Fundamentals of synoptic meteorology

Lecture 3

Sahraei
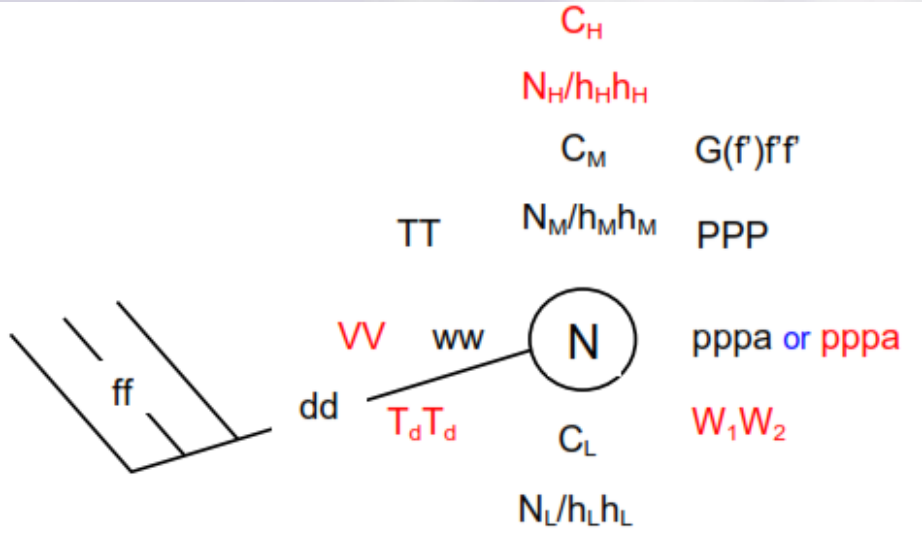
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G(f')f'f'	Wind gust (in knots)

$$C_H$$
$$N_H/h_Hh_H$$
$$C_M \qquad G(f')f'f'$$
$$TT \qquad N_M/h_Mh_M \qquad PPP$$
$$VV \qquad ww \qquad \boxed{N}$$
$$\qquad pppa \text{ or } pppa$$
$$ff \qquad dd$$
$$T_dT_d \qquad C_L \qquad W_1W_2$$
$$N_L/h_Lh_L$$

pppa or pppa	Pressure tendency and trend (black: rising, red: falling) (in millibars)
PPP	Atmospheric pressure (in millibars)

Barometric Pressure is VERY important!

average barometric pressure at sea level is **1013.25 mb**

1013.3   **13.3**   **133**

barometric pressure varies around this value

somewhat higher   *+ about 30 = 1043*

1013.3

somewhat lower

- about 30 = 983

From the three numbers, you must INTERPRET whether the preceding value is

10

or

9

Which would make the value most realistic?

What is the pressure?   *(1013.3)*

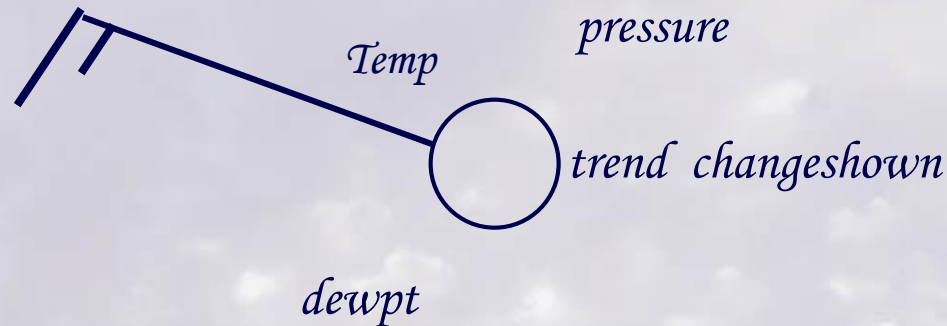|		
084	*08.4*	*1008.4*
962	*96.2*	*996.2*
281	*28.1*	*1028.1*
875	*87.5*	*987.5*
322	*32.2*	*1032.2*

Not only is the pressure itself important, but so is the way the pressure has been changing.

So, more information may be given and must be coded.

pressure

Temp

trend changeshown

dewpt

+ *it is higher now than in the past*

- *it is lower now than in the past*

the amount of change in the past three hours

again, reported in TENTHS without the decimal

Symbol	Description of curve	Pressure now compared with 3 hours ago
⋀	Rising, then Falling	Higher
⌐/	Rising, then steady	Higher
/	Rising	Higher
⋁	Falling, then Rising	Higher
___	Steady	same as
⋁	Falling, then Rising	Lower
_	Falling, then steady	Lower
\	Falling	Lower
⋀	Rising, then Falling	Lower

PRESSURE TENDENCY

Code No. a

Code No.	a	Pressure Tendency		Code No.	a	Pressure Tendency
0	(rising then falling)	Rising, then falling; same as or higher than 3 hours ago		4	(steady)	Steady; same as 3 hours ago
1	(rising then steady)	Rising, then steady; or rising, then rising more slowly	Barometric pressure now higher than 3 hours ago	5	(falling then rising)	Falling, then rising; same as or lower than 3 hours ago
2	(rising steadily)	Rising steadily, or unsteadily		6	(falling then steady)	Falling, then steady; or falling, then falling more slowly	Barometric pressure now lower than 3 hours ago
3	(falling then rising)	Falling or steady, then rising; or rising, then rising more rapidly		7	(falling steadily)	Falling steadily, or unsteadily	
				8	(steady then falling)	Steady or rising, then falling; or falling, then falling more rapidly	

Barometric Trend

the change in barometric pressure during the past three hours

Station Model

Temperature (°F) → **28**

Present weather →

Visibility (mi) → **1/2** ✻

Dewpoint (°F) → **27**

Wind speed →

Amount of cloud cover (approximately 75% covered)

196 Barometric pressure (1019.6 mb)

+19/ Barometric trend (a steady 1.9-mb rise the past 3 hours)

.25 Precipitation (inches past 6 hours)

Wind direction (from the southwest)

whole feather = 10 knots
half feather = 5 knots
total = 15 knots

(1 knot = 1.15 mi/hr)

The current pressure is 1019.6 mb
Because the pressure has been rising

steadily, three hours ago the pressure was 1.9 lower.
Three hours ago the air pressuer was 1017.7 mb. (1019.6 mb – 1.9 mb)

Cloud heights

On a synoptic chart, only two figures for the cloud height are plotted. As a result, a code is used to denote the cloud heights.

For example:

00 is a cloud base at less than 100 feet

01 is a cloud base at 100 feet

05 is a cloud base at 500 feet

10 is a cloud base at 1,000 feet

50 is a cloud base at 5,000 feet

1 ft = 0.3048 m

56 is a cloud base at 6,000 feet

57 is a cloud base at 7,000 feet

58 is a cloud base at 8,000 feet

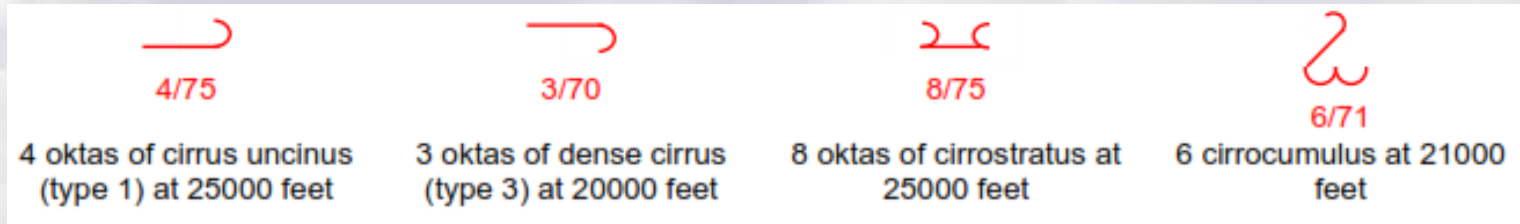59 is a cloud base at 9,000 feet

60 is a cloud base at 10,000 feet

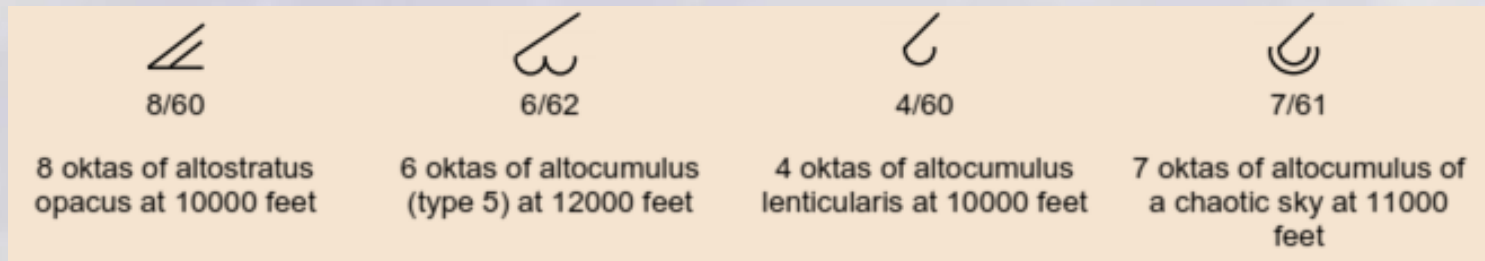61 is a cloud base at 11,000 feet

75 is a cloud base at 25,000 feet

Examples of cloud bases plotted on a synoptic chart

High Cloud

4/75	3/70	8/75	6/71
4 oktas of cirrus uncinus (type 1) at 25000 feet	3 oktas of dense cirrus (type 3) at 20000 feet	8 oktas of cirrostratus at 25000 feet	6 cirrocumulus at 21000 feet

Medium Cloud

8/60	6/62	4/60	7/61
8 oktas of altostratus opacus at 10000 feet	6 oktas of altocumulus (type 5) at 12000 feet	4 oktas of altocumulus lenticularis at 10000 feet	7 oktas of altocumulus of a chaotic sky at 11000 feet

Low Cloud

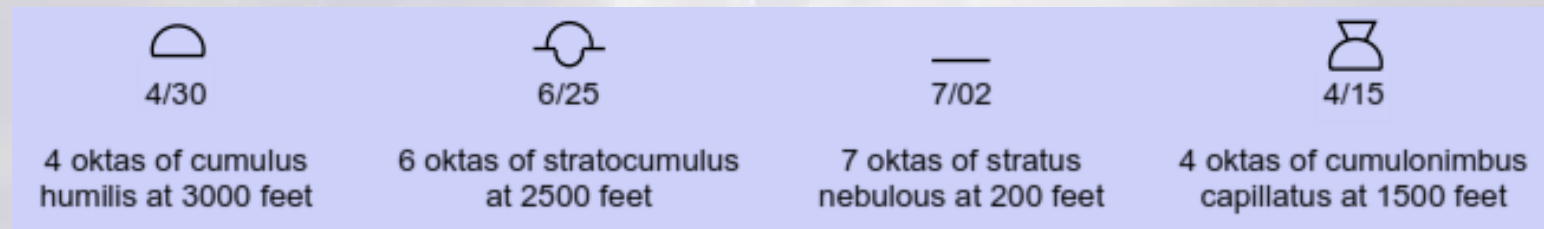| 4/30	6/25	7/02	4/15
4 oktas of cumulus humilis at 3000 feet	6 oktas of stratocumulus at 2500 feet	7 oktas of stratus nebulous at 200 feet	4 oktas of cumulonimbus capillatus at 1500 feet

Weather Elements:

Precipitation

Temperature

Wind Speed

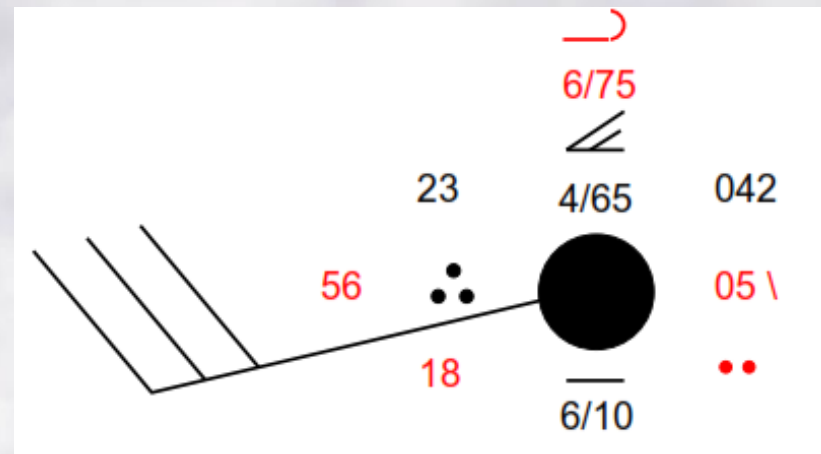Wind Direction

Sunshine

Humidity

Air Pressure

Cloud Cover

Visibility

Example of synoptic elements
plotted on a typical land station report

The decode of the above station plot is as follows:

| 6/75 |
23	4/65	042
56		05 \
18	
6/10	

Weather as observed	Code group	Description
8 oktas	N	Total amount of cloud (in oktas)
23 ℃	TT	Dry-bulb air temperature (in degrees Celsius)
Continuous moderate rain	ww	Present weather
260 °	dd	Wind direction (in degrees)
30 knots	ff	Wind speed (in knots)
6 km	VV	Visibility (in metres or kilometres)
18 ℃	$T_d T_d$	Dew-point temperature (in degrees Celsius)
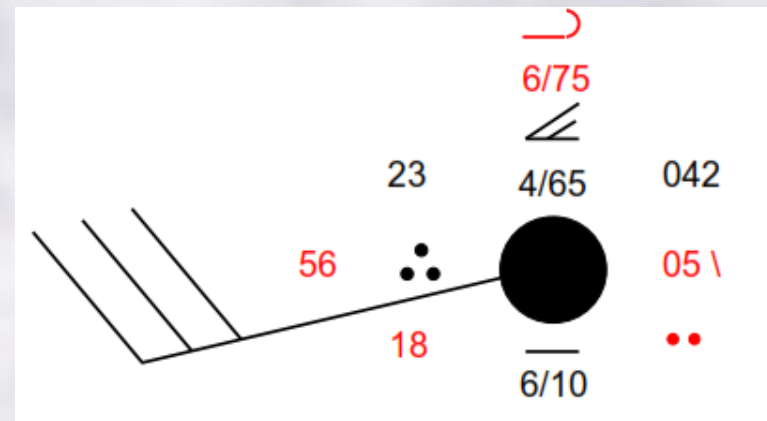
Weather as observed	Code group	Description
Stratus (6 oktas at 1000 feet)	C_L or C	Type of low cloud
Rain	W_1W_2	Past weather
Falling 0.5mb in last 3 hours	pppa or pppa	Pressure tendency and trend (black: rising, red: falling) (in millibars)
1004.2mb	PPP	Atmospheric pressure (in millibars)
Dense altostratus (4 oktas at 15000 feet)	C_m or C	Type of medium cloud
Cirrus (6 oktas at 25000 feet)	C_H or C	Type of high cloud

Surface weather map
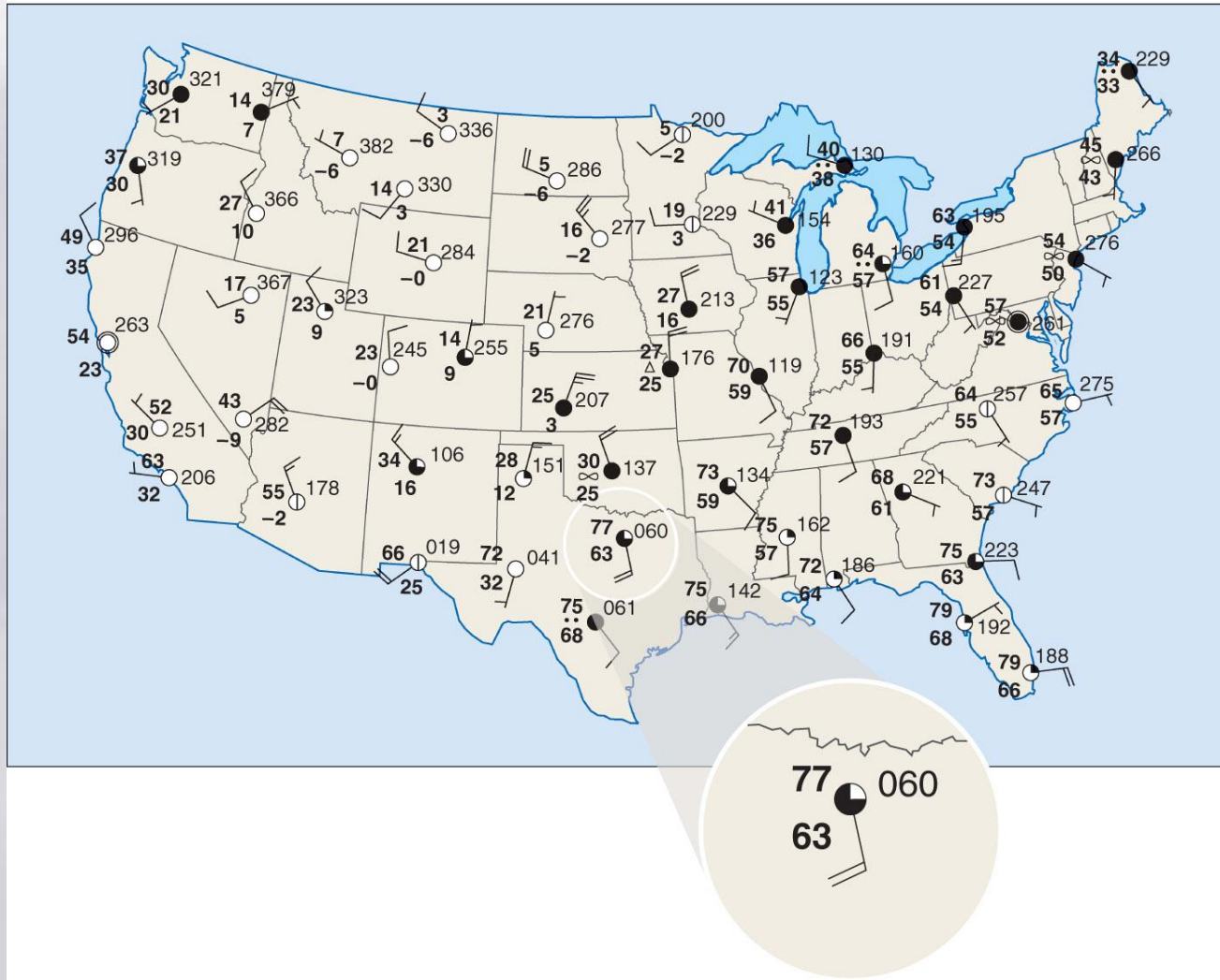
Decode this station

75

237

1 ,,   – 12

65   6 ● 3

4   36
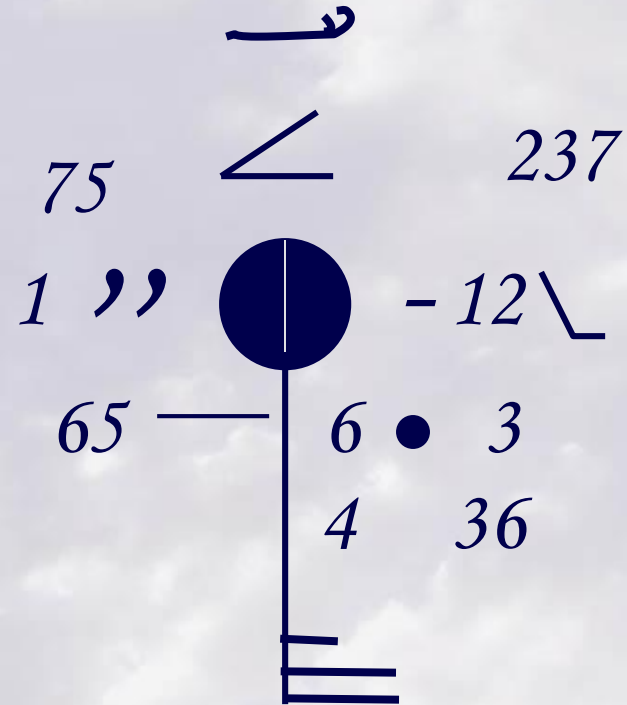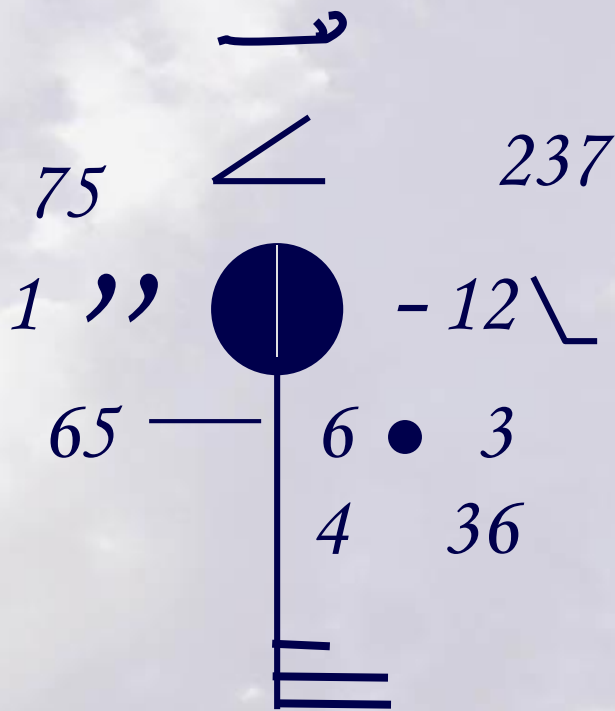
any low clouds?   *yes*

any middle clouds?   yes

any high clouds?   *yes*

amount of low and middle clouds   6

height of cloud base   *4*

visibility   1 mile

barometric pressure   1023.7 mb

trend in pressure   *falling*

pressure three hours ago   1024.9

how has pressure changed   *down then steady*

present weather   continuous slight drizzle

past weather   *rain*

when precipitation began/ended   4

amount of precipitation   .36"

temperature   *75*

dew point   *65*

wind direction   *south*

wind speed   *25 knots*

amount of sky cover   *80%*

Coordinated Universal Time (UTC)

Is the reference clock adopted by weather organizations around the world
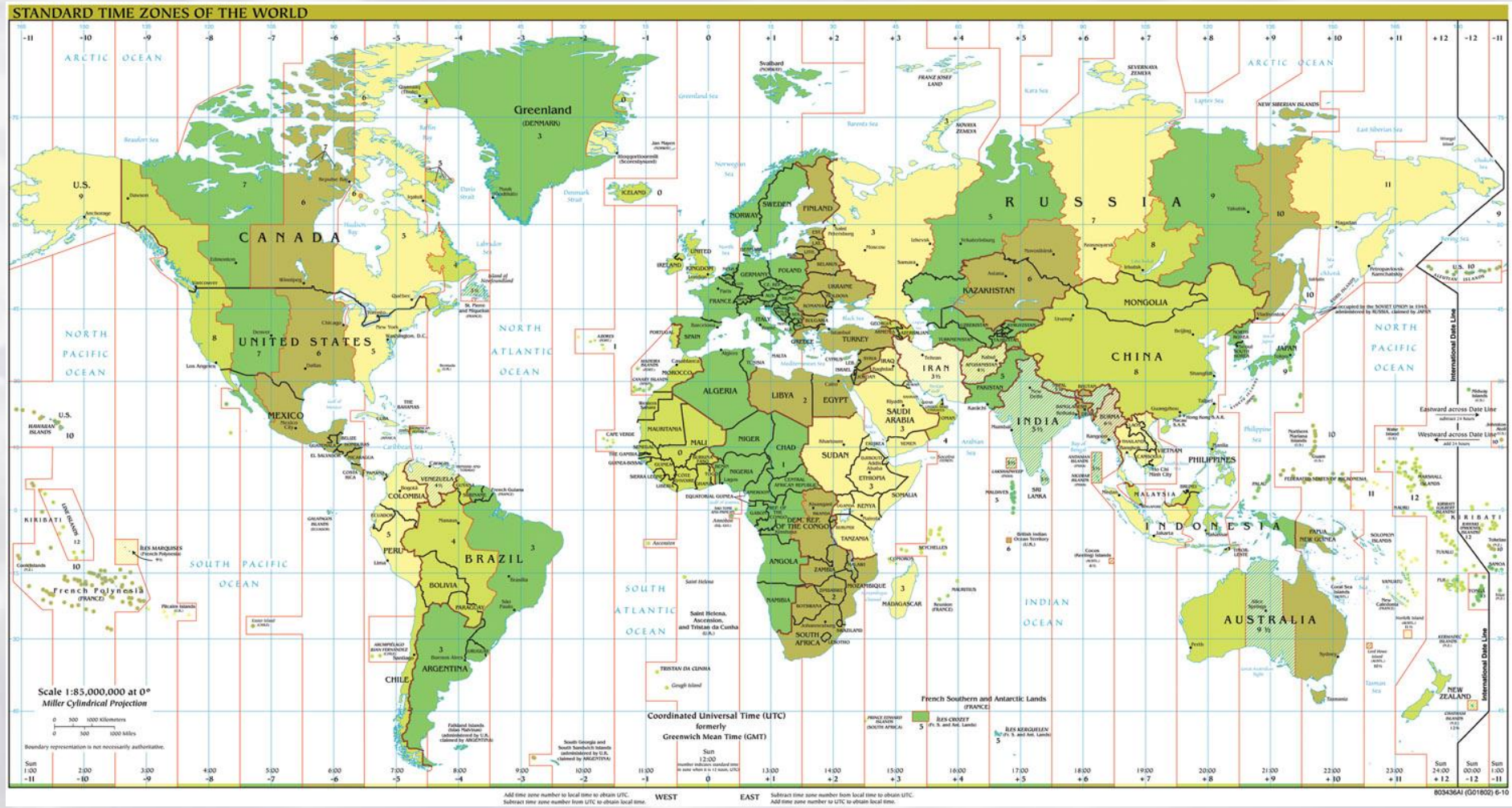
Greenwich, England is the reference time zone for UTC

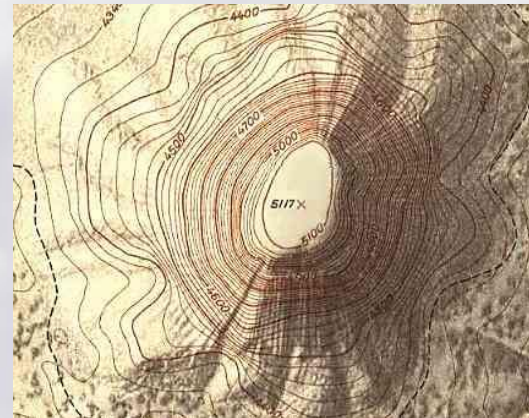Meteorology also uses a 24-hour military-style clock

UTC
1200(noon)
0000(midnight)

Time zone conversion map

How to Think about Contouring

- *Like topographic map*

- *Lines of constant height in this picture*

- *Walk along one of these lines -- stay at exactly the same altitude the ENTIRE time*

What Else Do We Contour?

- *Isopleth is a line on a map that connects all the points of a given variable with the SAME SPECIFIED VALUE*

- *Isobar - line of constant pressure*

- *Isotherm - line of constant temperature*

- *Isotach - line of constant wind speed*

- *Isodrosotherm - a line of constant dewpoint*

- *Isohyet - a line of constant precipitation accumulation*

- *Isoheight - a line of constant height*