X	
Pasquill category (A-F)			X

Table 2.3: Time resolution of the climatology model

Daily Period (All regions)	Local Standard Time (LST)			
Night	2000–0200			
Morning	0300–0900			
Day	1000–1400			
Afternoon	1500–1900			
	Season			
Region	Winter	Spring	Summer	Autumn
Central Europe	Nov–Feb	Mar–May	Jun–Aug	Sep–Oct
Mideast	Dec–Feb	Mar–May	Jun–Aug	Sep–Nov
Korea	Dec–Feb	Mar–May	Jun–Aug	Sep–Nov
Alaska	Nov–Mar	Apr–Apr	May–Sep	Oct–Oct
Scandinavia	Nov–Mar	Apr–Apr	May–Sep	Oct–Oct
Central America	Jan–Apr	May–May	Jun–Oct	Nov–Dec
Mexico	Jan–Feb	Mar–May	Jun–Oct	Nov–Dec
South America Tropics, Desert W.	May–Sep	Oct–Nov	Dec–Mar	Apr–Apr
South America Desert C., Subtropic	Jun–Sep	Oct–Nov	Dec–Mar	Apr–May
South America Subpolar	May–Sep	Oct–Oct	Nov–Feb	Mar–Apr
South America Highlands	Jun–Aug	Sep–Nov	Dec–Mar	Apr–May
India	Dec–Jan	Feb–Apr	May–Sep	Oct–Nov
Southeast Asia	Nov–Mar	Apr–Apr	May–Sep	Oct–Oct
Southern Europe French Plateau	Nov–Feb	Mar–May	Jun–Aug	Sep–Oct
Southern Europe All other regions	Dec–Feb	Mar–May	Jun–Aug	Sep–Nov
Canada and USA	Dec–Feb	Mar–May	Jun–Aug	Sep–Nov

Table 2.4: Number of reporting stations within each climatological region

Central Europe	Lowlands (36)	Rhine Valley (7)
Highlands (27)	Alpine (5)	
Mideast	Deserts (53)	Coastal (11)
Persian Gulf (6)	Red Sea (6)	Eastern Mountains (10))
Indus Valley (12)		
Korea	East Coast (4)	South (4)
West (11)		
Alaska	Tundra (6)	Subarctic Continental (25)
Southern Coast (6)		
Scandinavia	Western (11)	Eastern (4)
Central America	Pacific Side (8)	Interior (3)
Atlantic Side (6)		
Mexico	Subtropical (7)	Pacific (4)
Highlands (8)	Tropical (10)	
Southeast Asia		
Southeast Asia (14)		
South America	Tropics (29)	Desert West (11)
Desert Central (13)	Subtropics (12)	Subpolar (9)
Highlands (10)		
India	West/Central Region (8)	Northern Valleys (5)
Tropical Area (17)		
Southern Europe	Adriatic (14)	Agean (9)
Balkan Highlands (9)	Balkan Plains (20)	Dinaric Alps (10)
Po Valley (5)	Cent. Mediterranean (12)	Rhone Valley (5)
French Plateau (9)	NW. Mediterranean (5)	Spanish Plateau (6)
Atlantic Coast (7)		
Canada and USA		
Western Canada (5)	Sacramento Valley (6)	Northern Rocky Mts. (10)
Central Rocky Mts. (7)	Southern Rocky Mts. (4)	Southwestern Desert (8)
Northern Inter-Mountain (5)	Southern Inter-Mountain (8)	Canadian Prairie (5)
Northern Great Plains (10)	Central Great Plains (10)	Southern Great Plains (11)
Upper Mississippi Valley (10)	Middle Mississippi Valley (10)	Lower Mississippi Valley (10)
Middle Atlantic Coast (14)	Southern Atlantic Coast (18)	Gulf Coast (21)
Southern Pacific Coast (4)	Central Pacific Coast (7)	Northern Pacific Coast (12)
Tennessee Valley (7)	Ohio Valley (14)	Great Lakes (15)
Eastern Great Lakes (14)	Northern Atlantic Coast (11)	Canadian Atlantic Region (10)

Table 2.5: Number of observations in each region

Season	Time of Day (LST) 20–02	03–09	10–14	15–19	Time of Day (LST) 20–02	03–09	10–14	15–19
	Europe Lowlands				Europe Rhine Valley			
Winter	83385	83675	84041	83895	16305	16552	16851	16789
Spring	64126	64665	64970	64516	12302	12543	12708	12759
Summer	64342	64464	64312	64300	11950	12242	12505	12559
Autumn	43230	43266	43323	43311	7874	8038	8346	8346
	Europe Highlands				Europe Alpine			
Winter	59138	61937	64291	63677	7897	9569	11159	11125
Spring	44857	47297	49459	48893	6030	7208	8573	8437
Summer	44241	46535	48660	48101	6094	7368	8630	8600
Autumn	29340	30866	32542	32343	4109	4962	5811	5786
	Mideast Deserts				Mideast Coastal			
Winter	54532	50579	52105	38247	20640	15287	19345	8262
Spring	61314	58108	56066	43291	21789	16560	20426	9072
Summer	60507	58457	54808	42598	21004	16487	19992	8759
Autumn	56584	54581	53971	41043	20387	15730	19537	8450
	Mideast Persian Gulf				Mideast Red Sea			
Winter	4689	7320	4484	6262	6619	6895	5999	4111
Spring	5186	7864	4515	6723	7487	8037	6772	4815
Summer	5390	8179	4358	6715	7295	8109	6505	4842
Autumn	4816	7860	4465	6565	6720	7389	6178	4526
	Mideast Eastern Mountains				Mideast Indus Valley			
Winter	2518	3536	4087	2951	4067	5406	6167	3172
Spring	2498	3086	3510	2842	4166	5756	5755	3123
Summer	2923	3181	3642	2819	5057	6004	5957	3210
Autumn	2897	3342	3780	3157	4741	5734	5739	3198
	Korean East Coast				South Korea			
Winter	7259	11213	3772	7643	5507	8538	3275	6510
Spring	7927	11837	3851	8037	5681	8926	3505	7006
Summer	7906	11846	3858	8006	5883	9049	3543	7083
Autumn	7694	11707	3940	7962	5699	8833	3488	7178
	West Korea				Alaskan Tundra			
Winter	17362	27904	9776	18797	18246	14554	15350	7940
Spring	17772	28776	10113	19510	3737	2993	3057	1674
Summer	17948	29057	10272	19520	19010	14903	15402	8571
Autumn	17449	28112	10091	19141	3765	3020	3162	1716

Table 2.5: Number of observations in each region (continued)

Season	Time of Day (LST) 20–02	03–09	10–14	15–19	Time of Day (LST) 20–02	03–09	10–14	15–19
	Alaskan Subarctic Cont.				Alaskan Southern Coast			
Winter	107147	83486	94265	45866	13039	11747	13096	8028
Spring	21894	16965	18657	9336	2693	2363	2647	1583
Summer	112699	90078	94796	47047	13410	11572	13078	7856
Autumn	22600	18303	19353	9698	2750	2413	2630	1625
	Western Scandinavia				Eastern Scandinavia			
Winter	16326	18135	21135	20333	12948	9436	9471	5920
Spring	3290	3710	4272	4141	2613	1898	1892	1179
Summer	16833	18949	21837	21074	13058	9551	9566	5987
Autumn	3345	3735	4322	4189	2698	1965	1961	1235
	C. America Pacific				C. America Interior			
Winter	8699	13216	6363	10945	1684	2701	1165	2381
Spring	2362	3529	1705	2869	443	753	329	652
Summer	11951	17800	8309	14573	2770	4155	1735	3756
Autumn	4589	6864	3259	5564	943	1519	632	1290
	C. America Atlantic				Mexico Subtropical			
Winter	2171	5244	3773	5556	2595	4881	2634	5067
Spring	645	1513	1029	1513	4132	7401	4034	7723
Summer	3514	7693	4977	7596	6898	13257	7261	14035
Autumn	1364	2898	1955	2939	2493	4789	2676	5081
	Mexico Pacific				Mexico Highlands			
Winter	1894	2937	1357	2542	1867	3117	2525	3113
Spring	2968	4620	2183	3926	2919	5012	3938	4910
Summer	5070	8012	3740	6950	5132	8578	6481	8108
Autumn	1962	3154	1486	2691	2020	3203	2608	3262
	Mexico Tropical				S. America Tropics			
Winter	1875	6484	4059	7064	25400	44253	40447	45291
Spring	2991	10425	6278	10736	10403	18329	16287	18229
Summer	5699	17784	10306	17731	19901	34803	31387	34527
Autumn	2180	6534	4107	6991	5127	8704	7922	8830
	S. America Desert West				S. America Desert Cent.			
Winter	24569	22567	25877	17681	15088	24295	9067	21039
Spring	10266	9732	10398	7344	7919	12884	4666	10527
Summer	18542	17494	19168	13223	14165	23709	8912	20342
Autumn	4853	4346	4933	3404	7580	12464	4582	10563

Table 2.5: Number of observations in each region (continued)

Season	Time of Day (LST) 20–02	03–09	10–14	15–19	Time of Day (LST) 20–02	03–09	10–14	15–19
	S. America Subtropics				S. America Subpolar			
Winter	16289	22113	16274	16527	8680	12225	8875	8316
Spring	8386	12018	8115	8349	2080	2895	1848	1817
Summer	16081	22660	15501	15942	7244	10228	6661	6479
Autumn	8276	11124	7862	8166	3423	4731	3376	3187
	S. America Highlands				India West/Cent. Region			
Winter	5892	9373	13162	11061	5272	7547	3306	6123
Spring	6384	9916	13288	11606	8019	11594	4873	8973
Summer	7910	12483	17130	14785	13578	19362	7849	14852
Autumn	4119	6415	8916	7594	5262	7336	3161	5970
	India Northern Valleys				India Tropical Area			
Winter	2494	3816	1681	3048	13384	18811	7901	15272
Spring	3862	5782	2448	4557	20180	28336	11552	22374
Summer	6480	9882	3959	7467	33868	47877	18589	36406
Autumn	2544	3777	1670	3060	13428	18335	7752	15030
	Southeast Asia				European Adriatic			
Winter	25642	25824	32054	31380	15323	14172	14946	13023
Spring	5097	5212	6006	5942	15971	14942	15426	13603
Summer	25843	26905	31660	31017	16445	15534	16063	13981
Autumn	5342	5381	6438	6286	16118	14990	15992	13720
	European Agean				European Balkan High.			
Winter	15386	9934	10572	5243	11359	9601	10052	6339
Spring	15200	10047	10726	5344	11229	9755	10101	6476
Summer	15253	10284	11185	5470	12168	10609	10732	6824
Autumn	15952	10656	11520	5634	12043	10160	10738	6685
	European Balkan Plains				European Dinaric Alps			
Winter	29813	23785	24093	17534	12300	11135	11450	9155
Spring	29021	23551	23929	17387	12235	11356	11653	9353
Summer	30914	25000	25536	18468	12770	11332	11730	9067
Autumn	31245	24996	25290	18274	12856	11516	11840	9442
	European Po Valley				European Cent. Medit.			
Winter	5004	5430	5662	5715	13620	14303	15419	15183
Spring	4964	5654	5919	5874	13482	14350	15375	15085
Summer	5150	6044	6531	6391	14668	15594	16647	16282
Autumn	5479	5968	6218	6251	14252	15239	16370	15994

Table 2.5: Number of observations in each region (continued)

	Time of Day (LST)				Time of Day (LST)			
Season	20–02	03–09	10–14	15–19	20–02	03–09	10–14	15–19
	European Rhone Valley				European French Plateau			
Winter	6519	6526	6544	6556	14319	17681	20890	19718
Spring	6689	6700	6718	6712	10792	13330	15503	14497
Summer	6646	6648	6679	6680	10955	13308	15539	14116
Autumn	6547	6601	6603	6605	7390	9027	10557	9790
	European NW. Medit.				European Span. Plateau			
Winter	3910	5481	5029	6114	4277	6870	7865	8303
Spring	4111	5880	5255	6478	4367	7263	8070	8642
Summer	3629	5185	4584	5723	3941	6462	6963	7474
Autumn	3637	5088	4519	5558	3928	6355	7030	7596
	European Atlantic Coast				Western Canada			
Winter	6447	9117	7061	8662	11508	10948	9512	8257
Spring	6870	9615	7359	9079	11749	11131	9678	8373
Summer	6107	8579	6524	7959	11727	11291	9737	8486
Autumn	6206	8611	6583	8161	11620	11215	9675	8468
	Sacramento Valley				N. Rocky Mountains			
Winter	11440	12203	13605	13564	23891	17881	18099	10138
Spring	11485	12446	13868	13794	24102	18384	18693	10446
Summer	10764	12183	13689	13710	23000	17898	18289	10308
Autumn	10960	12187	13673	13713	23100	17566	17922	10131
	Cent. Rocky Mountains				S. Rocky Mountains			
Winter	20797	14050	14132	6992	7509	6008	7341	3291
Spring	21053	14334	14489	7129	7817	6192	7502	3408
Summer	20977	14436	14493	7090	7928	6284	7621	3392
Autumn	20775	14180	14283	7041	7817	6123	7414	3384
	Southwestern Desert				N. Inter-Mountain			
Winter	17170	14377	18056	12524	9168	9161	9151	9127
Spring	17294	14915	18627	12770	9339	9319	9385	9323
Summer	16994	15075	18560	12295	9296	9283	9292	9347
Autumn	17025	14755	18341	12272	9188	9124	9189	9234
	S. Inter-Mountain				Canadian Prairie			
Winter	23394	16047	17136	8514	14152	12604	8814	7295
Spring	23821	16762	17866	8793	14391	12713	8974	7396
Summer	23453	16973	17679	8797	14456	12902	9045	7478
Autumn	23212	16387	17315	8651	14397	12855	8978	7457

Table 2.5: Number of observations in each region (continued)

	Time of Day (LST)				Time of Day (LST)			
Season	20–02	03–09	10–14	15–19	20–02	03–09	10–14	15–19
	Northern Great Plains				Central Great Plains			
Winter	25946	26964	15375	16358	25528	27929	15387	17850
Spring	26337	27154	15678	16501	26046	28459	15790	18226
Summer	26699	27660	15827	16848	26122	28694	15657	18206
Autumn	26467	27402	15667	16664	26053	28457	15632	18068
	Southern Great Plains				Upper Miss. Valley			
Winter	25287	37927	12689	25257	15847	28272	10697	20474
Spring	25842	38515	12977	25779	16159	28656	11002	20489
Summer	25977	38771	13007	25895	15899	28457	10907	19867
Autumn	25691	38369	12908	25604	15765	28284	10847	20095
	Middle Miss. Valley				Lower Miss. Valley			
Winter	21954	33124	11187	22265	17385	27941	9876	19685
Spring	22313	33431	11365	22489	17624	28379	10076	19783
Summer	22363	33559	11348	22644	17612	28143	9947	19619
Autumn	22314	33430	11339	22485	17533	28003	9915	19741
	Middle Atlantic Coast				S. Atlantic Coast			
Winter	25400	25475	27607	27133	37238	37377	37600	37551
Spring	25853	26135	28385	27812	37999	37992	38315	38239
Summer	25536	26492	28267	27732	38168	38175	38235	38442
Autumn	25519	26004	28026	27495	37568	37460	37852	37822
	Gulf Coast				Southern Pacific Coast			
Winter	42861	60030	28689	45236	4083	4179	5733	5081
Spring	43413	61046	29181	45939	4089	4497	5837	5097
Summer	43197	61004	28980	45944	4135	4957	5833	5147
Autumn	42994	60234	28722	45555	4128	4684	5850	5206
	Central Pacific Coast				Northern Pacific Coast			
Winter	8753	8524	11980	10110	21642	21829	22138	21908
Spring	9239	9530	12756	10677	22218	22349	22636	22406
Summer	8841	9592	12535	10250	21893	22037	22479	22391
Autumn	8403	8926	12025	9962	21680	21817	22091	22048
	Tennessee Valley				Ohio Valley			
Winter	13846	19755	8076	13872	30243	37051	25138	31894
Spring	14234	20154	8276	14159	30758	37558	25687	32409
Summer	14214	20093	8211	14138	30517	37630	25460	32432
Autumn	13981	19727	8095	13889	30351	37296	25273	32111

Table 2.5: Number of observations in each region (continued)

	Time of Day (LST)				Time of Day (LST)			
Season	20–02	03–09	10–14	15–19	20–02	03–09	10–14	15–19
	Great Lakes				Eastern Great Lakes			
Winter	34211	38705	29684	34219	24081	24537	26935	26620
Spring	34913	39381	30306	34837	24245	25270	27657	27127
Summer	34930	39565	30181	34949	23626	25709	27737	26916
Autumn	34660	39286	29938	34612	23618	25025	27211	26493
	N. Atlantic Coast				Canadian Atlantic Reg.			
Winter	22751	23240	24799	24860	17601	12851	13031	6379
Spring	23147	23456	25231	25237	17816	12998	13335	6449
Summer	23191	23617	25047	25210	17602	12966	13215	6390
Autumn	23101	23470	25053	25111	17515	12898	13077	6270

The relative humidity R was computed from the equation

$$R = 100e(D)/e(T) \ , \tag{2.1}$$

where

T = the ambient temperature in degrees Kelvin

D = the dew-point temperature in degrees Kelvin

$e(X)$ = the vapor pressure in millibars, with $X = D$ or T.

The vapor pressure is obtained from the equation [1]

$$\ln[e(X)/6.105] = 25.22(X - 273)/X - 5.31 \ln(X/273) \ . \tag{2.2}$$

The absolute humidity A was computed from the equation

$$A = 216.68e(D)/T \ . \tag{2.3}$$

The Pasquill stability category was obtained from a sequential procedure. The procedure starts by calculating the solar angle parameter S. Let A denote the solar angle in degrees above the horizon (negative if below the horizon) and S is determined by the inequalities,

$$A \leq 0 \ \mapsto \ S = 0 \tag{2.4}$$

$$0 < A \leq 15 \ \mapsto \ S = 1 \tag{2.5}$$

$$15 < A \leq 35 \ \mapsto \ S = 2 \tag{2.6}$$

$$35 < A \leq 60 \ \mapsto \ S = 3 \tag{2.7}$$

$$60 < A \leq 90 \ \mapsto \ S = 4 \tag{2.8}$$

$$\tag{2.9}$$

with A computed for the station latitude and longitude and the time of day and Julian date for each observation.

The next step in the procedure calculates the net radiation index NRI. Let C denote the cloud cover in octants or eighths, H denote the cloudbase height in hundreds of feet, and $NRI \in [1, \ldots, 7]$. The NRI was determined by the values of C, H, A, and S according to the conditions in table 2.6.

The value of $C = 9$ or 10 denotes an obscured sky. Given $C = 8$, $H > 7$, and $A > 0$, 1 was added to the NRI obtained above. Next, when $A > 0$ and $NRI > 4$, NRI was set equal to 4. [2]

Let V denote the windspeed in knots. The Pasquill stability index was obtained from table 2.7 and the value of NRI.

A complete climatology model as described in this section is available for each season, for each of the four daily time periods, for each of the 74 regions. The model contains statistics for any of the 22 meteorological classes listed in table 2.1.

Table 2.6: Net radiative index as a function of cloud cover (C), cloudbase height (H), solar angle (A), and solar angle parameter (S)

C	H	A	NRI
9-10	All	All	5
8	<7	All	5
8	≥ 7	≤ 0	6
4-7	All	≤ 0	6
0-3	All	≤ 0	7
0-4	All	>0	$5-S$
5-7	<7	>0	$7-S$
5-8	7-16	>0	$6-S$
5-8	>16	>0	$5-S$

Table 2.7: The pasquill stability category (A–F) as a function of the wind speed (V) in knots and the net radiative index

			Net Radiative Index						
			1	2	3	4	5	6	7
$0 \leq$	V	< 2	A	A	B	C	D	F	F
$2 \leq$	V	< 4	A	B	B	C	D	F	F
$4 \leq$	V	< 6	A	B	C	D	D	E	F
$6 \leq$	V	< 7	B	B	C	D	D	E	F
$7 \leq$	V	< 8	B	B	C	D	D	D	E
$8 \leq$	V	< 10	B	C	C	D	D	D	E
$10 \leq$	V	< 11	C	C	D	D	D	D	E
$11 \leq$	V	< 12	C	C	D	D	D	D	D
$12 \leq$	V		C	D	D	D	D	D	D

Chapter 3

Caveats

3.1 Grade of Software

The CLIMAT model is considered to be fieldable. It is a collection of means, standard deviations, and percent occurrences of actual weather observations. All available observations in the ASL climate data base were considered candidates for inclusion in the model. For the regions that had observations available from numerous stations, only the observations from stations with the most consistent data and longer periods of record were used. Editing of the data was performed. There is a high probability that some bogus values were used in the calculations. The values in CLIMAT compare well with other comparable published data. The data used in developing CLIMAT has been used by numerous Army agencies for the past 12 years in studies and evaluations of systems and wargaming.

3.2 Model Failure

The CLIMAT model should not fail to return values. There is an inherent risk that the user may inadvertently ask for climatology statistics for a heavy snow condition in the Mideast deserts in July when such an occurrence would be rare. In such a case, the model should return zeros for all output variables.

3.3 Verification Tests

There have been no formal documented verification tests of the CLIMAT model.

Chapter 4

Operations Guide

4.1 Inputs

When the CLIMAT module is called, all other EOSAEL modules will subsequently use the supplied meteorological data from CLIMAT, superseding any meteorological data that may have been input to a specific module.

Input to CLIMAT is via one data statement read in EOEXEC under the common format (A4,6X,7E10.4). The identifier is CLIM. Table 4.1 gives the variables and descriptions.

Table 4.1: Description of input parameters for CLIMAT

Variable	Description
ICLMAT	Flag denoting either climatology input from CLIMAT (ICLMAT = 1.0) or user input of data (ICLMAT = 2.0)
LOCAT	The region indicator, 1.0 to 74.0, where the values refer to the IDs given in table 4.2 or 4.3.
MONTH	A value, 1.0 to 12.0, indicating month and used to determine the season
NHOUR	A value, 0.0 to 23.0, indicating time of day and used to select one of four time periods of the day, 20–02, 03–09, 10–14 and 15–19
ICLASS	The climatology class number (see table 1). The default value is 22. If ICLASS = 0.0 (and NPRT > 0.0), the statistics for all 22 of the classes will be printed and the values for ICLASS = 22.0 will be returned in the `CALL CLIMAT` Statement.
NPRT	The print selector where: NPRT $\leq$ 0.0 indicates no printing of climatology data NPRT > 0.0 indicates printing of all available means, standard deviations, and percent occurrences for the chosen ICLASS

Table 4.2: The region for identification number

ID	Region	ID	Region
1.	European Lowlands	2.	European Rhine Valley
3.	European Highlands	4.	European Alpine
5.	Mideast Deserts	6.	Mideast Coastal
7.	Mideast Persian Gulf	8.	Mideast Red Sea
9.	Mideast Eastern Mountains	10.	Mideast Indus Valley
11.	Korean East Coast	12.	South Korea
13.	West Korea	14.	Alaskan Tundra
15.	Alaskan Subarctic Continental	16.	Alaskan Southern Coast
17.	Western Scandinavia	18.	Eastern Scandinavia
19.	Central America Pacific Side	20.	Central American Interior
21.	Central America Atlantic Side	22.	Mexico Subtropical
23.	Mexico Pacific	24.	Mexico Highlands
25.	Mexico Tropical	26.	South America Tropics
27.	South America Desert West	28.	South America Desert Central
29.	South America Subtropics	30.	South America Subpolar
31.	South America Highlands	32.	India West/Central Region
33.	India Northern Valleys	34.	India Tropical Area
35.	Southeast Asia	36.	European Adriatic
37.	European Agean	38.	European Balkan Highlands
39.	European Balkan Plains	40.	European Dinaric Alps
41.	European Po Valley	42.	European Cent. Mediterranean
43.	European Rhone Valley	44.	European French Plateau
45.	European NW. Mediterranean	46.	European Spanish Plateau
47.	European Atlantic Coast	48.	Western Canada
49.	Sacramento Valley	50.	Northern Rocky Mountains
51.	Central Rocky Mountains	52.	Southern Rocky Mountains
53.	Southwestern Desert	54.	Northern Inter-Mountain
55.	Southern Inter-Mountain	56.	Canadian Prairie
57.	Northern Great Plains	58.	Central Great Plains
59.	Southern Great Plains	60.	Upper Mississippi Valley
61.	Middle Mississippi Valley	62.	Lower Mississippi Valley
63.	Middle Atlantic Coast	64.	Southern Atlantic Coast
65.	Gulf Coast	66.	Southern Pacific Coast
67.	Central Pacific Coast	68.	Northern Pacific Coast
69.	Tennessee Valley	70.	Ohio Valley
71.	Great Lakes	72.	Eastern Great Lakes
73.	Northern Atlantic Coast	74.	Canadian Atlantic Region

Table 4.3: The identification number for region

Region	ID	Region	ID
Alaskan Southern Coast	16.	Alaskan Subarctic Continental	15.
Alaskan Tundra	14.	Canadian Atlantic Region	74.
Canadian Prairie	56.	Central America Atlantic Side	21.
Central America Pacific Side	19.	Central American Interior	20.
Central Great Plains	58.	Central Pacific Coast	67.
Central Rocky Mountains	51.	Eastern Great Lakes	72.
Eastern Scandinavia	18.	European Adriatic	36.
European Agean	37.	European Alpine	4.
European Atlantic Coast	47.	European Balkan Highlands	38.
European Balkan Plains	39.	European Cent. Mediterranean	42.
European Dinaric Alps	40.	European French Plateau	44.
European Highlands	3.	European Lowlands	1.
European NW. Mediterranean	45.	European Po Valley	41.
European Rhine Valley	2.	European Rhone Valley	43.
European Spanish Plateau	46.	Great Lakes	71.
Gulf Coast	65.	India Northern Valleys	33.
India Tropical Area	34.	India West/Central Region	32.
Korean East Coast	11.	Lower Mississippi Valley	62.
Mexico Highlands	24.	Mexico Pacific	23.
Mexico Subtropical	22.	Mexico Tropical	25.
Middle Atlantic Coast	63.	Middle Mississippi Valley	61.
Mideast Coastal	6.	Mideast Deserts	5.
Mideast Eastern Mountains	9.	Mideast Indus Valley	10.
Mideast Persian Gulf	7.	Mideast Red Sea	8.
Northern Atlantic Coast	73.	Northern Great Plains	57.
Northern Inter-Mountain	54.	Northern Pacific Coast	68.
Northern Rocky Mountains	50.	Ohio Valley	70.
Sacramento Valley	49.	South America Desert Central	28.
South America Desert West	27.	South America Highlands	31.
South America Subpolar	30.	South America Subtropics	29.
South America Tropics	26.	South Korea	12.
Southeast Asia	35.	Southern Atlantic Coast	64.
Southern Great Plains	59.	Southern Inter-Mountain	55.
Southern Pacific Coast	66.	Southern Rocky Mountains	52.
Southwestern Desert	53.	Tennessee Valley	69.
Upper Mississippi Valley	60.	West Korea	13.
Western Canada	48.	Western Scandinavia	17.

4.2 Output

Eleven output quantities are available from CLIMAT:

TEMP	Mean temperature (degrees Celsius)
PRESS	Mean sea-level pressure (millibars)
RH	Mean relative humidity (percent)
AH	Mean absolute humidity (grams per cubic meter)
DP	Mean dew-point temperature (degrees Celsius)
VIS	Mean horizontal visibility (kilometers)
WNDVEL	Mean windspeed (meters per second)
WINDIR	Most probable wind direction (degrees), given in 30° increments (015, 045, 075, ..., 345)
IPASCT	An indicator (1–6) for the most probable Pasquill stability category (A–F)
CLDHT	Mean cloud height (kilometers)
CLDCVR	Mean total cloud cover (percent)

Chapter 5

Sample Runs

5.1 Overview

This chapter describes the sample input and output files supplied with the CLIMAT module. Sample 1 is a naive question, and sample 2 is a better way to start.

5.2 Sample 1

Sample 1 is an example of the most often asked question, what happens when the weather is raining?

5.2.1 Input File CLIMAT01.DAT

This is an input file that might be used to plan a 4^{th} of July picnic in Washington, D.C. The first line, labeled WAVL, has the wavelength of interest. This is always required for EOSAEL though the CLIMAT module doesn't use it for anything.

```
WAVL       10.591
CLIMAT       1.0      63.0       7.0      16.0       0.0       1.0
STOP
# THE FOLLOWING IS EOSAEL SOURCE CONTROL INFORMATION YOU CAN SAFELY REMOVE IT
# SCCS  @(#) CLIMAT02.DAT 2.1 02/23/90
```

5.2.2 Output File CLIMAT01.OUT

The output file from the CLIMAT01.OUT file follows.

```
*******************************************************************************
  WARNING - THIS LIBRARY CONTAINS TECHNICAL DATA WHOSE EXPORT IS RESTRICTED
  BY THE ARMS EXPORT CONTROL ACT (TITLE 22, U.S.C., SEC 2751 ET SEQ.) OR
  EXECUTIVE ORDER 12470.  VIOLATION OF THESE EXPORT LAWS ARE SUBJECT TO
                   SEVERE CRIMINAL PENALTIES.
```

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1

                    *********************************
                    *                               *
                    *    ELECTRO-OPTICAL SYSTEMS    *
                    *                               *
                    *  ATMOSPHERIC EFFECTS LIBRARY  *
                    *                               *
                    *    NOT FOR OPERATIONAL USE    *
                    *                               *
                    * EOSAEL92 REV 2.2   03/07/91   *
                    *                               *
                    *********************************


WAVL       10.591
 NOTE: THAT THE ABOVE CARD WAS MODIFIED FOR CONSISTENCY TO:
WAVL       .1059E+02 .1059E+02 .0000E+00
1

                    *********************************
                    *                               *
                    *         C L I M A T           *
                    *                               *
                    *         CLIMATOLOGY           *
                    *            MODULE             *
                    * NOT FOR OPERATIONAL USE       *
                    *                               *
                    * EOSAEL92 REV 1.5   04/03/91   *
                    *                               *
                    *********************************


                   CLIMATOLOGY MODEL


  DEFINITIONS OF METEOROLOGICAL CLASSES

 CLASS  1 = FOG, HAZE AND MIST WITH VIS LT 1 KM.
 CLASS  2 = FOG, HAZE AND MIST WITH VIS GE 1, LT 3 KM.
```

CLASS 3 = FOG, HAZE AND MIST WITH VIS GE 3, LT 7 KM.
CLASS 4 = FOG, HAZE AND MIST WITH VIS GE 7 KM.
CLASS 5 = DUST WITH VIS LT 3 KM.
CLASS 6 = DUST WITH VIS GE 3 KM.
CLASS 7 = DRIZZLE, RAIN AND TSTMS WITH VIS LT 1 KM.
CLASS 8 = DRIZZLE, RAIN AND TSTMS WITH VIS GE 1, LT 3 KM.
CLASS 9 = DRIZZLE, RAIN AND TSTMS WITH VIS GE 3, LT 7 KM.
CLASS 10 = DRIZZLE, RAIN AND TSTMS WITH VIS GE 7 KM.
CLASS 11 = SNOW WITH VIS LT 1 KM.
CLASS 12 = SNOW WITH VIS GE 1, LT 3 KM.
CLASS 13 = SNOW WITH VIS GE 3, LT 7 KM.
CLASS 14 = SNOW WITH VIS GE 7 KM.
CLASS 15 = NO WEATHER AND ABSOLUTE HUMIDITY LT 10 GM/CU M.
CLASS 16 = NO WEATHER AND ABSOLUTE HUMIDITY GE 10 GM/CU M.
CLASS 17 = VIS LT 1 KM AND CEILING HEIGHT LT 300 M.
CLASS 18 = VIS LT 3 KM AND CEILING HEIGHT LT 1000 M.
CLASS 19 = CEILING HEIGHT LT 300 M.
CLASS 20 = CEILING HEIGHT LT 1000 M.
CLASS 21 = NO CEILING.
CLASS 22 = ALL CONDITIONS COMBINED.

EOSAEL CLIMATOLOGY FOR MIDDLE ATLANTIC COAST DURING SUMMER AT 15-19 (LST)

CLASS NO.	FREQCY CLASS (%)	MEAN TEMP (C)	MEAN DP (C)	MEAN AH (GM/CU.M)	MEAN RH (%)	MEAN VIS (KM)	MEAN PRESS (MB)	MEAN/STDEV WNDVEL (MPS)
1	.0	22.8	20.4	17.8	86.9	.721	1012.9	6.0/ 2.9
2	.8	21.5	19.5	17.1	88.8	2.021	1014.3	3.9/ 2.3
3	13.8	26.5	20.7	18.0	72.3	5.357	1014.6	3.3/ 2.1
4	20.5	27.5	20.1	17.4	65.7	8.933	1014.7	3.2/ 1.8
5	.0	.0	.0	.0	.0	.000	.0	.0/ .0
6	.0	27.6	19.1	16.3	62.4	9.600	1012.0	4.2/ .9
7	.2	23.0	20.6	18.1	87.3	.724	1013.2	6.4/ 3.3
8	.8	21.1	19.1	16.8	89.1	1.961	1014.0	4.4/ 2.6
9	3.0	22.2	19.6	17.1	85.8	4.850	1014.1	3.8/ 2.3
10	4.2	23.1	19.1	16.7	79.1	11.247	1014.5	3.5/ 2.1
11	.0	.0	.0	.0	.0	.000	.0	.0/ .0
12	.0	.0	.0	.0	.0	.000	.0	.0/ .0
13	.0	.0	.0	.0	.0	.000	.0	.0/ .0
14	.0	.0	.0	.0	.0	.000	.0	.0/ .0
15	9.9	23.3	8.8	8.5	40.6	25.399	1017.6	4.1/ 2.0
16	48.9	26.4	17.3	14.8	58.7	16.383	1016.1	3.5/ 1.9
17	.1	22.7	20.6	18.1	88.3	.710	1013.2	6.2/ 3.3
18	1.1	21.8	19.7	17.2	88.2	1.795	1014.0	4.5/ 2.6
19	26.4	25.0	19.0	16.5	71.2	10.019	1014.9	3.5/ 2.1
20	29.7	24.9	19.1	16.5	71.7	10.067	1014.9	3.5/ 2.1
21	40.6	27.1	16.3	14.1	53.3	16.488	1016.4	3.5/ 1.9
22	100.0	26.2	17.6	15.2	61.2	13.980	1015.7	3.5/ 2.0

CLASS NO.	FREQCY CLASS	MEAN CLDHT (KM)	MEAN/STDEV CLDCVR (PERCENT)	FREQCY A	FREQCY B	FREQCY C	FREQCY D	FREQCY E	FREQCY F
1	.0	.110	100.0/ .0	.0	.0	.0	100.0	.0	.0

2	.8	.251	99.9/	.8	.0	.0	.0	98.7	.9	.4
3	13.8	2.189	88.6/	26.8	.0	2.2	6.8	83.9	2.6	4.4
4	20.5	4.840	74.8/	35.0	.2	6.8	16.9	65.3	3.8	6.9
5	.0	.000	.0/	.0	.0	.0	.0	.0	.0	.0
6	.0	3.555	80.0/	44.7	.0	.0	.0	100.0	.0	.0
7	.2	.100	100.0/	.0	.0	.0	.0	100.0	.0	.0
8	.8	.254	99.9/	.8	.0	.0	.5	99.1	.0	.5
9	3.0	.291	99.8/	3.5	.0	.2	.4	98.7	.7	.0
10	4.2	1.056	99.1/	7.1	.0	.2	3.1	93.2	2.0	1.4
11	.0	.000	.0/	.0	.0	.0	.0	.0	.0	.0
12	.0	.000	.0/	.0	.0	.0	.0	.0	.0	.0
13	.0	.000	.0/	.0	.0	.0	.0	.0	.0	.0
14	.0	.000	.0/	.0	.0	.0	.0	.0	.0	.0
15	9.9	6.234	52.5/	38.0	.5	9.4	21.2	62.5	2.4	4.0
16	48.9	5.821	66.3/	36.7	.4	7.8	19.5	60.8	4.2	7.4
17	.1	.041	100.0/	.0	.0	.0	.0	100.0	.0	.0
18	1.1	.090	100.0/	.0	.0	.0	.0	100.0	.0	.0
19	26.4	.033	100.0/	.0	.0	.0	.0	100.0	.0	.0
20	29.7	.110	100.0/	.3	.0	.0	.0	100.0	.0	.0
21	40.6	2.978	29.2/	15.8	.7	15.1	29.0	38.9	3.9	12.4
22	100.0	4.846	71.2/	36.2	.3	6.5	16.5	66.9	3.6	6.2

CLASS NO.	FREQCY CLASS (%)	FREQCY WNDDIR 015 (%)	FREQCY WNDDIR 045 (%)	FREQCY WNDDIR 075 (%)	FREQCY WNDDIR 105 (%)	FREQCY WNDDIR 135 (%)	FREQCY WNDDIR 165 (%)	FREQCY WNDDIR 195 (%)
1	.0	4.2	8.3	.0	12.5	.0	16.7	4.2
2	.8	4.9	16.1	15.7	8.1	9.9	9.0	4.5
3	13.8	3.2	5.7	8.1	8.0	9.2	12.1	11.6
4	20.5	2.4	3.9	4.9	6.8	10.2	13.7	13.8
5	.0	.0	.0	.0	.0	.0	.0	.0
6	.0	.0	.0	.0	20.0	.0	.0	20.0
7	.2	4.8	7.1	2.4	7.1	.0	9.5	4.8
8	.8	6.0	16.3	12.6	8.4	8.4	6.5	5.6
9	3.0	7.0	10.2	11.5	6.7	7.9	10.4	8.4
10	4.2	5.8	6.7	6.3	5.3	9.1	12.6	10.4
11	.0	.0	.0	.0	.0	.0	.0	.0
12	.0	.0	.0	.0	.0	.0	.0	.0
13	.0	.0	.0	.0	.0	.0	.0	.0
14	.0	.0	.0	.0	.0	.0	.0	.0
15	9.9	5.3	3.3	3.8	5.0	5.4	5.9	4.0
16	48.9	3.1	3.5	5.5	7.0	9.2	13.6	11.5
17	.1	4.9	7.3	2.4	9.8	.0	7.3	4.9
18	1.1	3.8	14.0	12.7	8.9	6.5	8.2	5.1
19	26.4	3.5	6.0	7.6	8.2	8.9	12.7	11.2
20	29.7	3.8	6.2	7.8	8.5	9.3	12.7	11.0
21	40.6	3.2	3.1	4.6	5.8	8.0	11.3	10.1
22	100.0	3.3	4.0	5.6	6.8	8.9	12.4	11.1

CLASS NO.	FREQCY CLASS (%)	FREQCY WNDDIR 225 (%)	FREQCY WNDDIR 255 (%)	FREQCY WNDDIR 285 (%)	FREQCY WNDDIR 315 (%)	FREQCY WNDDIR 345 (%)	FREQCY WNDDIR VBL (%)
1	.0	12.5	4.2	8.3	12.5	16.7	.0

```
 2       .8    4.0    3.6    4.9    7.2    7.6    4.5
 3     13.8   13.1    9.1    5.0    3.9    3.3    7.7
 4     20.5   14.8    8.0    5.7    4.1    2.9    8.9
 5       .0     .0     .0     .0     .0     .0     .0
 6       .0     .0   60.0     .0     .0     .0     .0
 7       .2   11.9    7.1   16.7   14.3   14.3     .0
 8       .8    3.3    5.6    7.4    8.4    7.9    3.7
 9      3.0    7.4    6.2    5.8    5.6    6.1    6.6
10      4.2   12.0    6.7    5.4    6.0    5.5    8.1
11       .0     .0     .0     .0     .0     .0     .0
12       .0     .0     .0     .0     .0     .0     .0
13       .0     .0     .0     .0     .0     .0     .0
14       .0     .0     .0     .0     .0     .0     .0
15      9.9    6.2    8.5   14.2   20.5   16.0    2.2
16     48.9   11.7    8.1    7.4    7.6    5.3    6.4
17       .1   14.6    7.3    9.8   14.6   17.1     .0
18      1.1    4.8    6.5    7.5    8.2    9.9    3.8
19     26.4   11.9    8.0    5.2    4.8    4.4    7.5
20     29.7   11.4    7.6    5.0    4.8    4.6    7.2
21     40.6   11.6    8.9    9.0   10.3    7.5    6.5
22    100.0   11.9    8.3    7.5    7.8    5.8    6.6



                              END EOSAEL RUN

STOP 000
```

5.3 Sample 2

Sample 2 looks at how the weather changes over four different times of the day. It looks at the same region and season for all four times.

5.3.1 Input File CLIMAT02.DAT

```
WAVL       10.591
CLIMAT       1.0      52.0       7.0      23.0       0.0       1.0
CLIMAT       1.0      52.0       7.0      03.0       0.0       1.0
CLIMAT       1.0      52.0       7.0      10.0       0.0       1.0
CLIMAT       1.0      52.0       7.0      16.0       0.0       1.0
STOP
# THE FOLLOWING IS EOSAEL SOURCE CONTROL INFORMATION YOU CAN SAFELY REMOVE IT
# SCCS  @(#) CLIMAT02.DAT 2.1 02/23/90
```

5.3.2 Output File CLIMAT02.OUT

The output file from the CLIMAT02.OUT file follows.

```
*************************************************************************
  WARNING - THIS LIBRARY CONTAINS TECHNICAL DATA WHOSE EXPORT IS RESTRICTED
  BY THE ARMS EXPORT CONTROL ACT (TITLE 22, U.S.C., SEC 2751 ET SEQ.) OR
  EXECUTIVE ORDER 12470.  VIOLATION OF THESE EXPORT LAWS ARE SUBJECT TO
                   SEVERE CRIMINAL PENALTIES.
*************************************************************************


1




                     *********************************
                     *                               *
                     *    ELECTRO-OPTICAL SYSTEMS    *
                     *                               *
                     *  ATMOSPHERIC EFFECTS LIBRARY  *
                     *                               *
                     *    NOT FOR OPERATIONAL USE    *
                     *                               *
                     * EOSAEL92 REV 2.2   03/07/91   *
                     *                               *
                     *********************************



WAVL       10.591
 NOTE: THAT THE ABOVE CARD WAS MODIFIED FOR CONSISTENCY TO:
WAVL       .1059E+02 .1059E+02 .0000E+00
1




                     *********************************
                     *                               *
                     *         C L I M A T           *
                     *                               *
                     *         CLIMATOLOGY           *
                     *            MODULE             *
                     * NOT FOR OPERATIONAL USE       *
                     *                               *
                     * EOSAEL92 REV 1.5   04/03/91   *
                     *                               *
                     *********************************
```

CLIMATOLOGY MODEL

DEFINITIONS OF METEOROLOGICAL CLASSES

CLASS 1 = FOG, HAZE AND MIST WITH VIS LT 1 KM.
CLASS 2 = FOG, HAZE AND MIST WITH VIS GE 1, LT 3 KM.
CLASS 3 = FOG, HAZE AND MIST WITH VIS GE 3, LT 7 KM.
CLASS 4 = FOG, HAZE AND MIST WITH VIS GE 7 KM.
CLASS 5 = DUST WITH VIS LT 3 KM.
CLASS 6 = DUST WITH VIS GE 3 KM.
CLASS 7 = DRIZZLE, RAIN AND TSTMS WITH VIS LT 1 KM.
CLASS 8 = DRIZZLE, RAIN AND TSTMS WITH VIS GE 1, LT 3 KM.
CLASS 9 = DRIZZLE, RAIN AND TSTMS WITH VIS GE 3, LT 7 KM.
CLASS 10 = DRIZZLE, RAIN AND TSTMS WITH VIS GE 7 KM.
CLASS 11 = SNOW WITH VIS LT 1 KM.
CLASS 12 = SNOW WITH VIS GE 1, LT 3 KM.
CLASS 13 = SNOW WITH VIS GE 3, LT 7 KM.
CLASS 14 = SNOW WITH VIS GE 7 KM.
CLASS 15 = NO WEATHER AND ABSOLUTE HUMIDITY LT 10 GM/CU M.
CLASS 16 = NO WEATHER AND ABSOLUTE HUMIDITY GE 10 GM/CU M.
CLASS 17 = VIS LT 1 KM AND CEILING HEIGHT LT 300 M.
CLASS 18 = VIS LT 3 KM AND CEILING HEIGHT LT 1000 M.
CLASS 19 = CEILING HEIGHT LT 300 M.
CLASS 20 = CEILING HEIGHT LT 1000 M.
CLASS 21 = NO CEILING.
CLASS 22 = ALL CONDITIONS COMBINED.

EOSAEL CLIMATOLOGY FOR SOUTHERN ROCKY MOUNTAINS DURING SUMMER AT 20-02 (LST)

CLASS NO.	FREQCY CLASS (%)	MEAN TEMP (C)	MEAN DP (C)	MEAN AH (GM/CU.M)	MEAN RH (%)	MEAN VIS (KM)	MEAN PRESS (MB)	MEAN/STDEV WNDVEL (MPS)
1	.0	.0	.0	.0	.0	.000	.0	.0/ .0
2	.0	.0	.0	.0	.0	.000	.0	.0/ .0
3	.0	.0	.0	.0	.0	.000	.0	.0/ .0
4	.1	22.4	13.2	11.9	66.5	28.200	1011.1	4.5/ 3.5
5	.0	28.5	7.9	8.0	30.5	1.067	1006.7	8.2/ 2.1
6	.2	27.8	7.7	8.0	30.7	18.756	1007.1	7.7/ 3.6
7	.0	.0	.0	.0	.0	.000	.0	.0/ .0
8	.0	19.7	14.5	12.5	72.3	2.133	1011.6	7.3/ 4.5
9	.2	18.8	16.9	14.6	89.6	4.965	1014.8	3.7/ 1.6
10	8.6	23.2	14.8	12.7	63.3	32.141	1012.1	3.8/ 2.5
11	.0	.0	.0	.0	.0	.000	.0	.0/ .0
12	.0	.0	.0	.0	.0	.000	.0	.0/ .0
13	.0	.0	.0	.0	.0	.000	.0	.0/ .0
14	.0	.0	.0	.0	.0	.000	.0	.0/ .0
15	50.2	26.2	4.9	6.7	27.7	50.636	1008.7	2.8/ 2.0
16	40.7	23.7	14.6	12.4	58.6	46.215	1011.7	2.4/ 1.9
17	.0	.0	.0	.0	.0	.000	.0	.0/ .0
18	.0	24.2	10.9	10.0	51.4	1.760	1008.7	7.3/ 3.3

19	12.1	23.1	13.9	12.2	61.6	34.881	1011.6	3.3/ 2.4
20	12.3	23.0	13.9	12.2	61.6	34.822	1011.6	3.3/ 2.4
21	59.3	25.2	7.7	8.4	37.3	50.092	1009.6	2.6/ 1.9
22	100.0	24.9	9.7	9.6	43.5	47.051	1010.2	2.8/ 2.0

CLASS NO.	FREQCY CLASS	MEAN CLDHT (KM)	MEAN/STDEV CLDCVR (PERCENT)	FREQCY A	FREQCY B	FREQCY C	FREQCY D	FREQCY E	FREQCY F
1	.0	.000	.0/ .0	.0	.0	.0	.0	.0	.0
2	.0	.000	.0/ .0	.0	.0	.0	.0	.0	.0
3	.0	.000	.0/ .0	.0	.0	.0	.0	.0	.0
4	.1	1.007	79.7/ 38.9	.0	.0	.0	87.5	.0	12.5
5	.0	.620	100.0/ .0	.0	.0	.0	100.0	.0	.0
6	.2	3.350	80.6/ 38.9	.0	.0	.0	94.4	.0	5.6
7	.0	.000	.0/ .0	.0	.0	.0	.0	.0	.0
8	.0	.030	100.0/ .0	.0	.0	.0	100.0	.0	.0
9	.2	.219	100.0/ .0	.0	.0	.0	100.0	.0	.0
10	8.6	2.124	93.8/ 20.3	.0	.0	.0	78.9	11.3	9.8
11	.0	.000	.0/ .0	.0	.0	.0	.0	.0	.0
12	.0	.000	.0/ .0	.0	.0	.0	.0	.0	.0
13	.0	.000	.0/ .0	.0	.0	.0	.0	.0	.0
14	.0	.000	.0/ .0	.0	.0	.0	.0	.0	.0
15	50.2	5.681	37.8/ 37.2	.0	.0	.0	19.5	22.8	57.7
16	40.7	5.522	65.6/ 37.7	.0	.0	.0	31.1	19.9	48.9
17	.0	.000	.0/ .0	.0	.0	.0	.0	.0	.0
18	.0	.030	100.0/ .0	.0	.0	.0	100.0	.0	.0
19	12.1	.030	100.0/ .0	.0	.0	.0	100.0	.0	.0
20	12.3	.041	100.0/ .0	.0	.0	.0	100.0	.0	.0
21	59.3	3.657	22.8/ 18.5	.0	.0	.0	8.3	21.3	70.5
22	100.0	5.190	54.2/ 40.5	.0	.0	.0	29.7	20.5	49.7

CLASS NO.	FREQCY CLASS (%)	FREQCY WNDDIR 015 (%)	FREQCY WNDDIR 045 (%)	FREQCY WNDDIR 075 (%)	FREQCY WNDDIR 105 (%)	FREQCY WNDDIR 135 (%)	FREQCY WNDDIR 165 (%)	FREQCY WNDDIR 195 (%)
1	.0	.0	.0	.0	.0	.0	.0	.0
2	.0	.0	.0	.0	.0	.0	.0	.0
3	.0	.0	.0	.0	.0	.0	.0	.0
4	.1	12.5	.0	.0	12.5	25.0	.0	.0
5	.0	33.3	.0	.0	.0	.0	.0	.0
6	.2	5.6	.0	11.1	5.6	.0	.0	.0
7	.0	.0	.0	.0	.0	.0	.0	.0
8	.0	.0	.0	.0	.0	.0	33.3	.0
9	.2	17.6	17.6	.0	5.9	.0	5.9	23.5
10	8.6	10.4	6.8	6.2	6.0	9.4	7.8	6.2
11	.0	.0	.0	.0	.0	.0	.0	.0
12	.0	.0	.0	.0	.0	.0	.0	.0
13	.0	.0	.0	.0	.0	.0	.0	.0
14	.0	.0	.0	.0	.0	.0	.0	.0
15	50.2	4.3	4.1	6.2	9.0	15.0	12.4	6.0
16	40.7	8.3	6.8	5.5	8.0	13.8	12.0	4.8
17	.0	.0	.0	.0	.0	.0	.0	.0
18	.0	.0	.0	.0	.0	.0	20.0	.0
19	12.1	11.2	6.9	5.5	4.7	8.1	10.8	5.4

20	12.3	11.2	7.2	5.4	4.7	8.1	10.7	5.4
21	59.3	5.0	4.9	5.7	9.9	16.5	12.6	5.6
22	100.0	6.5	5.5	5.9	8.3	14.0	11.8	5.5

CLASS NO.	FREQCY CLASS (%)	FREQCY WNDDIR 225 (%)	FREQCY WNDDIR 255 (%)	FREQCY WNDDIR 285 (%)	FREQCY WNDDIR 315 (%)	FREQCY WNDDIR 345 (%)	FREQCY WNDDIR VBL (%)
1	.0	.0	.0	.0	.0	.0	.0
2	.0	.0	.0	.0	.0	.0	.0
3	.0	.0	.0	.0	.0	.0	.0
4	.1	.0	12.5	12.5	.0	12.5	12.5
5	.0	.0	66.7	.0	.0	.0	.0
6	.2	27.8	22.2	5.6	16.7	5.6	.0
7	.0	.0	.0	.0	.0	.0	.0
8	.0	.0	.0	.0	.0	66.7	.0
9	.2	5.9	.0	5.9	.0	11.8	5.9
10	8.6	7.5	7.8	6.2	5.3	11.3	9.3
11	.0	.0	.0	.0	.0	.0	.0
12	.0	.0	.0	.0	.0	.0	.0
13	.0	.0	.0	.0	.0	.0	.0
14	.0	.0	.0	.0	.0	.0	.0
15	50.2	6.8	9.3	7.2	3.7	4.4	11.5
16	40.7	4.7	5.0	4.1	3.7	7.0	16.4
17	.0	.0	.0	.0	.0	.0	.0
18	.0	.0	40.0	.0	.0	40.0	.0
19	12.1	5.7	9.3	7.0	4.4	10.4	10.6
20	12.3	5.7	9.1	7.0	4.6	10.5	10.5
21	59.3	5.9	7.2	5.7	3.3	4.3	13.6
22	100.0	6.0	7.4	5.9	3.9	6.1	13.3

EOSAEL CLIMATOLOGY FOR SOUTHERN ROCKY MOUNTAINS DURING SUMMER AT 03-09 (LST)

CLASS NO.	FREQCY CLASS (%)	MEAN TEMP (C)	MEAN DP (C)	MEAN AH (GM/CU.M)	MEAN RH (%)	MEAN VIS (KM)	MEAN PRESS (MB)	MEAN/STDEV WNDVEL (MPS)
1	.0	.0	.0	.0	.0	.000	.0	.0/ .0
2	.0	.0	.0	.0	.0	.000	.0	.0/ .0
3	.0	.0	.0	.0	.0	.000	.0	.0/ .0
4	.3	21.0	11.0	10.8	61.4	62.400	1011.7	3.1/ 2.6
5	.0	.0	.0	.0	.0	.000	.0	.0/ .0
6	.0	.0	.0	.0	.0	.000	.0	.0/ .0
7	.0	.0	.0	.0	.0	.000	.0	.0/ .0
8	.0	.0	.0	.0	.0	.000	.0	.0/ .0
9	.0	.0	.0	.0	.0	.000	.0	.0/ .0
10	2.5	20.5	15.5	13.4	76.5	40.972	1013.0	2.7/ 2.0
11	.0	.0	.0	.0	.0	.000	.0	.0/ .0
12	.0	.0	.0	.0	.0	.000	.0	.0/ .0
13	.0	.0	.0	.0	.0	.000	.0	.0/ .0
14	.0	.0	.0	.0	.0	.000	.0	.0/ .0
15	42.6	22.7	5.4	7.0	35.3	71.845	1010.9	2.0/ 2.0
16	54.5	22.4	14.7	12.5	63.4	65.366	1013.2	1.8/ 1.6
17	.0	.0	.0	.0	.0	.000	.0	.0/ .0

18	.0	.0	.0	.0	.0	.000	.0	.0/	.0
19	5.8	21.4	14.7	12.8	69.3	56.673	1013.5	2.2/	1.8
20	6.1	21.4	14.8	12.9	70.0	55.520	1013.5	2.2/	1.7
21	69.4	22.6	9.5	9.4	47.5	69.994	1011.9	1.9/	1.8
22	100.0	22.5	10.7	10.2	51.8	67.510	1012.2	1.9/	1.8

CLASS NO.	FREQCY CLASS	MEAN CLDHT (KM)	MEAN/STDEV CLDCVR (PERCENT)		FREQCY A	FREQCY B	FREQCY C	FREQCY D	FREQCY E	FREQCY F
1	.0	.000	.0/	.0	.0	.0	.0	.0	.0	.0
2	.0	.000	.0/	.0	.0	.0	.0	.0	.0	.0
3	.0	.000	.0/	.0	.0	.0	.0	.0	.0	.0
4	.3	4.401	57.4/	39.5	.0	5.9	5.9	58.8	.0	29.4
5	.0	.000	.0/	.0	.0	.0	.0	.0	.0	.0
6	.0	.000	.0/	.0	.0	.0	.0	.0	.0	.0
7	.0	.000	.0/	.0	.0	.0	.0	.0	.0	.0
8	.0	.000	.0/	.0	.0	.0	.0	.0	.0	.0
9	.0	.000	.0/	.0	.0	.0	.0	.0	.0	.0
10	2.5	1.795	92.5/	22.0	.0	.0	2.6	71.0	12.9	13.5
11	.0	.000	.0/	.0	.0	.0	.0	.0	.0	.0
12	.0	.000	.0/	.0	.0	.0	.0	.0	.0	.0
13	.0	.000	.0/	.0	.0	.0	.0	.0	.0	.0
14	.0	.000	.0/	.0	.0	.0	.0	.0	.0	.0
15	42.6	7.076	31.3/	33.1	3.9	27.7	17.6	9.9	5.8	35.1
16	54.5	6.069	56.9/	37.8	2.2	22.7	22.1	22.1	5.7	25.2
17	.0	.000	.0/	.0	.0	.0	.0	.0	.0	.0
18	.0	.000	.0/	.0	.0	.0	.0	.0	.0	.0
19	5.8	.032	100.0/	.0	.0	.0	.0	100.0	.0	.0
20	6.1	.061	100.0/	.0	.0	.0	.0	100.0	.0	.0
21	69.4	4.190	23.4/	18.3	4.1	33.8	18.7	4.3	3.7	35.3
22	100.0	6.270	46.8/	38.4	2.9	24.2	19.6	18.2	5.9	29.2

CLASS NO.	FREQCY CLASS (%)	FREQCY WNDDIR 015 (%)	FREQCY WNDDIR 045 (%)	FREQCY WNDDIR 075 (%)	FREQCY WNDDIR 105 (%)	FREQCY WNDDIR 135 (%)	FREQCY WNDDIR 165 (%)	FREQCY WNDDIR 195 (%)
1	.0	.0	.0	.0	.0	.0	.0	.0
2	.0	.0	.0	.0	.0	.0	.0	.0
3	.0	.0	.0	.0	.0	.0	.0	.0
4	.3	11.8	5.9	5.9	17.6	11.8	.0	5.9
5	.0	.0	.0	.0	.0	.0	.0	.0
6	.0	.0	.0	.0	.0	.0	.0	.0
7	.0	.0	.0	.0	.0	.0	.0	.0
8	.0	.0	.0	.0	.0	.0	.0	.0
9	.0	.0	.0	.0	.0	.0	.0	.0
10	2.5	14.8	6.5	7.1	5.8	8.4	6.5	7.1
11	.0	.0	.0	.0	.0	.0	.0	.0
12	.0	.0	.0	.0	.0	.0	.0	.0
13	.0	.0	.0	.0	.0	.0	.0	.0
14	.0	.0	.0	.0	.0	.0	.0	.0
15	42.6	8.6	7.3	5.5	6.2	9.6	9.3	4.0
16	54.5	9.8	7.6	5.2	5.7	9.1	9.1	4.1
17	.0	.0	.0	.0	.0	.0	.0	.0
18	.0	.0	.0	.0	.0	.0	.0	.0

19	5.8	9.3	3.8	5.5	5.2	6.8	13.4	3.6
20	6.1	10.0	4.5	5.8	5.2	6.8	13.1	3.4
21	69.4	9.4	7.9	5.6	6.1	9.2	8.4	4.1
22	100.0	9.4	7.4	5.4	5.9	9.3	9.1	4.1

CLASS NO.	FREQCY CLASS (%)	FREQCY WNDDIR 225 (%)	FREQCY WNDDIR 255 (%)	FREQCY WNDDIR 285 (%)	FREQCY WNDDIR 315 (%)	FREQCY WNDDIR 345 (%)	FREQCY WNDDIR VBL (%)
1	.0	.0	.0	.0	.0	.0	.0
2	.0	.0	.0	.0	.0	.0	.0
3	.0	.0	.0	.0	.0	.0	.0
4	.3	5.9	5.9	.0	5.9	11.8	11.8
5	.0	.0	.0	.0	.0	.0	.0
6	.0	.0	.0	.0	.0	.0	.0
7	.0	.0	.0	.0	.0	.0	.0
8	.0	.0	.0	.0	.0	.0	.0
9	.0	.0	.0	.0	.0	.0	.0
10	2.5	4.5	1.3	1.3	5.8	17.4	13.5
11	.0	.0	.0	.0	.0	.0	.0
12	.0	.0	.0	.0	.0	.0	.0
13	.0	.0	.0	.0	.0	.0	.0
14	.0	.0	.0	.0	.0	.0	.0
15	42.6	3.9	4.3	6.2	5.5	8.0	21.5
16	54.5	3.0	2.9	5.2	5.0	7.0	26.3
17	.0	.0	.0	.0	.0	.0	.0
18	.0	.0	.0	.0	.0	.0	.0
19	5.8	4.1	4.4	4.9	6.3	9.0	23.6
20	6.1	3.9	4.2	5.0	6.0	9.2	22.8
21	69.4	3.4	3.7	5.6	5.2	6.9	24.5
22	100.0	3.4	3.5	5.5	5.3	7.7	23.9

EOSAEL CLIMATOLOGY FOR SOUTHERN ROCKY MOUNTAINS DURING SUMMER AT 10-14 (LST)

CLASS NO.	FREQCY CLASS (%)	MEAN TEMP (C)	MEAN DP (C)	MEAN AH (GM/CU.M)	MEAN RH (%)	MEAN VIS (KM)	MEAN PRESS (MB)	MEAN/STDEV WNDVEL (MPS)
1	.0	.0	.0	.0	.0	.000	.0	.0/ .0
2	.0	.0	.0	.0	.0	.000	.0	.0/ .0
3	.0	.0	.0	.0	.0	.000	.0	.0/ .0
4	.3	29.5	12.4	10.8	39.0	43.491	1012.0	3.2/ 2.2
5	.0	.0	.0	.0	.0	.000	.0	.0/ .0
6	.0	30.5	3.5	6.1	20.5	64.000	1011.8	7.0/ 2.1
7	.0	.0	.0	.0	.0	.000	.0	.0/ .0
8	.0	.0	.0	.0	.0	.000	.0	.0/ .0
9	.0	22.5	15.5	13.3	74.2	4.800	1016.4	3.9/ 2.6
10	5.2	26.2	14.7	12.4	52.6	59.378	1012.8	3.7/ 2.3
11	.0	.0	.0	.0	.0	.000	.0	.0/ .0
12	.0	.0	.0	.0	.0	.000	.0	.0/ .0
13	.0	.0	.0	.0	.0	.000	.0	.0/ .0
14	.0	.0	.0	.0	.0	.000	.0	.0/ .0
15	53.6	32.4	5.9	7.0	20.4	76.242	1009.9	3.3/ 1.9
16	40.6	29.2	14.6	12.1	42.3	70.713	1012.6	2.5/ 1.7

17	.0	.0	.0	.0	.0	.000	.0	.0/ .0
18	.0	.0	.0	.0	.0	.000	.0	.0/ .0
19	4.0	26.4	12.6	11.3	49.0	58.319	1012.5	3.3/ 2.3
20	4.6	26.1	13.0	11.5	50.5	58.510	1012.6	3.2/ 2.2
21	67.8	31.6	8.8	8.7	27.0	75.048	1010.8	2.9/ 1.8
22	100.0	30.8	9.9	9.4	31.1	72.967	1011.2	3.0/ 1.9

CLASS NO.	FREQCY CLASS	MEAN CLDHT (KM)	MEAN/STDEV CLDCVR (PERCENT)	FREQCY A	FREQCY B	FREQCY C	FREQCY D	FREQCY E	FREQCY F
1	.0	.000	.0/ .0	.0	.0	.0	.0	.0	.0
2	.0	.000	.0/ .0	.0	.0	.0	.0	.0	.0
3	.0	.000	.0/ .0	.0	.0	.0	.0	.0	.0
4	.3	5.123	56.3/ 43.6	18.2	45.5	18.2	18.2	.0	.0
5	.0	.000	.0/ .0	.0	.0	.0	.0	.0	.0
6	.0	.000	45.8/ 50.5	.0	.0	66.7	33.3	.0	.0
7	.0	.000	.0/ .0	.0	.0	.0	.0	.0	.0
8	.0	.000	.0/ .0	.0	.0	.0	.0	.0	.0
9	.0	.470	100.0/ .0	.0	.0	.0	100.0	.0	.0
10	5.2	2.605	93.0/ 19.8	7.5	14.8	13.8	64.0	.0	.0
11	.0	.000	.0/ .0	.0	.0	.0	.0	.0	.0
12	.0	.000	.0/ .0	.0	.0	.0	.0	.0	.0
13	.0	.000	.0/ .0	.0	.0	.0	.0	.0	.0
14	.0	.000	.0/ .0	.0	.0	.0	.0	.0	.0
15	53.6	5.185	40.4/ 33.6	34.1	34.7	22.5	8.7	.0	.0
16	40.6	4.681	60.3/ 34.3	36.1	32.9	15.6	15.4	.0	.0
17	.0	.000	.0/ .0	.0	.0	.0	.0	.0	.0
18	.0	.000	.0/ .0	.0	.0	.0	.0	.0	.0
19	4.0	.030	100.0/ .0	.0	.0	.0	100.0	.0	.0
20	4.6	.116	100.0/ .0	.0	.0	.0	100.0	.0	.0
21	67.8	2.664	28.3/ 16.3	47.7	34.2	17.6	.5	.0	.0
22	100.0	4.791	51.4/ 36.1	33.4	32.9	19.2	14.5	.0	.0

CLASS NO.	FREQCY CLASS (%)	FREQCY WNDDIR 015 (%)	FREQCY WNDDIR 045 (%)	FREQCY WNDDIR 075 (%)	FREQCY WNDDIR 105 (%)	FREQCY WNDDIR 135 (%)	FREQCY WNDDIR 165 (%)	FREQCY WNDDIR 195 (%)
1	.0	.0	.0	.0	.0	.0	.0	.0
2	.0	.0	.0	.0	.0	.0	.0	.0
3	.0	.0	.0	.0	.0	.0	.0	.0
4	.3	4.5	13.6	4.5	13.6	18.2	.0	13.6
5	.0	.0	.0	.0	.0	.0	.0	.0
6	.0	33.3	33.3	.0	.0	.0	.0	.0
7	.0	.0	.0	.0	.0	.0	.0	.0
8	.0	.0	.0	.0	.0	.0	.0	.0
9	.0	.0	.0	.0	.0	.0	.0	.0
10	5.2	7.8	8.3	8.8	9.3	9.3	11.5	6.0
11	.0	.0	.0	.0	.0	.0	.0	.0
12	.0	.0	.0	.0	.0	.0	.0	.0
13	.0	.0	.0	.0	.0	.0	.0	.0
14	.0	.0	.0	.0	.0	.0	.0	.0
15	53.6	3.3	4.2	5.8	7.2	9.0	10.8	10.6
16	40.6	4.5	5.0	7.7	9.6	12.1	11.3	8.1
17	.0	.0	.0	.0	.0	.0	.0	.0

18	.0	.0	.0	.0	.0	.0	.0	.0
19	4.0	5.2	6.5	9.4	9.8	9.4	10.4	7.5
20	4.6	4.9	7.5	9.8	10.1	10.4	10.1	6.9
21	67.8	3.6	4.3	5.9	7.7	10.2	11.5	9.6
22	100.0	4.1	4.7	6.7	8.3	10.3	11.0	9.3

CLASS NO.	FREQCY CLASS (%)	FREQCY WNDDIR 225 (%)	FREQCY WNDDIR 255 (%)	FREQCY WNDDIR 285 (%)	FREQCY WNDDIR 315 (%)	FREQCY WNDDIR 345 (%)	FREQCY WNDDIR VBL (%)
1	.0	.0	.0	.0	.0	.0	.0
2	.0	.0	.0	.0	.0	.0	.0
3	.0	.0	.0	.0	.0	.0	.0
4	.3	9.1	4.5	9.1	.0	.0	9.1
5	.0	.0	.0	.0	.0	.0	.0
6	.0	.0	.0	33.3	.0	.0	.0
7	.0	.0	.0	.0	.0	.0	.0
8	.0	.0	.0	.0	.0	.0	.0
9	.0	33.3	.0	33.3	.0	33.3	.0
10	5.2	8.3	7.3	10.3	2.5	5.0	6.0
11	.0	.0	.0	.0	.0	.0	.0
12	.0	.0	.0	.0	.0	.0	.0
13	.0	.0	.0	.0	.0	.0	.0
14	.0	.0	.0	.0	.0	.0	.0
15	53.6	12.2	11.5	8.8	6.1	4.5	5.9
16	40.6	8.2	6.9	6.0	4.8	5.0	10.8
17	.0	.0	.0	.0	.0	.0	.0
18	.0	.0	.0	.0	.0	.0	.0
19	4.0	5.9	10.4	6.8	4.6	5.2	8.8
20	4.6	6.3	9.2	6.1	4.6	4.9	9.2
21	67.8	11.6	9.9	7.7	5.6	4.6	7.6
22	100.0	10.3	9.4	7.8	5.4	4.7	8.0

EOSAEL CLIMATOLOGY FOR SOUTHERN ROCKY MOUNTAINS DURING SUMMER AT 15-19 (LST)

CLASS NO.	FREQCY CLASS (%)	MEAN TEMP (C)	MEAN DP (C)	MEAN AH (GM/CU.M)	MEAN RH (%)	MEAN VIS (KM)	MEAN PRESS (MB)	MEAN/STDEV WNDVEL (MPS)
1	.0	.0	.0	.0	.0	.000	.0	.0/ .0
2	.0	.0	.0	.0	.0	.000	.0	.0/ .0
3	.0	.0	.0	.0	.0	.000	.0	.0/ .0
4	.0	.0	.0	.0	.0	.000	.0	.0/ .0
5	.0	31.6	9.0	8.5	27.2	1.600	1006.7	13.5/ 1.5
6	.4	31.9	6.6	8.0	24.6	12.369	1007.3	10.2/ 2.3
7	.0	.0	.0	.0	.0	.000	.0	.0/ .0
8	.0	21.2	17.3	14.7	78.4	1.733	1011.8	6.0/ 4.0
9	.0	.0	.0	.0	.0	.000	.0	.0/ .0
10	16.5	28.7	13.0	11.2	42.5	63.965	1010.0	4.5/ 2.4
11	.0	.0	.0	.0	.0	.000	.0	.0/ .0
12	.0	.0	.0	.0	.0	.000	.0	.0/ .0
13	.0	.0	.0	.0	.0	.000	.0	.0/ .0
14	.0	.0	.0	.0	.0	.000	.0	.0/ .0
15	59.6	33.7	5.2	6.6	18.2	76.500	1007.8	3.9/ 2.2

16	23.3	29.3	14.4	12.0	42.0	69.089	1010.6	3.3/ 2.0
17	.0	.0	.0	.0	.0	.000	.0	.0/ .0
18	.1	25.5	14.0	12.3	57.9	1.280	1009.4	10.5/ 3.7
19	7.1	26.6	12.0	11.0	46.9	58.197	1010.6	4.3/ 2.8
20	7.2	26.5	12.1	11.0	47.3	58.349	1010.6	4.3/ 2.8
21	51.4	33.6	6.0	7.2	20.0	78.179	1008.0	3.7/ 2.1
22	100.0	31.8	8.6	8.6	27.8	72.329	1008.8	3.8/ 2.3

CLASS NO.	FREQCY CLASS	MEAN CLDHT (KM)	MEAN/STDEV CLDCVR (PERCENT)		FREQCY A	FREQCY B	FREQCY C	FREQCY D	FREQCY E	FREQCY F
1	.0	.000	.0/	.0	.0	.0	.0	.0	.0	.0
2	.0	.000	.0/	.0	.0	.0	.0	.0	.0	.0
3	.0	.000	.0/	.0	.0	.0	.0	.0	.0	.0
4	.0	.000	.0/	.0	.0	.0	.0	.0	.0	.0
5	.0	1.220	100.0/	.0	.0	.0	.0	100.0	.0	.0
6	.4	8.915	92.3/	27.7	.0	.0	.0	100.0	.0	.0
7	.0	.000	.0/	.0	.0	.0	.0	.0	.0	.0
8	.0	.520	100.0/	.0	.0	.0	.0	100.0	.0	.0
9	.0	.000	.0/	.0	.0	.0	.0	.0	.0	.0
10	16.5	3.465	92.8/	19.4	.0	2.3	11.1	86.5	.0	.0
11	.0	.000	.0/	.0	.0	.0	.0	.0	.0	.0
12	.0	.000	.0/	.0	.0	.0	.0	.0	.0	.0
13	.0	.000	.0/	.0	.0	.0	.0	.0	.0	.0
14	.0	.000	.0/	.0	.0	.0	.0	.0	.0	.0
15	59.6	4.976	50.7/	35.2	.0	10.4	41.9	47.7	.0	.0
16	23.3	4.621	78.8/	29.8	.0	8.7	29.9	61.3	.0	.0
17	.0	.000	.0/	.0	.0	.0	.0	.0	.0	.0
18	.1	.030	100.0/	.0	.0	.0	.0	100.0	.0	.0
19	7.1	.030	100.0/	.0	.0	.0	.0	100.0	.0	.0
20	7.2	.043	100.0/	.0	.0	.0	.0	100.0	.0	.0
21	51.4	2.385	31.0/	15.1	.0	16.7	54.3	29.1	.0	.0
22	100.0	4.620	64.4/	36.2	.0	8.6	33.9	57.5	.0	.0

CLASS NO.	FREQCY CLASS (%)	FREQCY WNDDIR 015 (%)	FREQCY WNDDIR 045 (%)	FREQCY WNDDIR 075 (%)	FREQCY WNDDIR 105 (%)	FREQCY WNDDIR 135 (%)	FREQCY WNDDIR 165 (%)	FREQCY WNDDIR 195 (%)
1	.0	.0	.0	.0	.0	.0	.0	.0
2	.0	.0	.0	.0	.0	.0	.0	.0
3	.0	.0	.0	.0	.0	.0	.0	.0
4	.0	.0	.0	.0	.0	.0	.0	.0
5	.0	.0	.0	.0	.0	.0	.0	66.7
6	.4	7.7	7.7	.0	7.7	7.7	7.7	7.7
7	.0	.0	.0	.0	.0	.0	.0	.0
8	.0	33.3	.0	.0	.0	.0	33.3	.0
9	.0	.0	.0	.0	.0	.0	.0	.0
10	16.5	7.2	8.4	8.4	11.7	11.5	9.2	7.5
11	.0	.0	.0	.0	.0	.0	.0	.0
12	.0	.0	.0	.0	.0	.0	.0	.0
13	.0	.0	.0	.0	.0	.0	.0	.0
14	.0	.0	.0	.0	.0	.0	.0	.0
15	59.6	2.9	3.2	4.8	6.3	9.3	10.3	8.8
16	23.3	4.6	4.2	6.3	7.0	12.4	11.8	8.4

17	.0	.0	.0	.0	.0	.0	.0	.0
18	.1	20.0	.0	.0	.0	.0	.0	20.0
19	7.1	4.6	3.8	5.9	5.4	8.8	5.9	6.7
20	7.2	4.5	3.7	6.6	5.3	8.6	5.8	6.6
21	51.4	2.8	3.6	4.0	6.3	9.3	11.1	9.1
22	100.0	4.0	4.3	5.7	7.3	10.4	10.5	8.5

CLASS NO.	FREQCY CLASS (%)	FREQCY WNDDIR 225 (%)	FREQCY WNDDIR 255 (%)	FREQCY WNDDIR 285 (%)	FREQCY WNDDIR 315 (%)	FREQCY WNDDIR 345 (%)	FREQCY WNDDIR VBL (%)
1	.0	.0	.0	.0	.0	.0	.0
2	.0	.0	.0	.0	.0	.0	.0
3	.0	.0	.0	.0	.0	.0	.0
4	.0	.0	.0	.0	.0	.0	.0
5	.0	.0	.0	.0	33.3	.0	.0
6	.4	7.7	30.8	7.7	7.7	.0	.0
7	.0	.0	.0	.0	.0	.0	.0
8	.0	.0	.0	.0	33.3	.0	.0
9	.0	.0	.0	.0	.0	.0	.0
10	16.5	5.7	10.6	5.6	5.9	4.7	3.6
11	.0	.0	.0	.0	.0	.0	.0
12	.0	.0	.0	.0	.0	.0	.0
13	.0	.0	.0	.0	.0	.0	.0
14	.0	.0	.0	.0	.0	.0	.0
15	59.6	13.1	15.1	11.6	6.3	4.0	4.2
16	23.3	7.6	8.7	12.2	6.6	3.2	7.1
17	.0	.0	.0	.0	.0	.0	.0
18	.1	.0	.0	.0	60.0	.0	.0
19	7.1	10.9	16.3	15.1	9.2	2.9	4.6
20	7.2	10.7	16.0	14.8	9.5	2.9	4.9
21	51.4	13.0	14.8	12.1	6.2	3.8	3.8
22	100.0	10.5	12.9	10.7	6.4	3.9	4.7

END EOSAEL RUN

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Acronyms and Abbreviations

ARL Army Research Laboratory

ASL Atmospheric Sciences Laboratory

EOSAEL Electro-Optical Systems Atmospheric Effects Library

GEOSEM Global Electro-Optical Systems Environmental Matrix