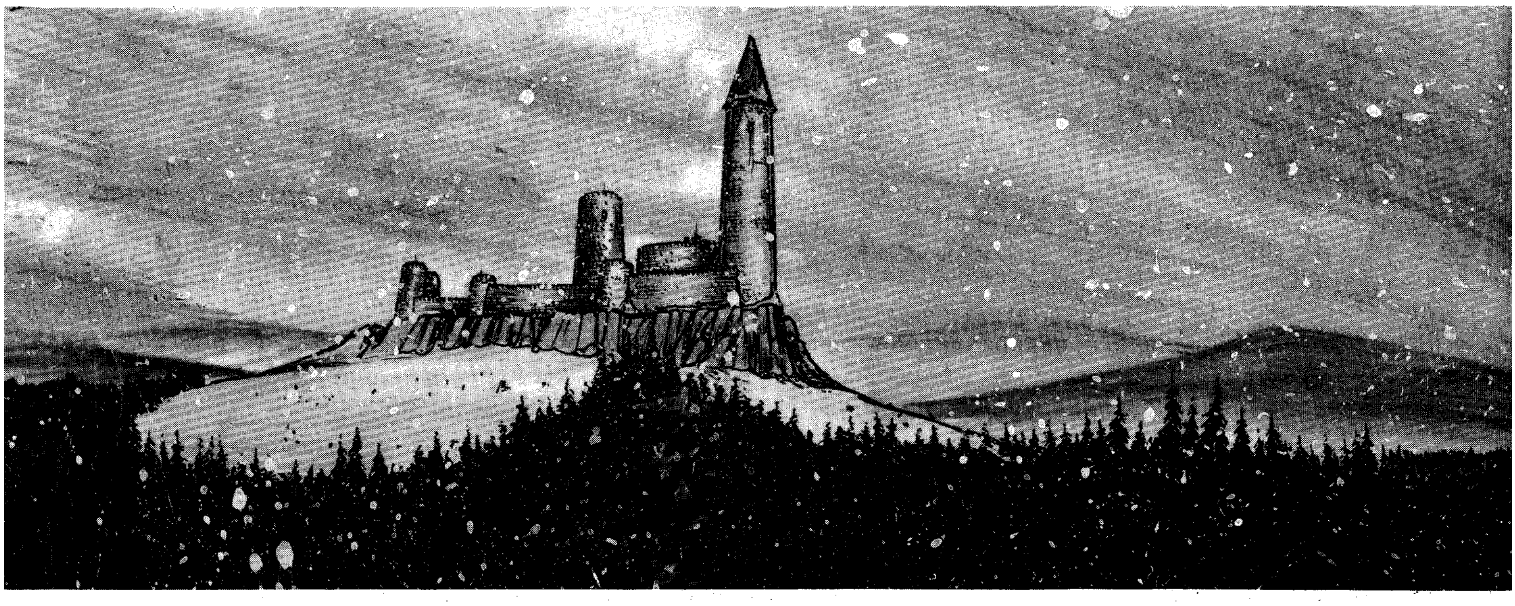


WEATHER IN THE WORLD

A CLIMATE FOR REALISTIC AD&D™ ADVENTURING

INTRODUCTION

This article describes a system by which a DM may easily deal with the many problems of adding weather effects to an AD&D™ campaign. While specifically designed for use with the WORLD OF GREYHAWK™ Fantasy Setting, it can easily be adapted to another sort of world by modifying the calculations in the first section. In addition to weather, this system includes other geophysical and astrophysical phenomena such as times of sunrise and sunset, the phases of the moon(s), seasonal variations, tsunamis (tidal waves), earthquakes, and volcanoes.

ACKNOWLEDGEMENTS

In creating this system, I have often felt much like an interior decorator, owing an immense debt to the architect for giving me a place to practice my skills. In this case, of course, the architect is E. Gary Gygax, who I must thank not only for the AD&D system, but also for opening his personal world — Greyhawk — to the public. It was the modules he created and set in this world — especially *Glacial Rift of the Frost Giant Jarl* (G2) and *Hall of the Fire Giant King* (G3) — that first caused me to recognize the need for a weather system that would be consistent with the AD&D rules. But it was not until the WORLD OF GREYHAWK setting was published that I was provided with the perfect locale to test my ideas. I cannot thank Gary Gygax enough for allowing me to use his world as the basis for my system.

Thanks are also due to Frank Mentzer, who first introduced me to high-quality AD&D play, from both a player's and a DM's perspective, and whose criticisms were invaluable in refining this system. Finally, I want to express my appreciation to my own players, who patiently suffered through months of play testing and corrections while the system slowly reached its final form.

BASIC ASSUMPTIONS

In order to accurately deal with weather and related phenomena, several sets of data are needed. The first is some basic facts about the world to which the system will be applied. A set of maps will provide most of this information. One must also know the size of the world, so that the system can be appropriately scaled. In addition, a set of "baseline weather" data is necessary, providing a full year's worth of meteorological information for a specific latitude and terrain. Finally, some astronomical information is required.

A simple way to acquire all this data is to begin with a predesigned world on which meteorological data from our own Earth can be overlaid. If this is done, then the DM must assume that the fantasy world is similar to Earth in details such as size, rotation and revolution periods, and angle of inclination from the ecliptic.

This approach is particularly appropriate for use with the world of Oerth as set forth in the WORLD OF GREYHAWK Gazetteer. Oerth's year is 364 days long, close enough to Earth's 365-day solar cycle that differences can be ignored. If it is assumed that Oerth is also approximately the same size as Earth, then a one-to-one correspondence can be easily drawn.

Because changes in climate are related to changes in latitude, the size of the world is crucial to the design of a weather system. On Oerth, it is assumed that 70 miles of travel (2 1/3 hexes) in a north or south direction covers one degree of latitude. Oerth thus has a polar circumference of 25,200 miles, quite close to our own planet's 24,800 miles. The accompanying table shows typical conversions between degrees of latitude, mileage, and hex counts on the map. (Note

DISTANCE CORRESPONDENCES BETWEEN HEXES, DEGREES OF LATITUDE, AND MILES

N-S distance in hexes	N-S distance in degrees of latitude	N-S distance in miles
1	.428	30
2	.856	60
2 1/3	1	70
4 2/3	2	140
5	2.14	150
7	3	210
10	4.28	300
11 2/3	5	350
20	8.56	600
23 1/3	10	700
35	15	1050

OF GREYHAWK

ADAPTABLE FOR USE IN YOUR WORLD

BY DAVID AXLER

that the Gazetteer states that a hex is approximately 30 miles across. This figure is always true for north-south travel, but the width of a hex will vary depending on the latitude.)

The use of this scale means that the Greyhawk maps, which cover 2,910 miles (97 hexes) on the north-south axis, also cover 41.571 degrees of latitude. If we compare this to Earth, we find that such an area covers the portion of North America extending from Guatemala, central Mexico, and the main Caribbean islands to as far north as Labrador, the Aleutian Islands, and the middle of Hudson Bay. This is reasonable, given the types of climate implied by the Greyhawk map and Gazetteer-tropical jungles in the south, a central temperate area, and chilly northern reaches.

The equivalence between Oerth and Earth is completed when parallels of latitude are superimposed on the Greyhawk map in a way which maintains the similarities between the two worlds. In this system, the superimposition is based on the assignment of the city of Greyhawk to the climate and latitude of Memphis, Tennessee (latitude 35°9' north). A second table shows where the latitude lines are located on Oerth, referring to the hex numbers at the right-hand edge of each map sheet and indicating locales on or close to each parallel.

The final step is to acquire baseline data from our own Earth to be applied at the equivalent Oerth latitude. The baseline used in this system is taken from 30-year weather surveys of Philadelphia (latitude 39°56' north), made by the U.S. Weather Bureau, and is applied to the 40th parallel on Oerth. The baseline information for Oerth is shown on the Baseline Data Chart (next page).

It is assumed that for each degree of travel in a north-south direction, the baseline temperature will change by two degrees Fahrenheit. Thus, a trip seven hexes north of Veluna City takes one to a point where the temperature is six degrees colder, since seven hexes equals three degrees of latitude; a trip seven hexes south would raise the temperature by the same amount. (If one crosses the Equator, each degree of travel away from the baseline works in reverse.)

One final introductory comment is necessary. Unlike our planet's weather, that of Oerth is affected (and possible generated) by magic. Some of the spells and items which can bring this about are described in the AD&D Players Handbook and Dungeon Masters Guide, and the DM should recognize the possibility that high-level players and NPCs may do the research necessary to develop new spells. Great care should be taken when such spells are implemented, not only to preserve game balance but also to deal with the fact that localized magical changes to the weather may have repercussions elsewhere in the world (and, perhaps, on other planes as well).

LOCATION OF MAJOR PARALLELS OF LATITUDE ON THE WORLD OF GREYHAWK™ MAPS

North latitude (degrees)	Hex # on map (Right half)	(Left half)	Major geographic features and locales on this parallel
15	93	129	Amedio Jungle; Pelisso Swamp; Forgotten City
20	81	117	Port Toli; Lordship of the Isles
24	72	108	Pitchfield
25	69	105	Gryrax; Pontylver
30	58	94	Rushmoors; Grandwood Forest
35	46	82	City of Greyhawk; Ullakand; Edgefield
40	34	70	Crockport; Spinecastle
45	23	59	Exag; Troll Fens; Feelreev Forest
50	11	47	Knudje; Kelten; Cold Marshes
54	02	38	Land of Black Ice; Icy Sea

Note: Latitude lines run horizontally across the map, and do not slope southwest to northeast as do the numbered lines of hexes.

BASELINE DATA CHART

	Fireseek	Readying	Coldeven	Planting	Flocktime	Wealsun
Base temp. *	32	34	42	52	63	71
Daily high adj.	+d10	+d6+4	+d8+4	+d10+6	+d10+6	+d8+8
Daily low adj.	-d20	-(d10+4)	-(d10+4)	-(d8+4)	-(d10+6)	-(d6+6)
Sky conditions:						
Clear	01-23	01-25	01-27	01-20	01-20	01-20
Partly cloudy	24-50	26-50	28-54	21-55	21-53	21-60
Cloudy	51-00	51-00	55-00	56-00	54-00	61-00
Chance of precip.:	46%	40%	44%	42%	42%	36%
Mid-month time of:						
Sunrise (a.m.)	7:21	6:55	6:12	5:24	4:45	4:32
Sunset (p.m.)	5:01	5:36	6:09	6:39	7:10	7:32

	Fireseek Readying Coldeven	Planting Flocktime Wealsun
Phases Of Luna	1/4: 4th day of month and 4th night of Growfest Full: 11th day of month 3/4: 18th day of month New: 25th day of month and 4th night of Needfest	Full: 4th day of month and 4th night of Richfest 3/4: 11th day of month New: 18th day of month 1/4: 25th day of month
Phases Of Celene	Full: Mid-Needfest and Mid-Growfest 3/4: 19th of Fireseek New: 11th of Readying 1/4: 4th of Coldeven	Full: Mid-Growfest and Mid-Richfest 3/4: 19th of Planting New: 11th of Flocktime 1/4: 4th of Wealsun

* — Base temperature can be affected by wind and chill factors, and (optionally) by record highs and lows.

ASTRONOMICAL PHENOMENA

The Baseline Data Chart shows the time of sunrise and sunset for the middle of each month at the baseline latitude of 40 degrees. For each degree of latitude away from the baseline, the times should be adjusted by two minutes, adding if above 40° north and subtracting if below. The DM should note that sunrise and sunset are not the times when light appears and disappears, since reflections from sky, clouds, and terrain may affect the hours of normal vision. (In the depths of a steep valley the period of vision will be significantly reduced, while atop the adjacent mountain it will be extended.)

DMs should note that on any selected parallel of latitude, sunrise will occur at the same local time everywhere. Only east-west travel of lengthy distances will create a need for time zones. On Oerth, as on our planet, a one-degree change in longitude will change the times of sunrise and sunset by four minutes.

At latitudes above 60°, the phenomenon known as the Midnight Sun can occur. During mid-summer months, the sun never sinks far enough below the horizon to permit total darkness; during mid-winter, there may be days when the sun never rises. At exactly 60° latitude, these effects will occur only on Midsummer Day (no sunset) and Midwinter Day (no sunrise). For every degree of latitude beyond the 60th parallel toward the poles, these phenomena will each occur for two additional days, one before the midpoint and one after.

In order to provide a pattern for Oerth's two moons that is both regular and easy to use, the year has been extended by four days from the duration specified in the WORLD OF GREYHAWK Gazetteer. These four days are added, one apiece, to the four great festivals, making each celebration a full week in length. The total year of 364 days consists of twelve months, each having four seven-day weeks, plus an additional "month" made of the four festival weeks.

The smaller moon (Celene, or The Handmaiden) goes through four cycles each year, becoming full on the middle evening of each of the festivals. This evening, of course, becomes the high point of the celebration, especially in the case of Midsummer's Night, when those who use druidic spells are gathering mistletoe for the coming year.

Luna, the large moon, makes thirteen cycles of twenty-eight days during an Oerth year. Its cycles are linked with those of Celene in a manner that causes both to be full on Midsummer's Night in Richfest. On Midwinter's Night, however, only Celene appears; this period is known as the Dark Time, or the Dim Nights, to many superstitious peasants.

The exact dates for new, waxing (1/4), full, and waning (3/4) moons are shown on the Baseline Data Chart. The astute DM will note that the combinations of the moons will have interesting repercussions on lycanthropy. Most characters who become lycanthropes (as described in the DMG) will have their were-cycles linked to the cycles of Luna only. However, 10% of lycanthropes are affected only by Celene, and another 10% are affected by either moon. In any case, whenever both moons are full, all were-creatures will be out a-hunting. (This happens on Midsummer's Night, unfortunately for mistletoe hunters!)

The seasons must be defined in terms of local temperature change. The following are suggested as guidelines:

Winter: Average base temperature less than or equal to 32° F.

Spring: Average increases from 32° to 50°.

Summer: Average rises from 50°) then falls to 60°.

Autumn: Average falls from 60° to 32°.

In areas with lengthy summers, the early half (rising temperature) is considered to be Low Summer; the second half (falling temperature) is known as High

Reaping	Good-month	Harvester	Patchwall	Ready'reat	Sunsebb
77 +d6+4 -(d6+6)	75 +d4+6 -(d6+6)	68 +d8+6 -(d8+6)	57 +d10+5 -(d10+5)	46 +d10+6 -(d10+4)	33 +d8+5 -d20
01-22	01-25	01-33	01-35	01-20	01-25
23-62	26-60	34-54	36-60	21-50	26-50
63-00	61-00	55-00	61-00	51-00	51-00
33%	33%	33%	36%	40%	43%
4:45	5:13	5:42	6:12	6:46	7:19
7:29	6:57	6:10	5:21	4:45	4:36

Reaping	Good-month	Harvester	Patchwall	Ready'reat	Sunsebb
3/4: 4th day of month and 4th night of Brewfest New: 11th day of month 1/4: 18th day of month Full: 25th day of month			New: 4th day of month and 4th night of Needfest 1/4: 11th day of month Full: 18th day of month 3/4: 25th day of month		
Full: Mid-Richfest and Mid-Brewfest 3/4: 19th of Reaping New: 11th of Goodmonth 1/4: 4th of Harvester			Full: Mid-Brewfest and Mid-Needfest 3/4: 19th of Patchwall New: 11th of Ready'reat 1/4: 4th of Sunsebb		

Summer. In areas with long winters, the first half is called Early Winter and the second half Late Winter or Bitter Winter. The elves and barbarians, of course, have their own names for these periods.

DETERMINING THE WEATHER

Playtesting experience has indicated that the best way to use this system is for the DM to generate the weather for one or two weeks at a time, in advance of actual play. This approach makes it much easier for the DM to calibrate the weather with the game-world's calendar, and with the actions of the player characters as well. The sole exception to this is when the party is on an extended trip through the wilderness, covering varied types of terrain, since it is hard for the DM to predict the exact location of the party in advance in such cases.

To determine current or future weather conditions, the DM does the following:

1) Find the base temperature for the current month on the Baseline Data Chart. Roll dice as specified to find the adjustments to the base temperature for the day's high and low. Adjust both the high and low for terrain and for the distance away from the 40th parallel (add 2° Fahrenheit for every 2 1/3 hexes south; subtract the same for distances above the 40th parallel).

It should be assumed that the high temperature for the day will occur about one hour after mid-day, and the low temperature will occur about one hour before sunrise.

At the DM's option, the possibility of temperature extremes may be added in the following way. Before the monthly base temperature is used, roll percentile dice and check this table:

01	Extreme record low
02	Severe record low
03-04	Record low
05-96	Normal temperatures
97-98	Record high
99	Severe record high
00	Extreme record high

To determine the new monthly base temperature during a record high or record low, adjust the monthly base temperature from the Baseline Data Chart by the maximum high or low possible for the month. Severe highs and lows are determined by adjusting the monthly base temperature by double the maximum high or low. For extreme highs or lows, adjust the base temperature by three times the maximum.

During each day of a record high or low, the daily temperature range is determined by adjusting the monthly base temperature and then applying all other appropriate adjustments.

A period of record high or low temperatures will usually span several days, the exact number determined by rolling d20:

01	1 day duration
02-03	2 days
04-10	3 days
11-14	4 days
15-17	5 days
18-19	6 days
20	7 days

2) Roll percentile dice to determine the sky conditions (clear, partly cloudy, or cloudy) for the day.

3) Roll percentile dice to determine if precipitation will occur during the day. This roll is affected by terrain, as specified in the Terrain Effects Table (page 47). The base chance of precipitation is given in the Baseline Data Chart.

If precipitation will not occur, roll d20 and subtract one to get the current wind speed in miles per hour, and adjust this speed for the terrain. Adjust the temperature for wind chill if necessary.

If precipitation will occur, an additional percentile roll is made to determine the type of precipitation, using the Precipitation Occurrence Table (page 48). If 00 is the result, roll percentile dice again and consult the Terrain Effects Table to determine what type of Special Weather Phenomenon will occur; these phenomena differ by terain type. (Optionally, once the Special Weather Phenomenon is determined, the DM can then repeat Step 3 to see if the Special Weather is accompanied by a more normal form of precipitation.)

Note: Certain varieties of precipitation require specific conditions, as noted in the Precipitation Occurrence Table, such as a maximum or minimum temperature. If the day's conditions do not fit the specified value, the DM may either roll again or cancel the precipitation entirely.

4) Once the type of precipitation is known, the DM should refer to the Standard Weather Table (page 49) or the Special Weather Phenomena Table (page 50) to discover the effects the weather will have on wind speed, movement, visibility, etc. In addition, the duration of

HIGH WIND EFFECTS TABLE

Wind speed (mph)	On land	At sea	In air*	In battle
0-29	No effect	No effect	No effect	No effect
30-44	All travel slowed by 25%; torches will be blown out	Sailing difficult; rowing impossible	Creatures eagle-size and below can't fly	Missiles at ½ range and -1 to hit
45-59	All travel slowed by 50%; torches and small fires will be blown out	Minor ship damage (d4 structural points) may occur; wave ht. 3d6 ft.	Man-sized creatures cannot fly	Missiles at ½ range and -3 to hit
60-74	Small trees are uprooted; all travel slowed by 75%; roofs may be torn off	Ships are endangered (d10 structural damage) and blown off course; wave ht. d10+20 ft.	No creatures can fly, except those from the Elemental Plane of Air	No missile fire permitted; all non-magical weapon attacks are -1 to hit; dexterity bonuses to AC cancelled
75+	Only strong stone buildings will be undamaged; travel is impossible	Ships are capsized and sunk; wave ht. d20+20 ft. or more	No creatures can fly, except those from the Elemental Plane of Air	No missile fire permitted; all non-magical weapon attacks at -3 to hit; 20% chance per attack that any weapon will be torn from the wielder's grip by the wind; dexterity bonuses to AC cancelled

* — Note: When wind speed exceeds 35 mph, the use of a *carpet, wings,* or *broom of flying* becomes extremely dangerous. The percentage chance that a creature or object will be blown off a broom or carpet is equal to the wind speed (in mph) minus the carpet's maximum speed (in"). This percentage should be reduced by 5% for every 100 pounds of body weight and encumbrance. Characters and objects weighing less than 100 pounds have their percentage chance increased by 1% for every 5 pounds below that limit.

Also note: The use of a *potion of gaseous form* during high winds (more than 35 mph) may cause dispersion of the gas to such an extent that the creature cannot reform!

the precipitation is given. When this duration expires, the DM should roll percentile dice; if the result is equal to or less than the specified chance of continuing, then the precipitation will continue in some form. In this case, the DM must roll d10 to see if the type of precipitation changes, as follows:

1 Up one line on Precipitation Occurrence Table
2-9 No change; roll for duration of continuation
10 Down one line on Precipitation Occurrence Table

5) Any time that the temperature falls below 35° F., the DM should consult the Wind Chill Table to determine the day's true effective temperature. Other relevant data on sub-freezing conditions is in Appendix A.

6) When precipitation ends, the DM should check as to whether or not a rainbow occurs, as shown on the Precipitation Occurrence Table.

7) Whenever the DM needs to determine the relative position or direction of a phenomenon (i.e., the position of a volcano), d8 should be rolled to select one of the eight cardinal points of the compass: 1 = North; 2 = Northeast; 3 = East; 4 = Southeast; 5 = South; 6 = Southwest; 7 = West; 8 = Northwest.

6) The WORLD OF GREYHAWK Gazetteer says that prevailing winds come from the north and northeast during the fall and winter seasons, and from the east and southeast during the remainder of the year. The DM should use this information as a guideline when direction of a wind is needed, but should also take into account geographical phenomena that may affect wind direction, such as mountain ranges.

9) The DM should be aware that strong winds can have harsh effects, some of which are described in the druid spell *Control Winds.* The High Wind Effect Table (above) delineates some of the consequences of great wind velocity.

WIND CHILL TABLE

Wind (mph)	Temperature (degrees Fahrenheit) 35	30	25	20	15	10	5	0	-5	-10	-15	-20
5	33	27	21	16	12	7	1	-6	-11	-15	-22	-28
10	21	16	9	2	-2	-9	-15	-22	-27	-31	-37	-43
15	16	11	1	-6	-11	-18	-25	-33	-40	-45	-51	-58
20	12	3	-4	-9	-17	-24	-32	-40	-46	-52	-58	-64
25	7	0	-7	-15	-22	-29	-37	-45	-52	-58	-65	-72
30	5	-2	-11	-18	-26	-33	-41	-49	-56	-63	-70	-78
35	3	-4	-13	-20	-27	-35	-43	-52	-60	-67	-75	-82
40	1	-4	-15	-22	-29	-36	-45	-54	-62	-69	-76	-83
45	1	-6	-17	-24	-31	-38	-46	-55	-63	-70	-77	-84
50	0	-7	-17	-24	-31	-38	-47	-56	-64	-71	-78	-85
55	-1	-8	-19	-25	-33	-39	-48	-57	-65	-72	-79	-86
60	-3	-10	-21	-27	-34	-40	-49	-58	-66	-73	-80	-87

TERRAIN EFFECTS TABLE

Type of terrain	Adjustments to: Chance of precipitation	Temperature (in degrees)	Wind speed	Special weather phenomena
Rough terrain or hills	None	None	+/- 5mph	01-80: Windstorm 81-00: Earthquake
Forest	None	- 5	-5 mph	01-80: Quicksand 81-00: Earthquake
Jungle	+10%	+5	-10 mph	01-05: Volcano 06-60: Rain forest downpour 61-80: Quicksand 81-00: Earthquake
Swamp or marsh[1]	+5%	+5	-5 mph	01-25: Quicksand 26-80: Sun shower 81-00: Earthquake
Dust[2]	-25%	+10 (day) -10 (night)	None	01-40: Flash flood 41-70: Dust storm 71-85: Tornado 86-00: Earthquake
Plains[3]	None	None	+5 mph	01-50: Tornado 51-00: Earthquake
Desert[4]	-30%	+10 (day) -10 (night)	+5 mph	01-25: Flash flood 26-50: Sandstorm 51-65: Oasis 66-85: Mirage oasis 86-00: Earthquake
Mountains	None	-3 degrees per 1,000 feet of elevation	+5 mph per 1,000 feet of elevation	01-20: Wind storm 21-50: Rock avalanche 51-75: Snow avalanche 76-80: Volcano 81-00: Earthquake
Seacoast[5] (within 2 hexes of coastline)	+5%	-5 (cold current) +5 (warm current)	+5 mph	01-80: Earthquake 81-94: Tsunami 95-00: Undersea volcano
At sea[5] (more than 1 hex from coast)	+15%	-10 (cold current) +5 (warm current)	+10 mph	01-20: Tsunami 21-40: Undersea volcano 41-00: Undersea earthquake

Notes:

[1] — In the Cold Marshes, temperature adjustment is -5.

[2] — No fog, gale, or hurricane permitted.

[3] — No monsoon or tropical storm permitted.

[4] — No fog, mist, blizzard, monsoon, tropical storm, gale, or hurricane permitted.

[5] — Duration of fog & mist doubled.

General notes for Terrain Effects Table

1. Sylvan forest zones should have temperate weather conditions and minimal precipitation throughout the year, due to the influence of Faerie upon the climate.

2. When Special Weather Phenomena that do not involve precipitation occur, the DM may re-roll the chance (and/or type) of precipitation.

3. All Special Weather Phenomena have a 10% chance that they have been caused by one of the following:

01-30 Elemental(s) or giant(s)
31-60 Elemental(s) under NPC control
61-90 NPC or monster
91-98 Demons, devils, or creatures from the appropriate Elemental Plane
99 A deity or his/her servants
00 A battle between two or more deities

4. All terrain effects are cumulative and may therefore cancel each other out, except that intervening mountains

will eliminate all "coastline" effects. However, when a Special Weather Phenomenon is needed, the DM should select one terrain type for which the random selection will be made, and then modify the results of that selection appropriately.

5. In the desert, there is a 2% per hour cumulative chance that a creature or character will become blinded by the glare. The effects are equivalent to a Light spell being cast on the creature's visage, and may be repaired with a Cure Disease or a night's sleep. Those creatures normally dwelling in such areas are immune to this effect. Note: Although the chance here is cumulative, it does not accrue from day to day. After a week of travel in the desert, the cumulative chance drops to 1% per hour, and after one month of continual exposure to these conditions, the possibility is entirely removed.

EXAMPLE OF PROCEDURE

The party is currently camped at an elevation of 3,000 feet in the Yecha Hills (latitude 48° north) during the month of Patchwall. The baseline temperature is 57°, and two d10 rolls (of 5 and 3) indicate that the day's base high and low will be 65° and 49°. These are then adjusted for latitude by subtracting 16 degrees from each figure, and are adjusted for terrain by subtracting an additional 9 degrees for the elevation, resulting in a high of 40° and a low of 24°.

A roll of 48 indicates that the sky is partly cloudy, and a second roll of 23 indicates precipitation will occur. The DM's first roll on the Precipitation Occurrence Table indicates a monsoon — but this roll is ignored, because the temperature will not rise to 50°) the minimum required. A re-roll shows that the party is surrounded by heavy fog.

Further rolls and results specified by the Standard Weather Table indicate that the fog will last for 8 hours, with winds of 12 mph. During the fog, visibility will be cut to two feet, movement will be at one-quarter speed, tracking (by a ranger) will not be possible, and the party members' chance of becoming lost will be increased by 50% (if they travel).

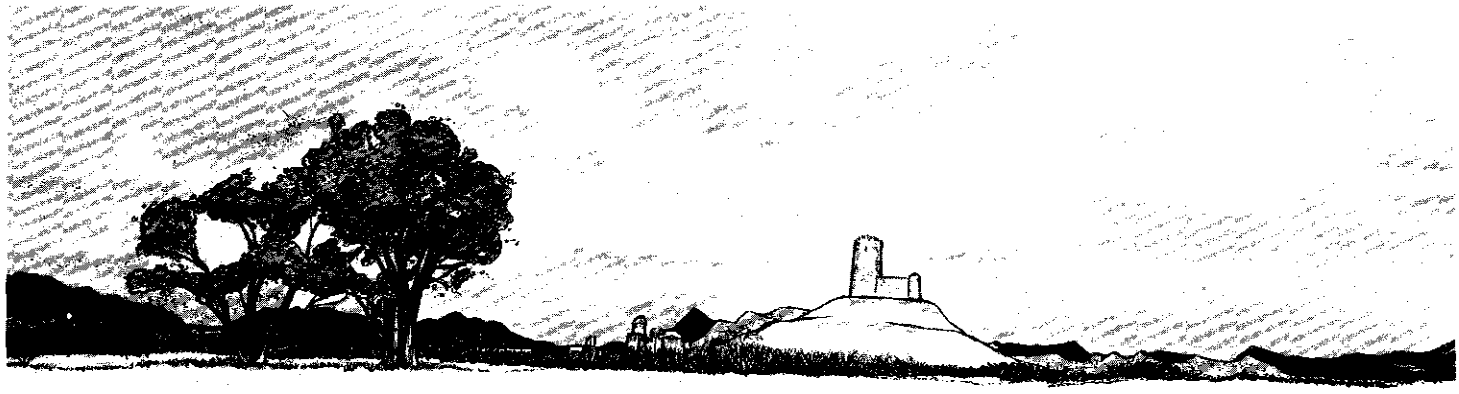
When it is time for the fog to lift, the DM rolls percentile dice again, getting a 33. This indicates that precipitation will continue. A 10 comes up on the d10 roll for continuation, indicating that the heavy fog will become light fog. The DM then determines the duration of the new weather and its effects.

Finally, the DM notes that the temperature will fall well below 35° by late afternoon. After the Wind Chill Table (page 46) is consulted, the party is informed that the effective afternoon temperature of 30° will feel like 12° to them — and the night will probably be even worse!

PRECIPITATION OCCURRENCE TABLE

Dice roll	Type of weather	Temp. required (°F.) Min.	Max.	Chance of continuing	Chance of rainbow	Not allowed in:
01-02	Blizzard, heavy	—	10	5%	—	Desert
03-05	Blizzard	—	20	10%	—	Desert
06-10	Snowstorm, heavy	—	25	20%	—	
11-20	Snowstorm, light	—	35	25%	1%	
21-25	Sleet storm	—	35	20%	—	
26-27	Hailstorm	—	65	10%	—	Desert, dust
28-30	Fog, heavy	20	60	25%	1%	Desert, dust
31-38	Fog, light-	30	70	30%	3%	Desert
39-40	Mist	30	—	15%	10%	
41-45	Drizzle	25	—	20%	5%	
46-60	Rainstorm, light	25	—	45%	15%	
61-70	Rainstorm, heavy	25	—	30%	20%	
71-84	Thunderstorm	30	—	15%	20%	
85-89	Tropical storm	40	—	20%	10%	Desert, plains
90-94	Monsoon	55	—	30%	5%	Desert, dust, plains
95-97	Gale	40	—	15%	10%	Desert
98-99	Hurricane or typhoon	55	—	20%	5%	Desert, dust
00	Special (refer to Terrain Table to determine type)	—	—	1% (if no continuation, roll new form of precipitation)	—	

Note: If rainbow occurs, roll again: 01-89 = single rainbow; 90-95 = double rainbow (may be an omen); 96-98 = triple rainbow (almost certainly an omen); 99 = Bifrost bridge or clouds in the shape of rain deity; 00 = rain deity or servant in sky.



STANDARD WEATHER TABLE

Phenomenon	Precipitation amount (inches)	Duration	Movement rate	Range of normal vision	Range of ultra- and infravision	Effect on tracking	Chance of getting lost	Wind speed (mph)
Blizzard, heavy [1]	2d10+10	3d8 hours	F: x 1/8 H: x ¼ C: no	2' radius	No	No	+50%	6d8+40
Blizzard[2]	2d8+8	3d10 hours	x ¼ (all)	10' radius	x ½	+40%	+35%	3d8+36
Snowstorm, heavy[3]	2d8+2	4d6 hours	x ½ (all)	x ½	x ½	-25%	+20%	3d10
Snowstorm, light[3]	d8	2d6 hours	F: x ¾ H: normal C: normal	x ¾	x ¾	-10%	+10%	4d6
Sleet storm	½d4	d6 hours	F: x ¾ H: x ½ C: x ½	x ¾	x ¾	-10%	+5%	3d10
Hailstorm[4]	see note[4]	d4 hours	x ¾ (all)	Normal	Normal	-10%	+10%	4d10
Heavy fog		d12 hours	x ¼ (all)	2' radius	x ½	-60%	+50%	d20
Light fog		2d4 hours	x ½ (all)	x ¼	x ¾	-30%	+30%	d10
Mist		2d6 hours	Normal	Normal	Normal	-5%	Normal	d10
Drizzle	¼d4	d10 hours	Normal	Normal	Normal	-1%/turn (cum.)	Normal	d20
Rainstorm, light[5]	½d6	d12 hours	Normal	Normal	Normal	-10%/turn (cum.)	Normal	d20
Rainstorm, heavy[5]	d4+3	d12 hours	F: x ¾ H: normal C: x ¾	x ¾	x ¾	-10%/turn (cum.)	+10%	2d12 +10
Thunderstorm[6]	d8	d4 hours	x ½ (all)	x ¾	x ¾	-10%/turn (cum.)	+10% (+30% if horsed)	4d10

STANDARD WEATHER TABLE (cont.)

Phenomenon	Precipitation amount (inches)	Duration	Movement rate	Range of normal vision	Range of ultra- and infravision	Effect on tracking	Chance of getting lost	Wind speed (mph)
Tropical storm[7]	d6/day	½d6 days	F: x ¼ H: x ¼ C: no	x½	x½	No	+30%	3d12 +30
Monsoon[7]	d8/day	d6+6 days	F: x ¼ H: x ¼ C: no	x¼	x¼	No	+30%	6d10
Gale[7]	d8/day	½d6 days	F: x ¼ H: x ¼ C: no	X¼	x¼	No	+20%	6d8+40
Hurricane or typhoon[8]	d10/day	½d8 days	F: x ¼ H: x ¼ C: no	x¼	x¼	No	+30%	7d10 +70

Notes: (F = foot travel; H = horse travel; C = carts & wagons; No = not allowed.)

[1] — Snowdrifts of up to 10' per hour may accumulate against buildings, walls, etc.

[2] — As with heavy blizzard, but only 5' per hour.

[3] — Drifts of 1' per hour will occur if wind speed is above 20 mph.

[4] — Average diameter of hailstones is ½d4 inches. If stones are more than 1 inch in diameter, assess 1 point of damage per ½ inch of diameter every turn for those AC 6 or worse. (1½ -inch diameter stones cause 3 points of damage.) Rings, bracers, etc., give no protection from this damage, but magic armor does.

[5] — A drop in temperature to 30 degrees or less after such a storm may result in icy ground, affecting travel, dexterity, etc.

[6] — Lightning strokes will occur once every 10 minutes, with a 1% probability on each that the party will be hit. This chance is increased to 10% if the party shelters under trees. Damage done will be 6d6, with a saving throw for half damage allowed.

[7] — Every 3 turns, a 10% chance of gust damage if wind speed is over 40 mph. Damage is 1d6 for every full 10 mph above 40 mph.

[8] — Unprotected creatures suffer 1d6 wind damage every 3 turns, and buildings take 1d4 structural damage each turn.

General notes for Standard Weather Table

1. The effects of precipitation on infravision and ultravision occur because the temperature of the precipitation is usually different than that of the surrounding air and terrain, resulting in a form of "jamming" similar to that which occurs when military aircraft drop bits of metal foil to confuse enemy radar systems,

2. The effects on tracking should be used to adjust the chances for a ranger to track any creatures in the wilderness.

3. The chance of getting lost applies to all parties, even those with maps, because landmarks are obscured, trails covered, and so on. Note: Terrain adjustments for this possibility, as stated in the DMG, also apply. If a party stops traveling until precipitation ceases, the effects are cancelled, except those for snow.

SPECIAL WEATHER PHENOMENA TABLE

Phenomenon	Precipitation	Duration or area	Movement rate	Range of normal vision	Range of ultra- and infravision	Effect on tracking	Chance of getting lost	Wind speed (mph)
Sand storm [1] or Dust storm [1]	—	1-8 hours	No	No	No	No	+80%	5d10
Wind storm[2]	—	1-10 hours	x½ (all)	x½	x¾	**No**	+30%	8d10 +20
Earthquake[3] (If undersea, a tsunami will occur in d10 hours)	—	1-10 hours	F: x¼ H: x¼ C: no (may be overturned)	Normal	Normal	-50%	+10% (+30% on horse)	d20
Avalanche[4] (rock or snow)	5d10 inches	1-10 minutes	May be blocked	Normal	Normal	-60%	+10% if trail is covered	d20

SPECIAL WEATHER PHENOMENA TABLE (cont.)

Phenomenon	Precipitation	Duration or area	Movement rate	Range of normal vision	Range of ultra- and infravision	Effect on tracking	Chance of getting lost	Wind speed (mph)
Volcano[5] (If undersea, an island will be formed after 2d6 days)	d8 inches of ash per day	½d20 days	x½ (all)	x ¾ (x½ if undersea due to mist)	x½	-50%	+20% (+40% if on horse)	d20
Tsunami[6]	Wave ht. 10d20 feet	½d4 hours	Normal	Normal	Normal	No	Normal	5d10 +10
Quicksand[7]	—	Covers radius of d20"	Normal (until entered)	Normal	Normal	No	+20% if skirted	d20
Flash flood [8]	see note[8]	d6+2 hours	x¾	Normal	Normal	-5%/turn	+10%	d20
Rain forest downpour [9]	1 inch per hour	3d4 hours	F: x½ H: x½ C: no	x¾	x¾	-5% per turn	+20%	0-5 (d6-1)
Sun shower [10]	½	6-60 minutes	Normal	Normal	Normal	Normal	Normal	d20
Tornado or cyclone [11]	1 inch per hour	5-50 hours	No	x¾	x¾	**No**	+40%	300
Oasis or mirage oasis [12]	—	3-6" radius	Normal	Normal	Normal	Normal	Normal	d20

Notes: (F =foot travel; H = horse travel; C = carts and wagons; No = not allowed.)

[1] — 50% chance of d4 damage every 3 turns, no saving throw, until shelter is found.

[2] — 50% chance of 2d6 rock damage every 3 turns. (Characters must roll dexterity or less on d20 to save for ½ damage; monsters must save vs. petrification.)

[3] — Center is 1-100 miles away from party, with shock waves extending 1-100 miles. The first shock wave of the earthquake will be preceded by 1-4 mild tremors, which do no damage but cause untrained horses, cattle, and other animals to bolt in fear and run for open ground. After a delay of 1-6 rounds, the first shock wave reaches the party, and there are 1-6 shock waves in an earthquake. Roll d20 to determine the number of rounds between each of the shock waves. Each shock wave causes damage as the 7th level cleric spell Earthquake.

[4] — Damage is 2d20 pts., with save (vs. dexterity or petrification, as in 2 above) for ½ damage. Victims taking more than 20 points of damage are buried and will suffocate in 6 rounds unless rescued.

[5] — Ash burns: d4 damage every 3 turns, no save. Location: 0-7 (d8-1) miles from party. Lava flows at d10 mph, does damage as a salamander's tail. For every day a volcano continues to erupt, the base temperature will rise 1 degree in a 60-mile-diameter area. This overheating will lapse after 7-12 months, as particles of ash in the air bring the temperature back down, but the chance of clear skies in the area will be cut by 50% for an additional 1-6 months thereafter.

[6] — Save vs. dexterity/petrification (see 2 above) or drown. If save is made, victim takes d20 damage.

[7] — An individual wearing no armor, leather armor, studded armor, elven chain, or magical armor will only sink up to the neck if he remains motionless, keeps his arms above the surface, and discards all heavy items. Other characters will be dragged under at the rate of 1 foot per round if motionless or 2 feet per round if attempting to escape. Drowning occurs 3 rounds after the head is submerged. If a victim is rescued after his head has been submerged, assess damage of d6 per round of submersion once character is resuscitated.

[8] — A flash flood will begin with what appears to be a heavy rainstorm, with appropriate effects, during which 3 inches of rain will fall each hour. The rain will stop when 50% of the flood's duration is over, at which point all low areas will be covered with running water to a depth which is triple the amount of rainfall. This water will remain for 6-10 turns, and then disappear at a rate of 3 inches per hour. The current will vary from 5-50 mph, increasing when water flows in narrow gullies.

[9] — The ground will absorb up to 6 inches of water; then mud will form, converting the area to a swamp for travel purposes.

[10] — 95% chance of a rainbow; see note under Precipitation Occurrence Table.

[11] — 10% chance party will be transported to the Ethereal Plane. Otherwise, treat as a triple-strength hurricane for damage.

[12] — If the oasis is real, roll d20. A result of 1 or 2 indicates that the oasis is currently populated (determine population type via the Wilderness Encounter Charts in the DMG), while a 20 indicates that the last visitor has poisoned all the wells. If the oasis is a mirage, anyone who "drinks" must save vs. spell or take d6 damage from swallowed sand.

APPENDIX A
EFFECTS OF CLIMATIC EXTREMES

The DM should be aware of some of the possible effects that can occur when a party confronts extreme temperatures. The suggestions in this section are only that, and make no attempt to present the full range of possibilities.

A. Cold Weather

1. Always use the Wind Chill Table to determine true temperatures.

2. The bulky clothing needed for protection in cold climes can affect a character's dexterity, armor class, and "to hit" rolls. A deduction of one point from each of these characteristics for every ten degrees below 0° F. is suggested.

3. The use of heat-producing magic, from spells or items, can, have severe repercussions on the local environment. Snow will melt and re-freeze into glare ice, for example, after a Fireball, and ice floes will crack and separate after intense heat. If it occurs in mountainous terrain, intense heat may cause a snow avalanche or a rock avalanche.

4. Extremes of cold may affect the usage of personal possessions. Oil, for instance, may not flow. Liquids may freeze, cracking their containers in the process. A potion may lose its effect, or be changed, after being subjected to extreme cold.

5. If a party travels with animals, pets, familiars, etc., or summons monsters, be sure to take the effects of the cold into account when describing the actions of these creatures. Extra food will often be needed under these conditions. Creatures from the Elemental Plane of Fire will be extremely annoyed at those who call on them in cold climes (double the chance of rebelling if summoned).

6. Drinking hot beverages at temperatures below -20° F. offers the possibility that the drinker's teeth may crack from the sudden temperature change.

7. Frostbite will destroy an exposed body part in 10-30 minutes at temperatures of -40° F. and below. Body parts lost to frostbite damage can only be restored by *regeneration,* such as from the cleric spell *Regenerate,* a *ring of regeneration,* or similar means. Frostbite is most likely to develop in situations where: (a) tight clothing is worn; (b) the extremities (hands, feet, ears, etc.) are inactive or immobile; (c) the character suffers from chronic vascular disease; and/or (d) the air is both cold and moist.

8. The DM should decide if it will be possible to cast spells with somatic components while the caster is wearing gloves, heavy clothing, etc. One possibility is to assign a chance of spell failure based upon temperature, such as 5% for every 10 degrees below -20° F.

9. On a sunny day, there is a 2% per hour cumulative chance that a character may become snowblind for d4 turns. The effects of this are equivalent to a *Light* spell being cast on the character's visage. Monsters that dwell in snowy climes are immune to this effect.

B. Hot Weather

1. When the temperature rises above 75° F., the DM should roll percentile dice to determine the current relaive humidity. Whenever the total of temperature and humidity is 140 or higher, consult the Temperature arid Humidity Effects Table (below) for the consequences to unprotected characters and creatures.

2. In hot climates, most mammalian creatures need additional salt to replace that lost through perspiration. Characters who fail to take precautions will suffer from double vision, dizzy spells, and shortness of breath for 1-4 hours. (Treat as a *Blindness* spell for effects on armor class, etc.) This condition can be remedied by Cure *Disease.* The effects given above describe a mild form of sunstroke. Severe sunstroke only occurs when the temperature and humidity total is higher than 200, and has a mortality rate of 20% (30% for characters who are Old or Venerable).

3. Heat cramps are caused by physical exertion at temperatures above 100° for those with a constitution of 12 or less (+10° for every point of constitution above 12). The cramps can be alleviated by Cure *Disease,* or by drinking a quart of salt water and waiting 1-4 hours— but if not cured within 2 turns of their onset, the cramps will last for 6d20 hours.

4. The effects of extreme heat on items and animals will be similar in scope to

TEMPERATURE & HUMIDITY EFFECTS TABLE

Temp. + hum.	Move	AC	To hit	Dexterity	Vision (all types)	Rest needed per hour	Chance of spell failure*
140 - 160	Normal	0	0	-1	Normal	2 turns	5%
161 - 180	x¾	0	-1	-1	x¾	3 turns	10%
181 - 200	x½	-1	-2	-2	x½	4 turns	15%
Above 200	x¼	-2	-3	-3	x¼	5 turns	20%

* — For spells with somatic components only

the effects of extreme cold, and the effects may in some ways be the "reverse" of each other. Very high temperatures may cause spontaneous combustion, especially when highly flammable items (such as oil in glass bottles exposed to the sun) are concerned. Be sure to account for evaporation, spoilage (wine becoming vinegar, etc.), and similar problems. Creatures from the Elemental Plane of Water, or those which use cold-based attacks, will strongly resent being brought into a hot climate. Remember, also, that metal items left out in the hot sun will quickly become painful to the touch.

5. When the temperature is above 75° and there is little or no precipitation, the possibility of fires in the wilderness must be considered. In areas that are no more than one hex away from a coastline or lake (but not a river), there is a 1% per day cumulative chance of spontaneous fire in wooded and agricultural areas. If the area is normal forest or grassland, this cumulative chance is 2% per day, and it rises to 3% per day if such an area is within one hex of a desert. This chance should be lowered by 1% for each quarter-inch of precipitation that has fallen within the preceding week, and the chance is reset to zero after any rainfall of more than two inches.

A forest or grassland fire will have an initial radius of one-quarter mile, and the center will be located 1/3 to 4 miles away from the party (roll d12, divide by 3). If there is no wind, the fire will spread slowly, increasing its radius by an additional quarter-mile every 6 hours. It will only be blocked by fire trails or rivers at least 180 feet wide. If there is a wind, the fire will move in the direction of the wind at a higher rate: For every 5 mph of wind speed, deduct one hour from the time it takes to move another quarter-mile, and add another 30 feet to the width of rivers and fire breaks that would be able to halt the blaze. For purposes of moderating activity in a melee situation, such afire is assumed to move at a base rate of 1" per round, plus an extra 1" for each 5 mph of wind speed.

It is possible for fires to spread into any type of terrain except water and desert. When a fire occurs, all creatures dwelling near it will flee from it at their maximum movement rate. If there is no wind, these creatures will take any random path that does not cross the fire. If there is a wind, it is possible that the fire will be literally driving the creatures before it. Such creatures will precede the fire's arrival at a site by d10 tenths of a mile, and will always attack (no morale checks) any creature or character that attempts to hinder them.

C. Burns and Their Effects

1. Sunburn can occur in any climate, and is particularly likely at high altitude and when there is reflection of sunlight off ice, snow, sand, or water.

2. Severe electrical burns (those causing damage greater than half of a creature's total hit points) have a 25% chance of causing 1-6 turns of unconsciousness (90%) or immediate cardiac arrest (10%).

3. Burns of any type which cover more than 10% of the body's surface will be followed in 1-4 hours by secondary shock, which will manifest itself as a coma of 1-10 hours' duration.

4. Burns which are not treated immediately must be kept in an antiseptic state. If this is not done, the character's chances of acquiring infections in the burned areas are increased by 5% for each *turn* the burns remain untreated.

5. Whenever a character's internal body temperature exceeds 106°, irreversible brain damage will occur. Forevery three turns that this condition persists, the affected character will lose one point each of intelligence, wisdom, and dexterity. This damage can be repaired by *regeneration* or by a *wish.*

APPENDIX B
TIDES AND CURRENTS

DMs whose campaigns include a great deal of waterborne travel and combat may wish to expand it by the addition of tides, ocean currents, and similar phenomena. Because of the complexity of this topic, only a few suggestions and reminders will be made here:

1. On a planet with one moon, high tide occurs when the moon is overhead, and low tide when the moon is on the opposite side of the planet. A matching pair of high and low tides will be caused by the planet's sun. This may lead to cancellation and/or reinforcement of the moon's tides, depending on how the sun and moon are synchronized. When more than one moon exists (as with Oerth), the tidal patterns will be far more complex.

2. All rivers flow in a general direction toward the equator.

3. High winds will affect both the timing and wave height of tides.

4. Ocean currents can affect weather conditions, especially (but not exclusively) along coastlines and in areas near coastlines.

BIBLIOGRAPHY

A number of references were extremely useful in the creation of this system. The *Bulletin Almanac* for 1974 (Philadelphia: Bulletin Publishing Co.) provided the U.S. Weather Bureau's 30-year survey of Philadelphia weather, from which was derived the information in the Baseline Data Chart. This volume was also the source for the Wind Chill Table and some precise definitions for various weather phenomena.

The *American Institute of Physics Handbook,* 3rd edition, supplied the formula for the temperature-altitude relationship as well as some other constants. *Van Nostrand's Scientific Encyclopedia* was also useful in this regard. *The Weather Machine* by Nigel Calder provided a useful reference for basic meteorology.

The effects of temperature extremes on the human body were developed from the descriptions of various ailments given in the latest edition of *The Merck Manual,* a standard medical tome.