CHART WEATHER ANALYSIS

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Content

- Introduction to analysis chart
- Scales of Weather System
- Type of synoptic charts

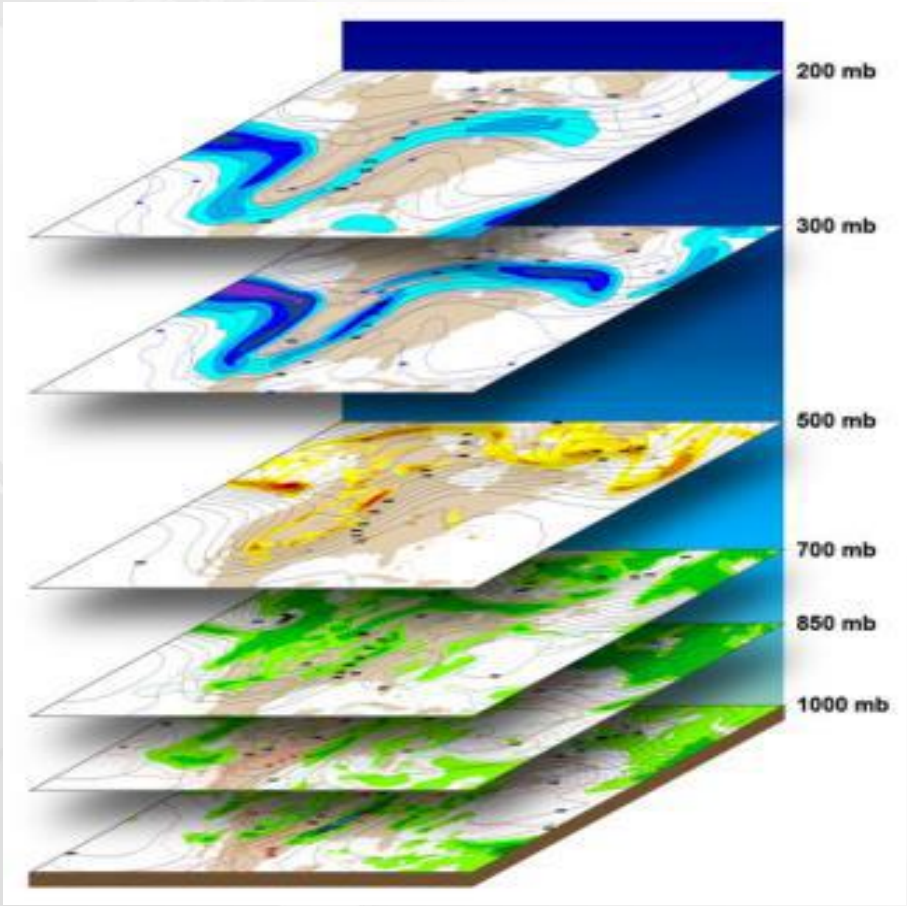
Introduction to Chart Analysis

- **Weather Chart (Meteorology):** a map showing the principal meteorological elements at a given time and over an extended region.

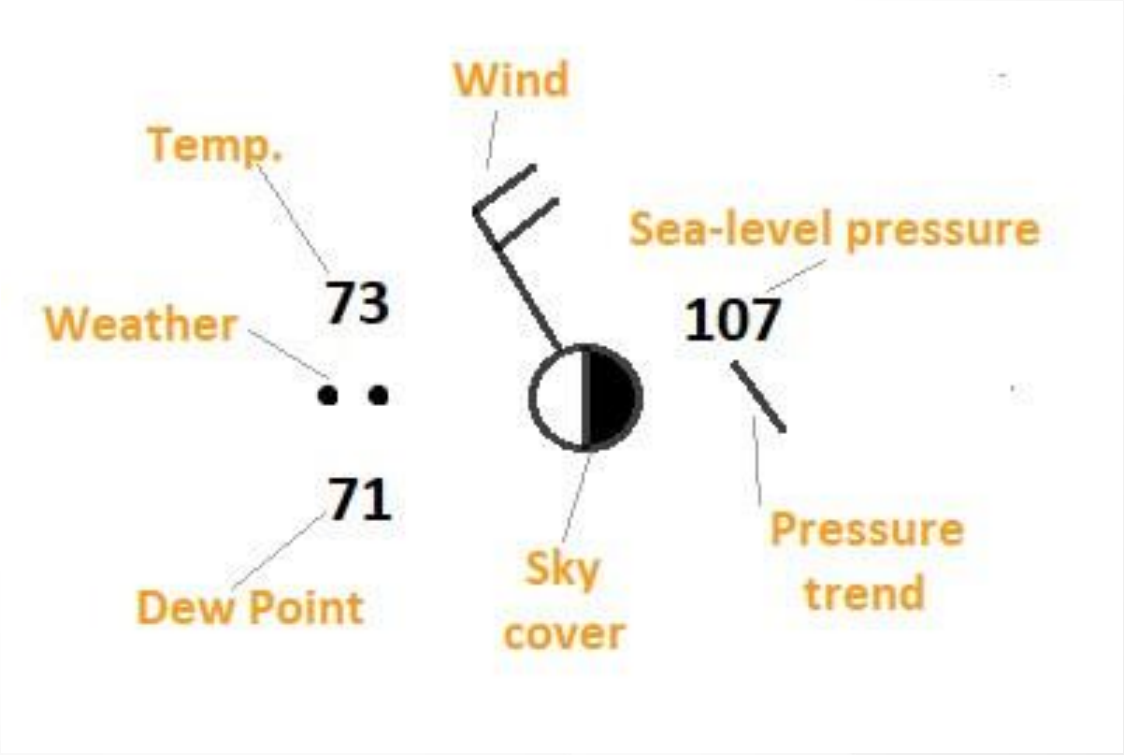
- Elements (Temperature, wind , Pressure, cloud and rainfall) are given as numbers and symbols Level chart

Introduction to Chart Analysis

Weather Charts



Elements

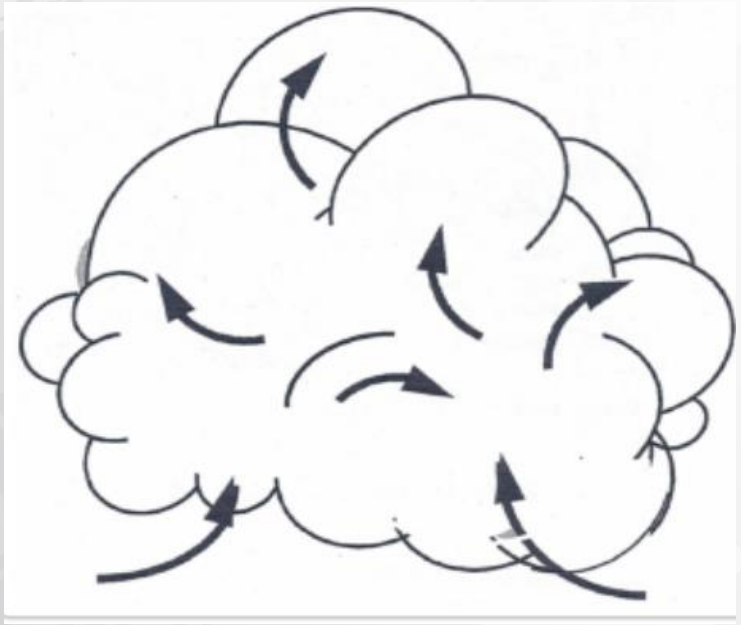


Scales of the Weather Systems

Type of scale	Horizontal extension	Vertical extension	Time period	Examples
Micro Scale	Less than 1Km	Up to 10 meters	Few minutes	Formation of dew, small eddy currents, and industrial smoke.
Meso scale	1Km to 100Km	1 to 10Kms	Few hours to one day	Thunder storm, dust storm, fog, squall lines, land breeze, and sea breeze.
Synoptic scale	100Km to 1000Km	Few to 10Kms	Few days	Low-pressure, High-pressure areas, troughs, ridges. depressions, cyclones.
Planetary scale	> 1000Kms	> 10Kms	Large number of days	Blocking highs, IT.C.Z, Monsoon Trough, etc

Scales of the Weather Systems

Examples of **micro scale** systems: turbulent flow (updrafts and downdrafts):

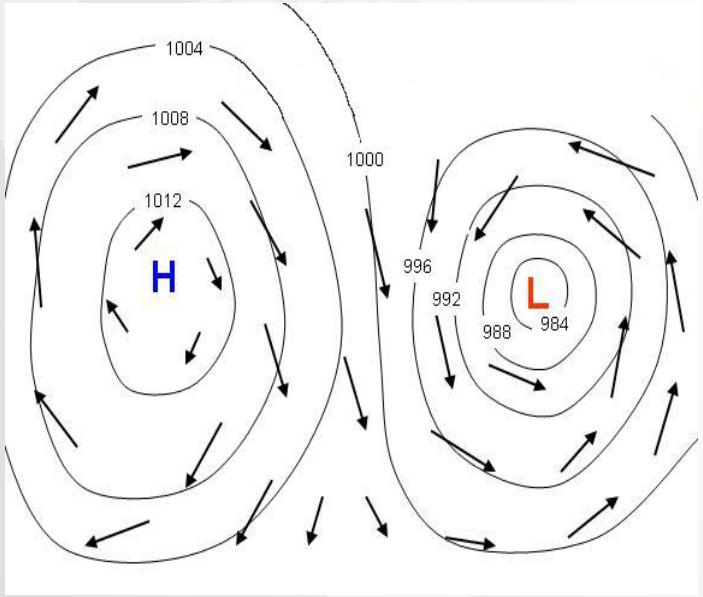


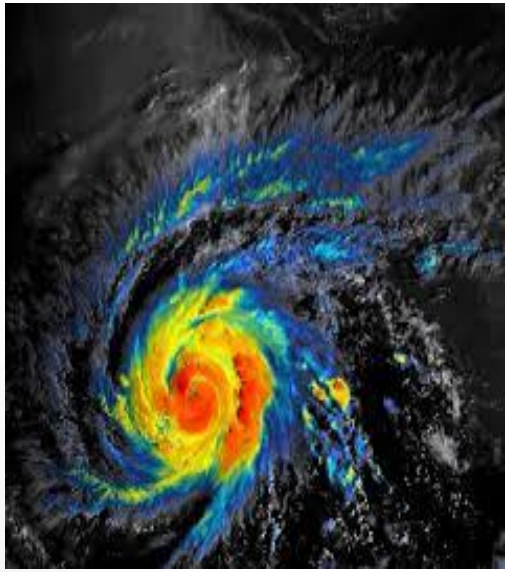
Turbulent flow

Fog

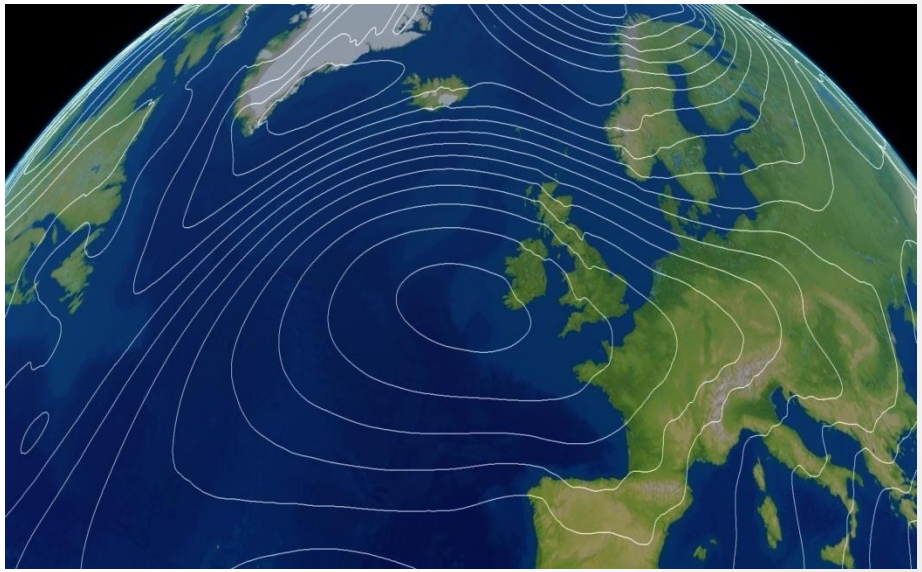
Thunderstorm

Scales of the Weather Systems





Synoptic scale: low pressure, high pressure and cyclone



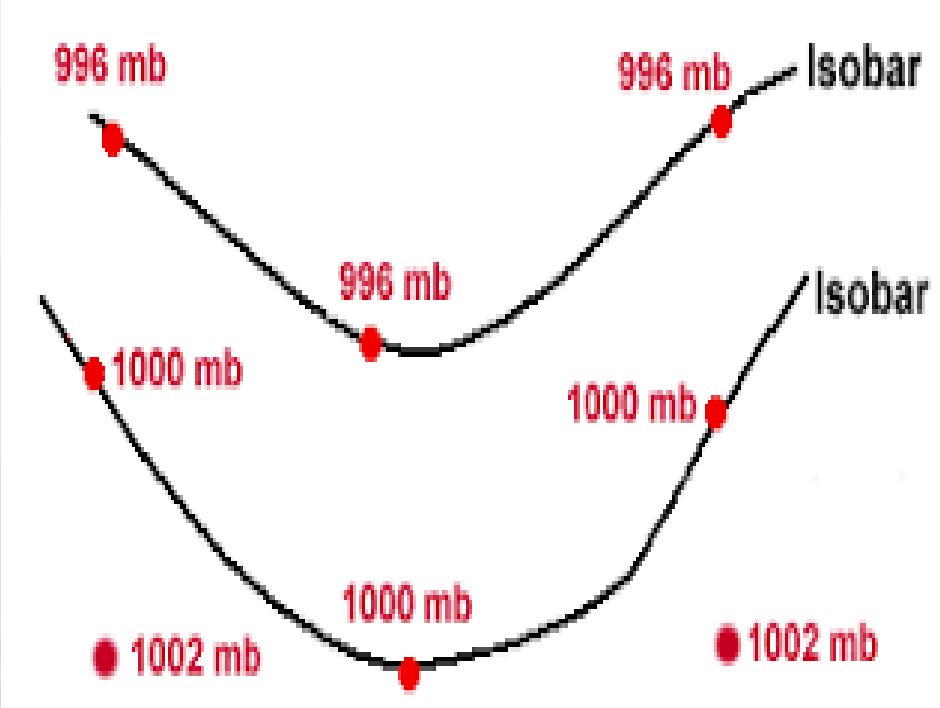
Planetary scale system

Scalar Analysis

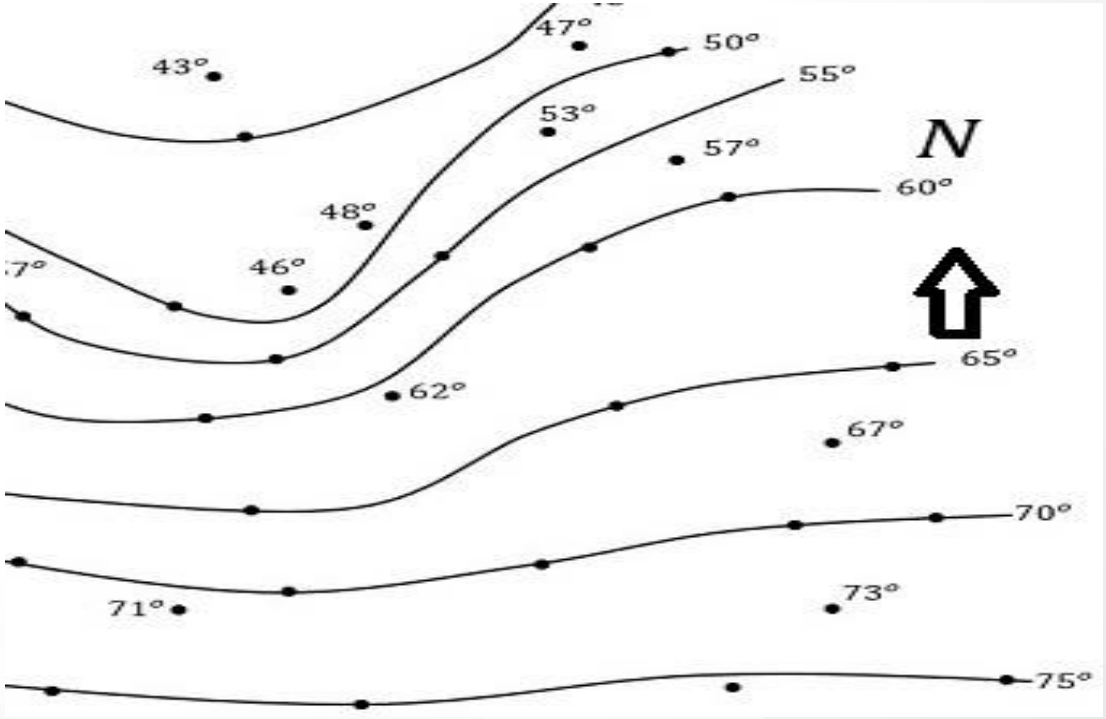
- A variety of synoptic charts are used for studying both surface and upper air weather reports
- lines joining places with equal values called **Iso:**
  - **Isobar:** A line passing through equal values of pressure
  - **Isotherm:** A line passing through equal values of temperature
  - **Isotach:** A line passing through equal values of wind speed
  - **Contours:** A line passing through equal values of heights

Scalar Analysis

Isobar

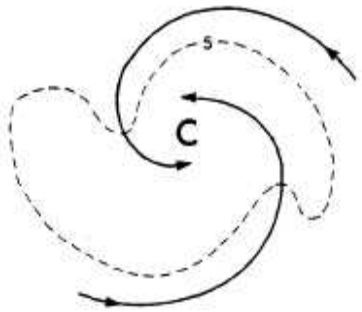


Isotherm

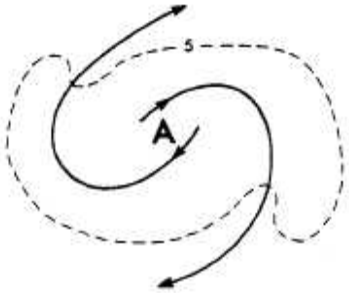


Vector Analysis

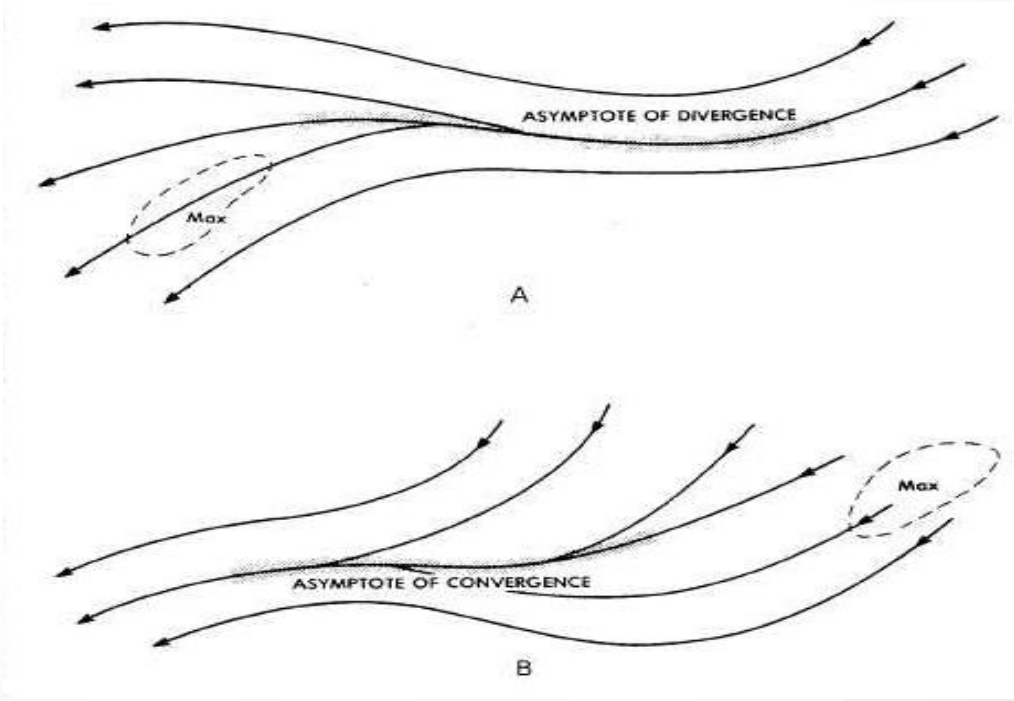
Isotach



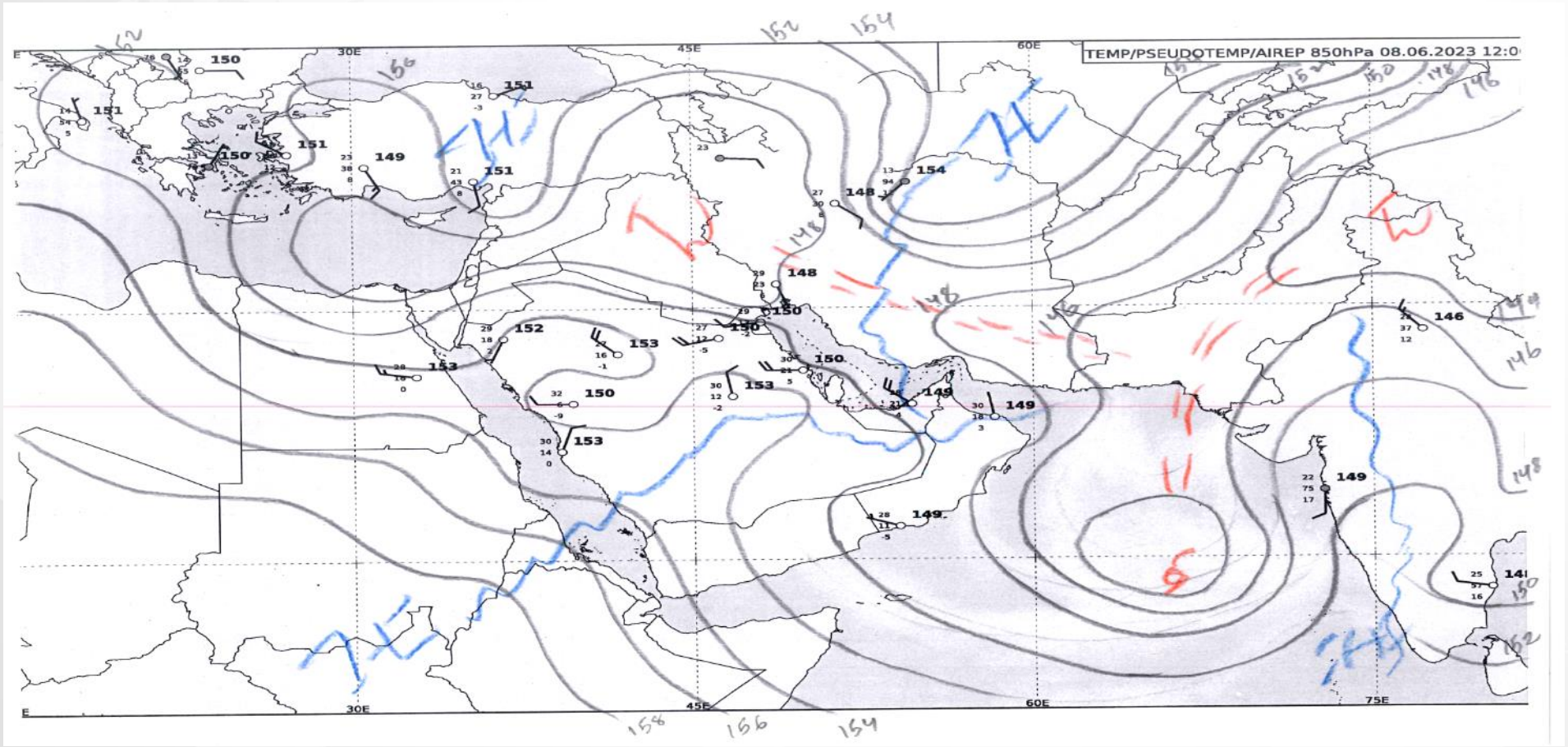
WITH A CYCLONIC CIRCULATION, THE ISOTACH LINES KINK WITH THE FLOW.



WITH A ANTICYCLONIC CIRCULATION, THE ISOTACH LINES KINK AGAINST THE FLOW WHEN CROSSING THE STREAMLINE (ASYMPTOTE).



Scalar Analysis



Contours / geopotential height

Surface Chart

What to look for?

- Advections
- Fronts
- Pressure
- Convergence and divergence
- Temperature and moisture gradients

Surface and Upper Air Chart

Low-pressure area:

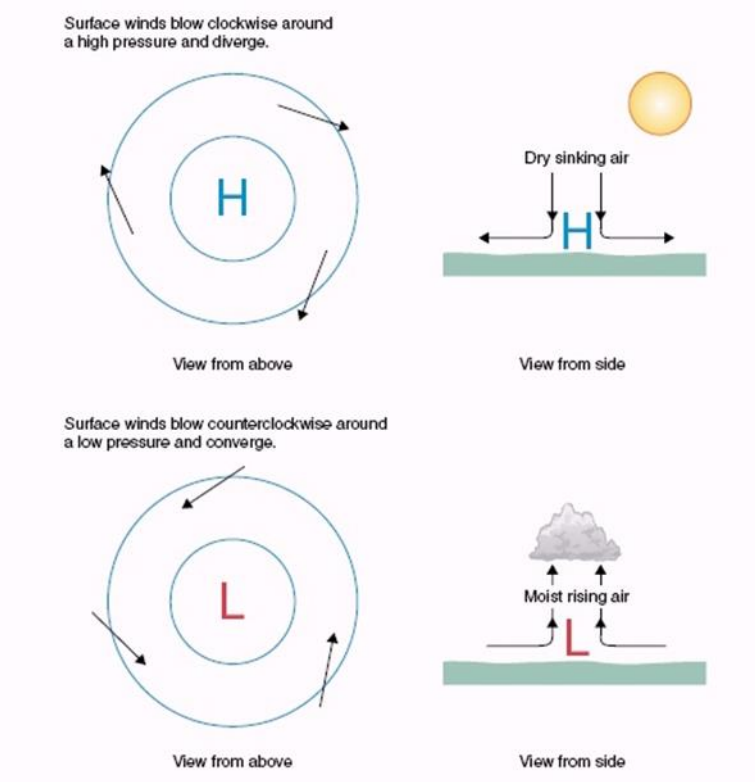
- Closed isobar with lowest pressure at the centre.
- As we move away from the centre, pressure increases in all the directions.
- Winds blow around low in anticlockwise rotation in northern hemisphere and clockwise rotation in southern hemisphere.
- Low-pressure area is associated with positive vorticity, convergence, and upward motion of air.
- In association with low clouds and rainfall occurs.
- On charts the low-pressure is marked as **L** in red colour.

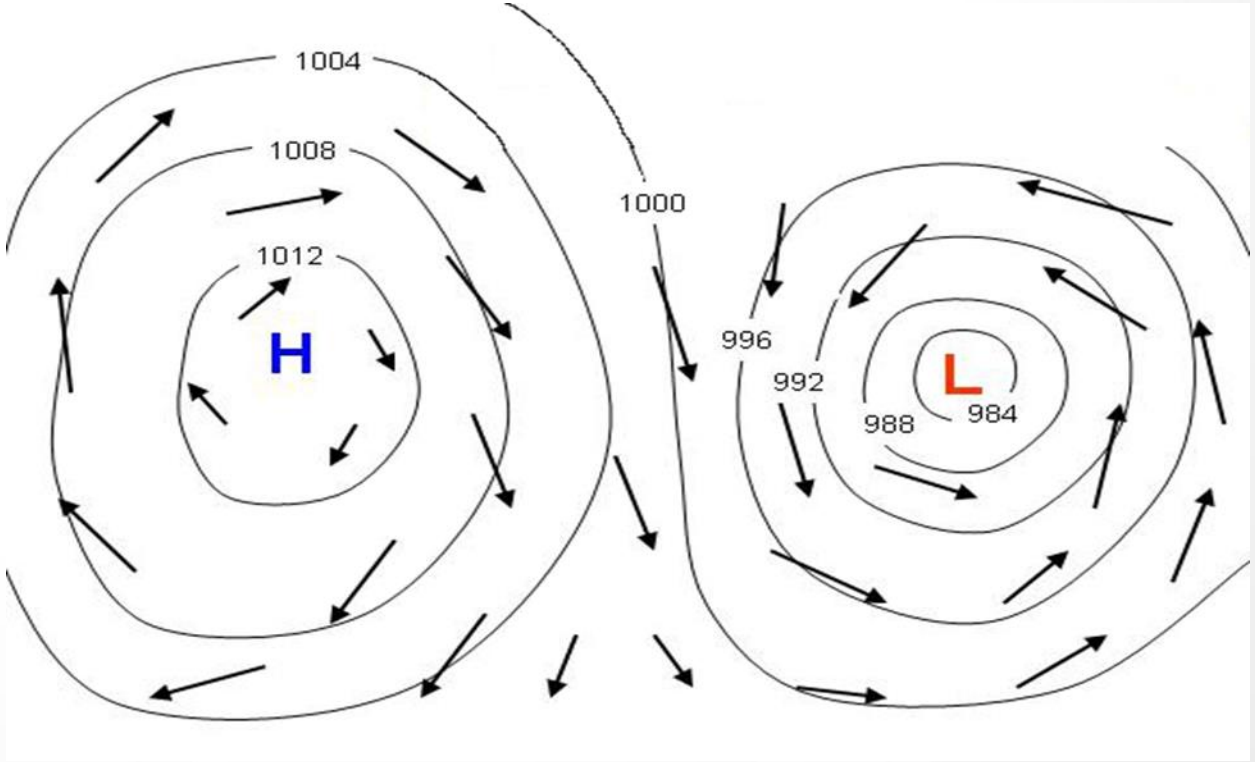
Surface and Upper Air Chart

High-pressure area:

- Closed isobar with highest pressure at the centre.
- The pressure at the centre of high is highest and as we move away from the centre, pressure decreases in all directions.
- Winds blow around high in clockwise rotation in northern hemisphere and in anticlockwise rotation in southern hemisphere.
- On charts the High-pressure is marked as H in blue colour.

Low-pressure Area and High-pressure Area





Surface and Upper Air Chart

A trough of a Low-pressure area:

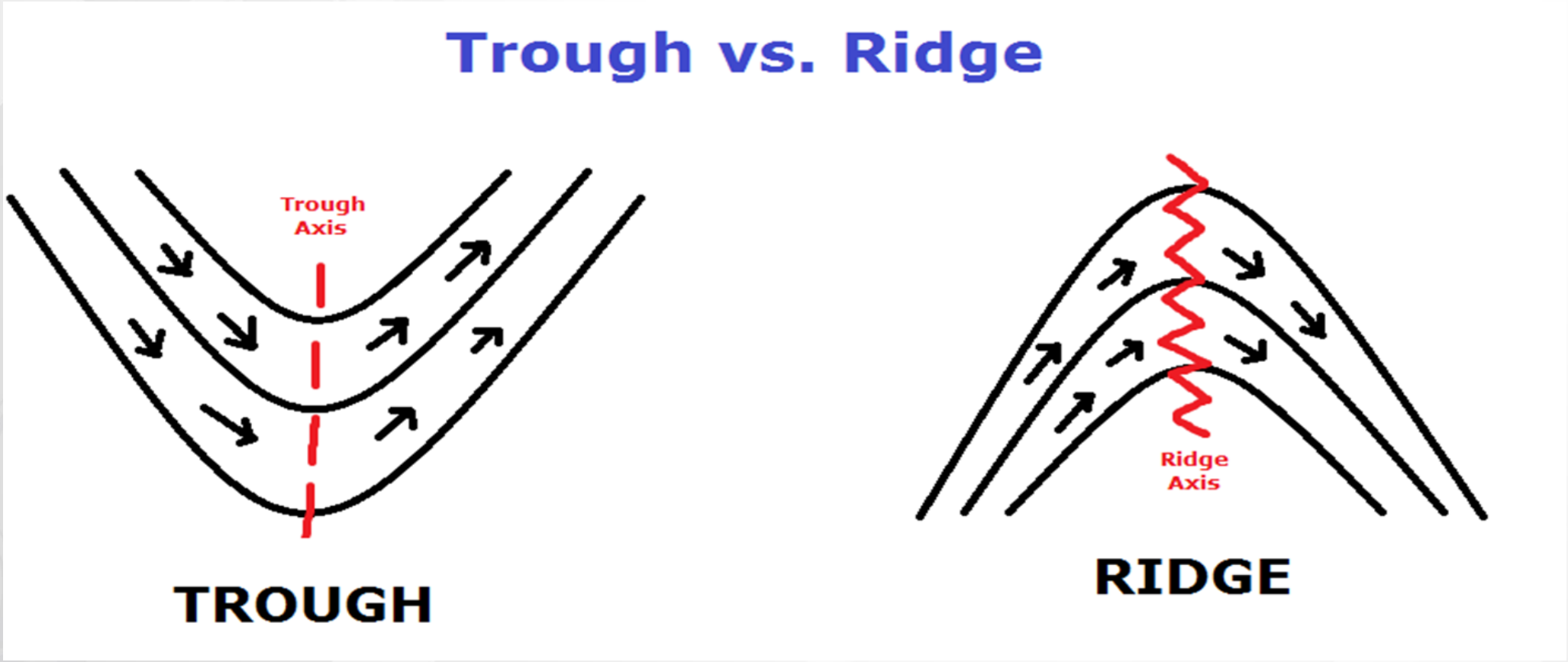
- convergence may be associated with the ascent of air in a depression or trough. If the air is moist and unstable, clouds and precipitation may occur.
- 1A trough line is a line where pressures are minimum along the line.
- As we move away from the trough line, the pressures will increase on both sides of trough line.
- Trough line need not be a straight line; it can be curved also.
- The winds change abruptly in anticlockwise rotation in northern hemisphere and clockwise rotation in southern hemisphere.
- Trough line is associated with positive vorticity and convergence.
- Trough line is associated with clouds and weather.
- Trough line is marked as = = ======== line in red pencil on charts.

Surface and Upper Air Chart

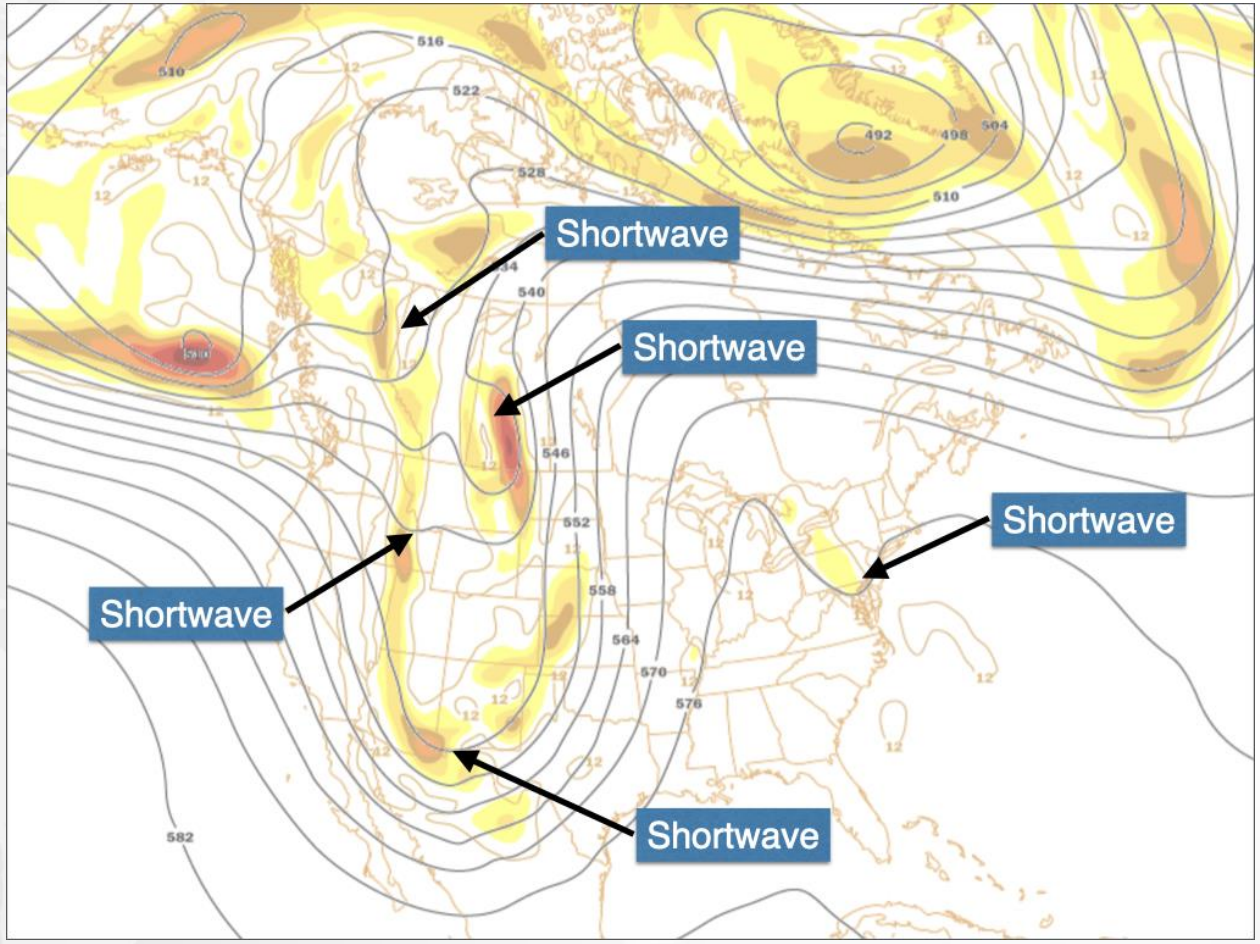
A Ridge of High-pressure area:

- It is a line along which pressures is maximum.
- As we move away from the ridge, line pressure decreases on both sides of ridgeline.
- Ridge line need not be a straight line; it can be a curved line also.
- The winds change abruptly in a clockwise direction along the ridge in the northern hemisphere.
- Ridgeline is associated with negative vorticity and divergence.
- Ridge is associated with cloud free fair weather.
- A ridgeline is marked as a zigzag (N) line in blue colour on charts

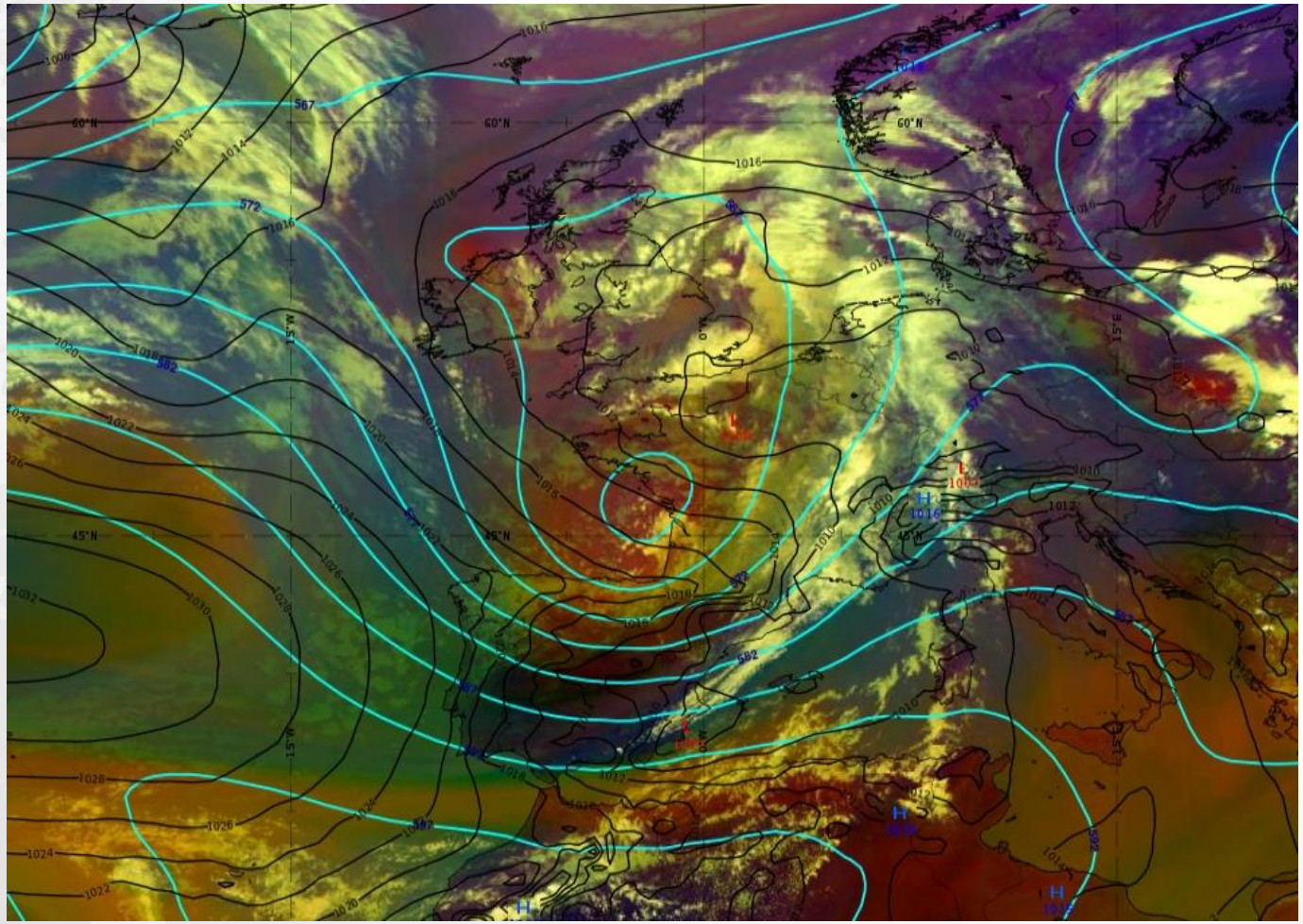
Trough and Ridge



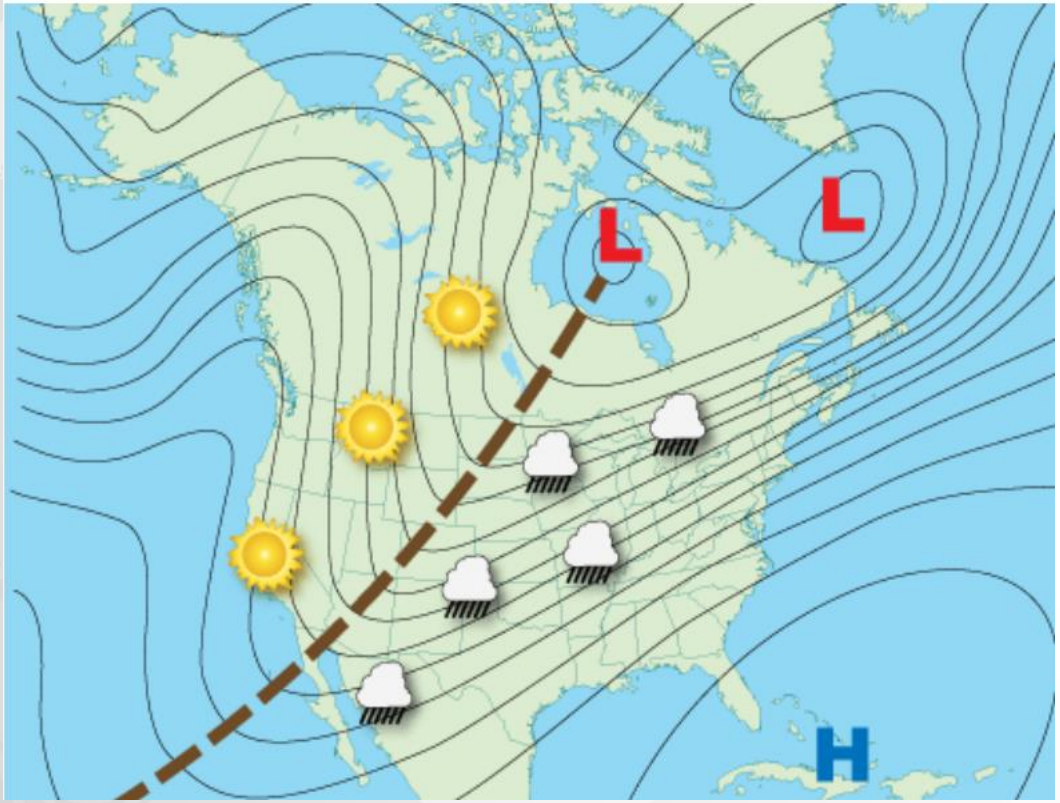
Types of Troughs : Shortwaves

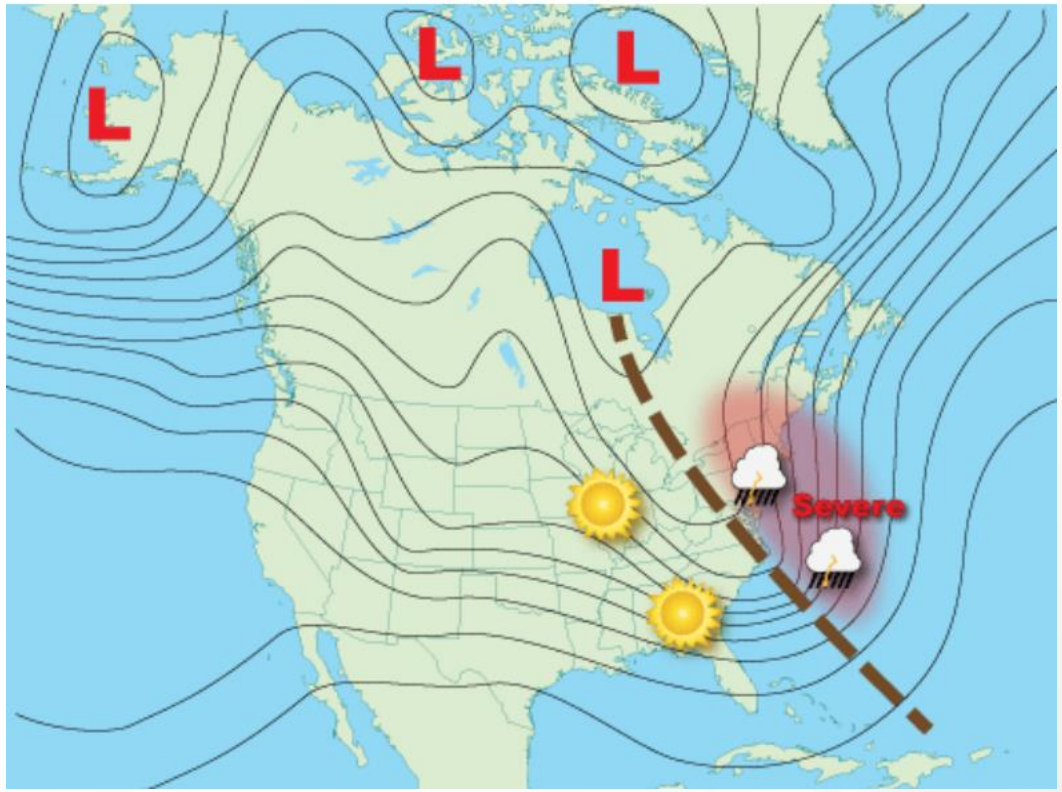


Types of Troughs: Cutoff Low



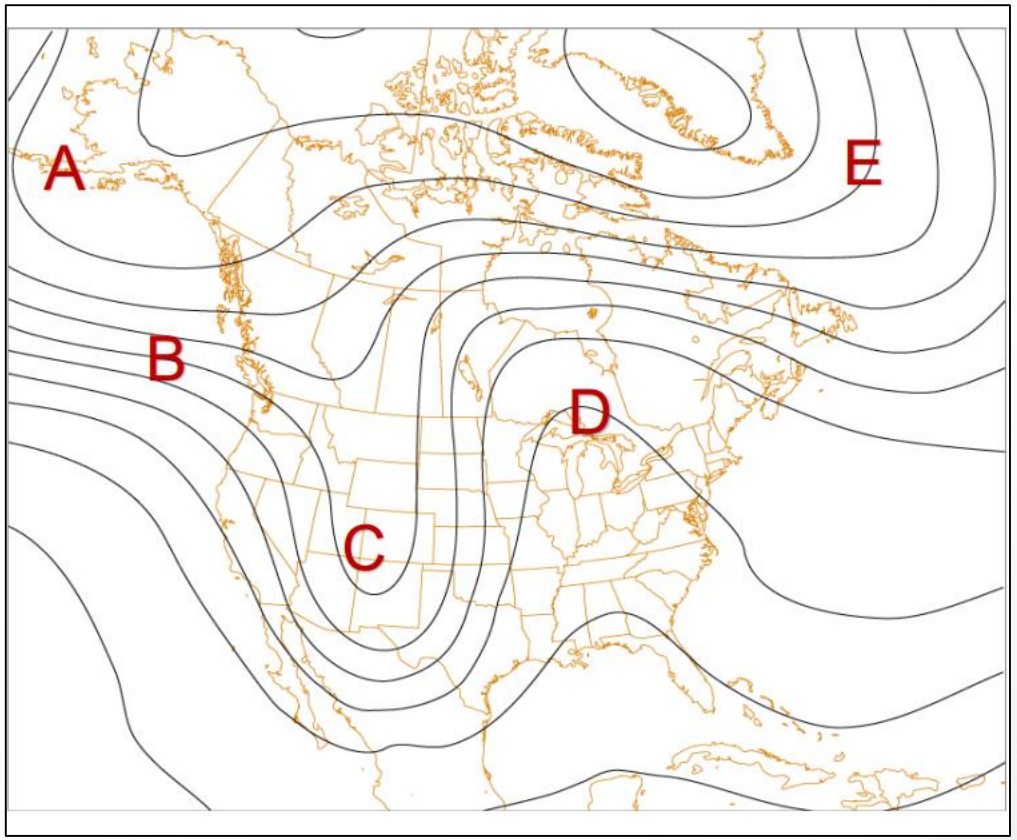
Types of Troughs : Negative and Positive Tilt





Test Your Knowledge

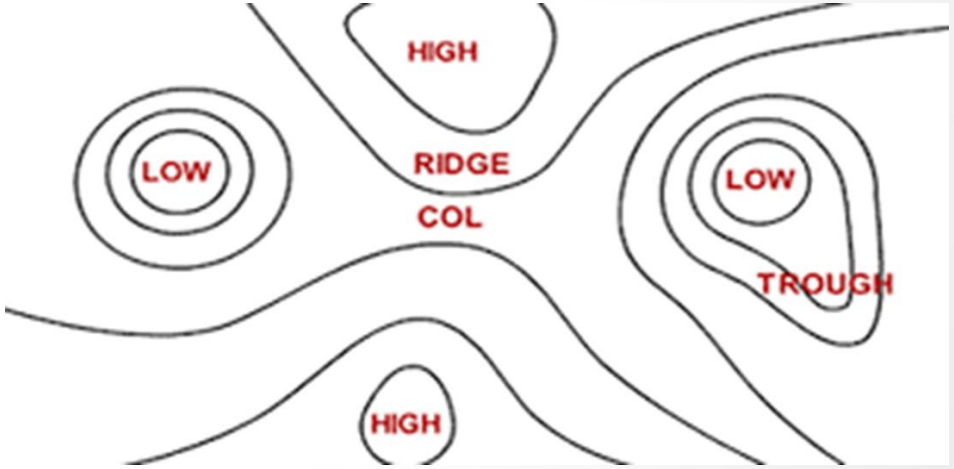
Identify the trough?



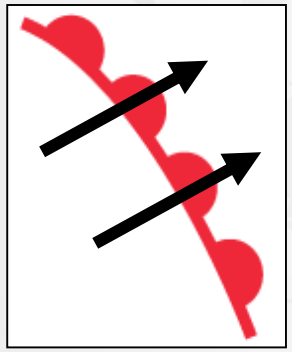
Surface and Upper Air Chart : COL Region

COL REGION:

- Col region is a region of intersection between a trough line and ridgeline.
- It is a region between two highs and two lows.
- Near the centre of the col region, the pressure gradient is weak; so winds are weak, light, and variable.
- Normally pressure systems remain stationary in the col regions.

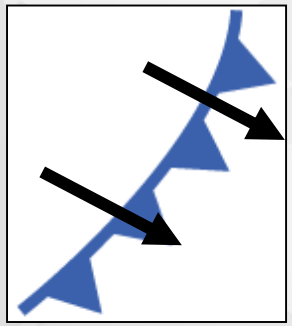


Surface and Upper Air Chart : Frontal Systems



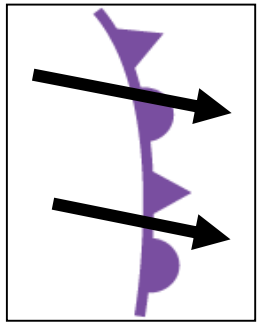
WARM Front:

Warm air replace cooler air at the surface



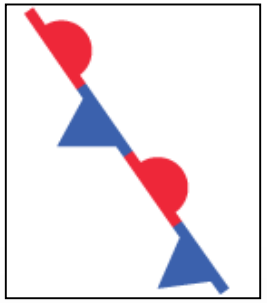
COLD Front:

Cold air replace warmer air at the surface



OCCLUDED Front:

Cold front overtakes a warm front



STATIONARY Front:

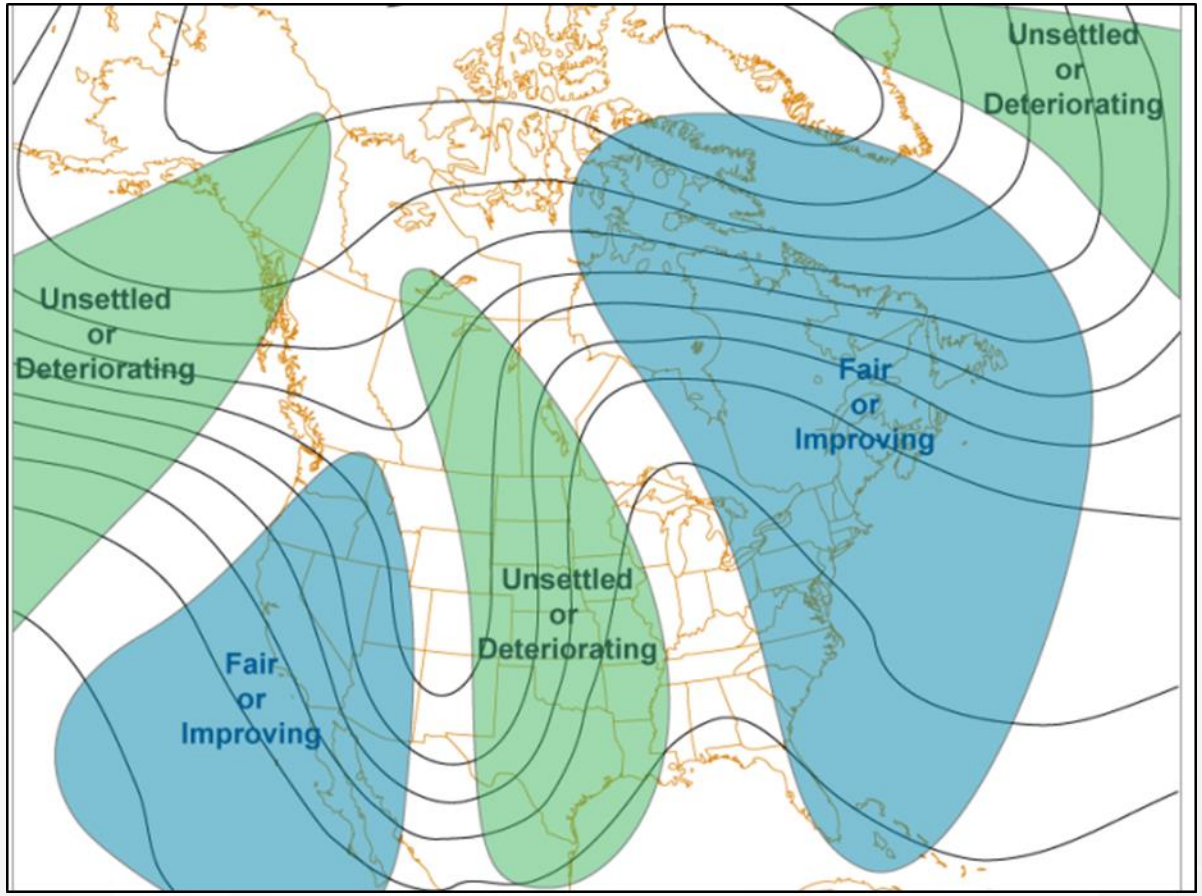
Front is stalled or marginally moves

Spacing Between Lines

- For surface chart, the plotting is every two mb. (1000 then 1002……)
- For upper air every two meter.
- Closer the lines indicate stronger wind speed.

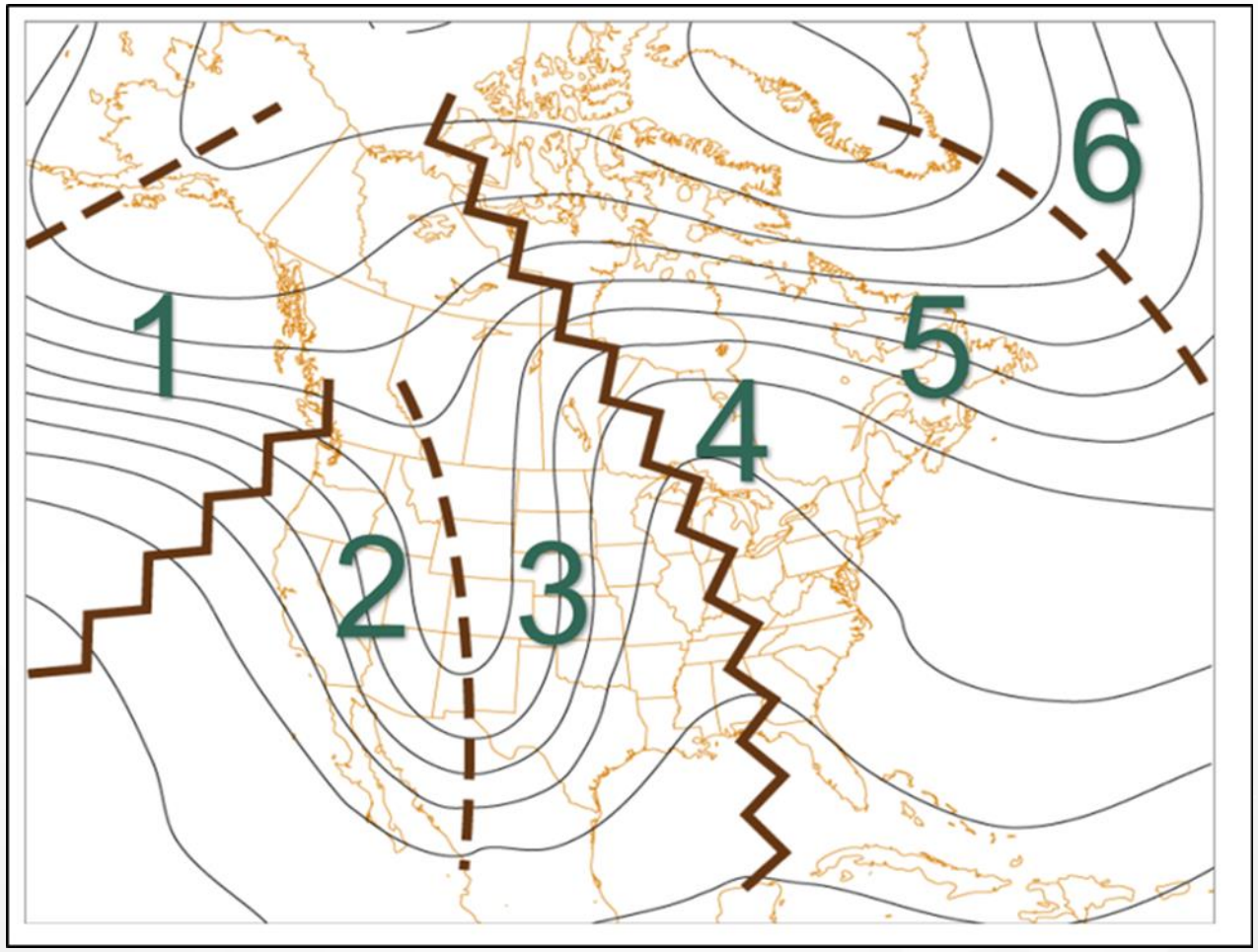
Test Your Knowledge

Greater wind speed ?

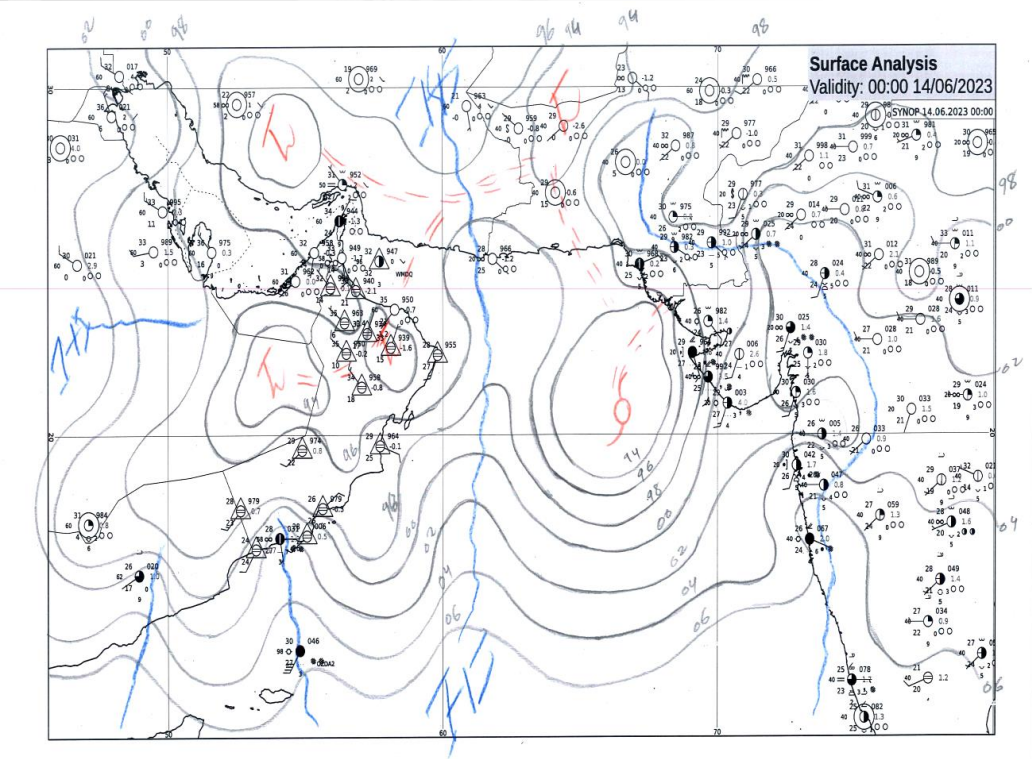


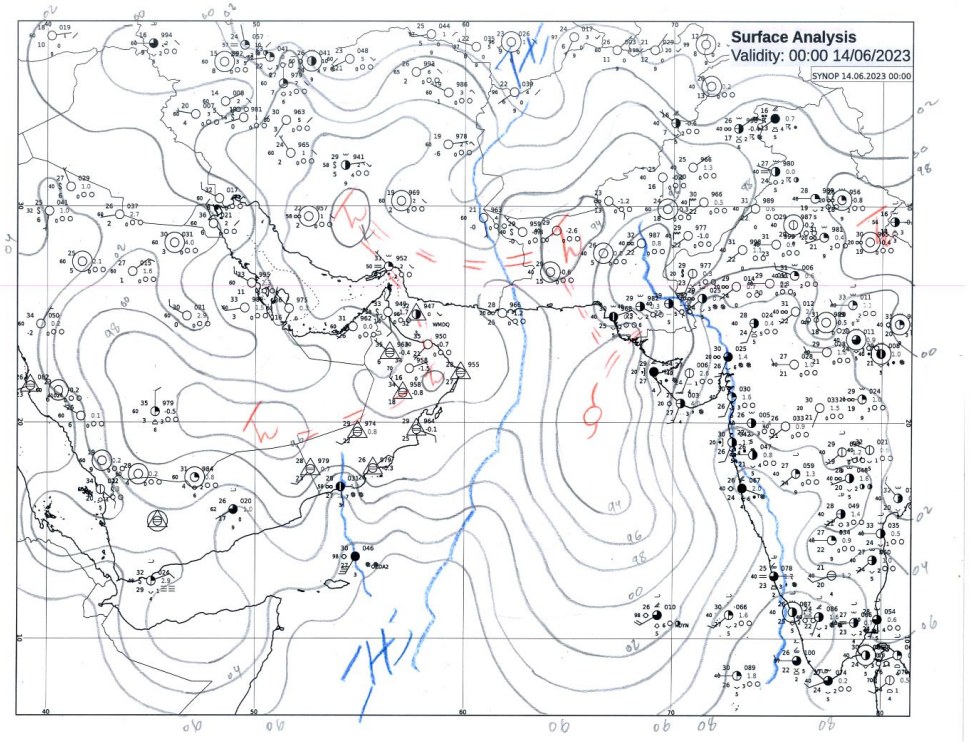
Test Your Knowledge

Area of active weather ?



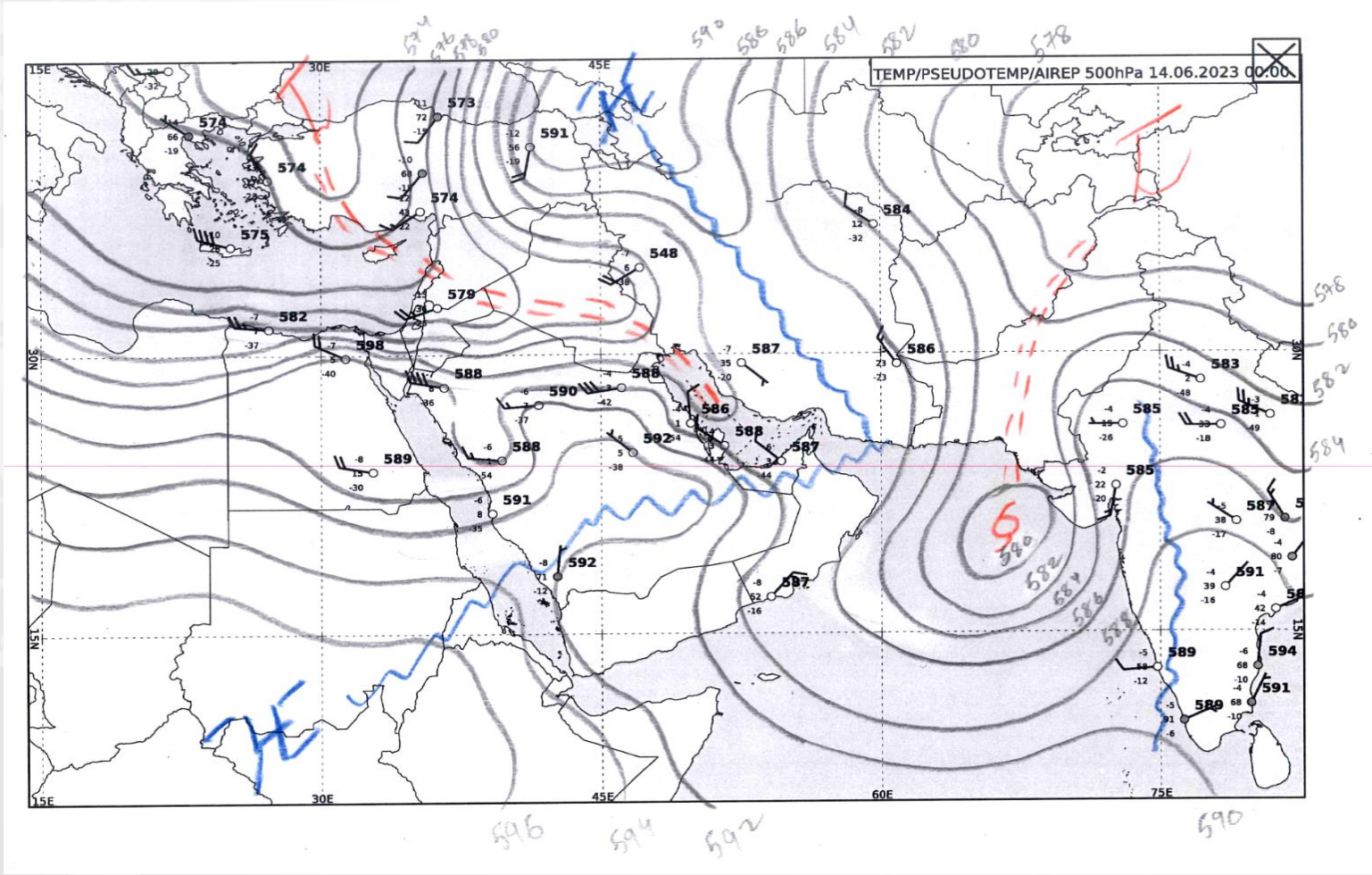
Surface Chart Analysis





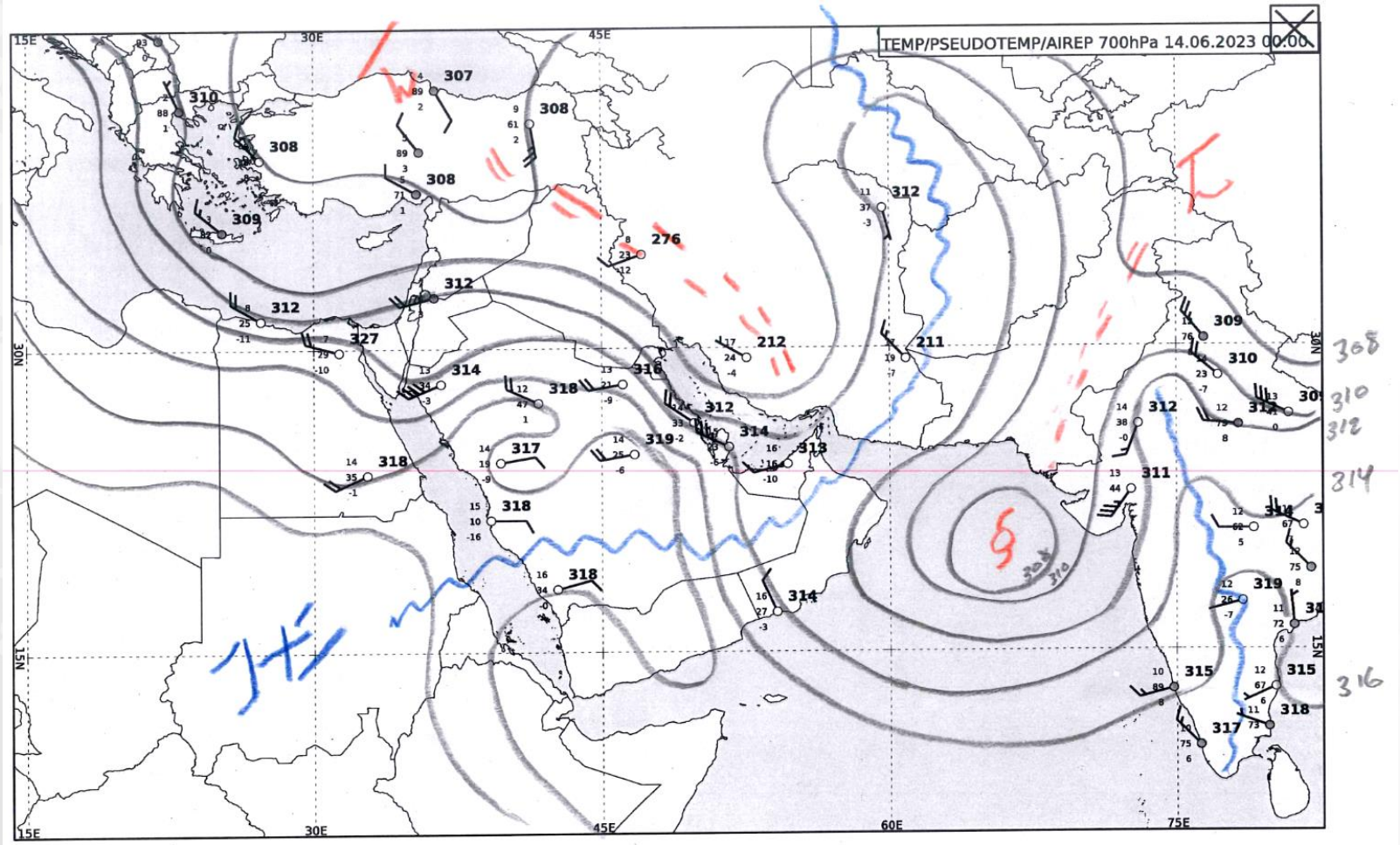
Upper Air Chart

500hpa



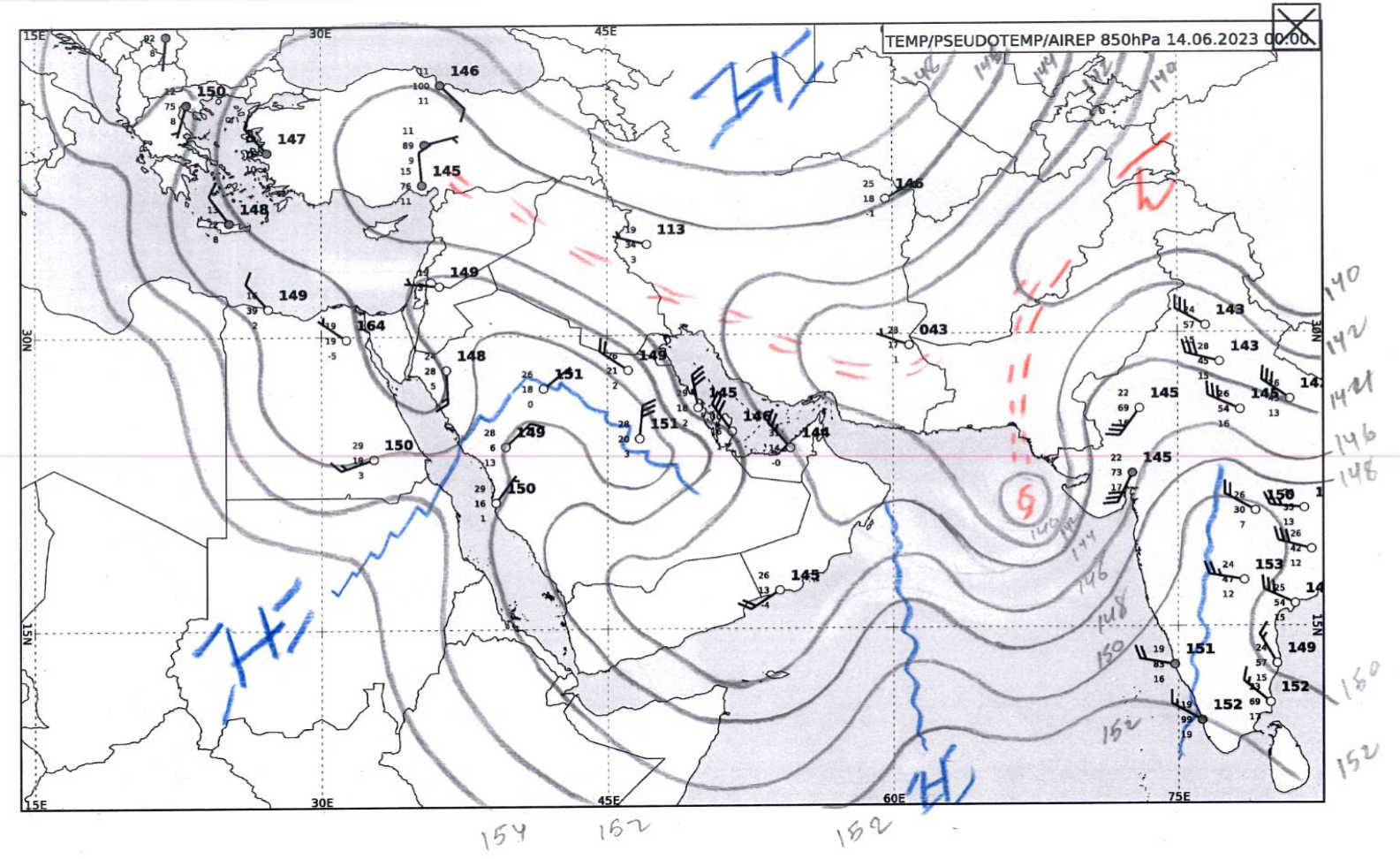
Upper Air Chart

700hpa



Upper Air Chart

850hpa



Thanks