

## **Lab No.4**

### **Determine Surface air fronts on weather maps**

#### **The aim:**

Determine the front on a weather map.

#### **Tools:**

Weather map of 850 mb pressure surface, colored pens (black, red, green, blue).

#### **Methodology:**

The surface front is a boundary between two air masses with different characteristics on the Earth's surface, it has the following characteristics:

1. Large horizontal thermal gradient.
2. A large decrease in the value of moisture horizontally.
3. A large horizontal gradient in wind speed.
4. Large vertical shear in horizontal wind.
5. The vorticity value is relatively high.
6. It is a convergence area for winds on the roof.
7. It is an area of clouds and precipitation.
8. The location of the front on the weather map suffers has clear changes in geopotential high contours and wind direction.

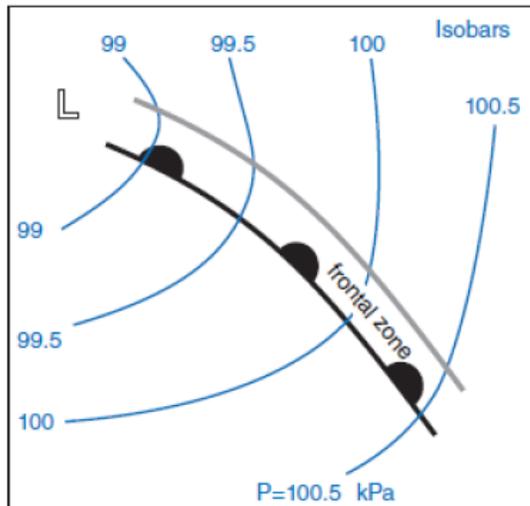
#### **Types of air fronts:**

1 - COLD FRONT: It is formed when a cold air mass rushes towards an area dominated by relatively warm air (below the upper TROUGH area).

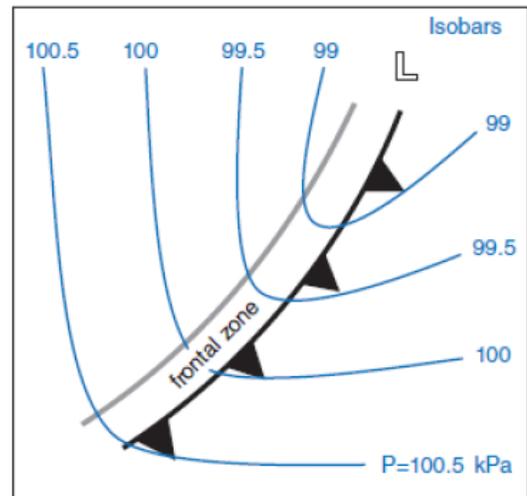
2 - WARM FRONT: It is formed when a warm air mass rushes towards an area dominated by cold air) below the upper RIDGE region.

### Method of determining front:

The location of a front can be determined by using isobar line map, where the lines in the cold front region suffer an angle of curvature approaching 90 degrees, as shown in the following figure:

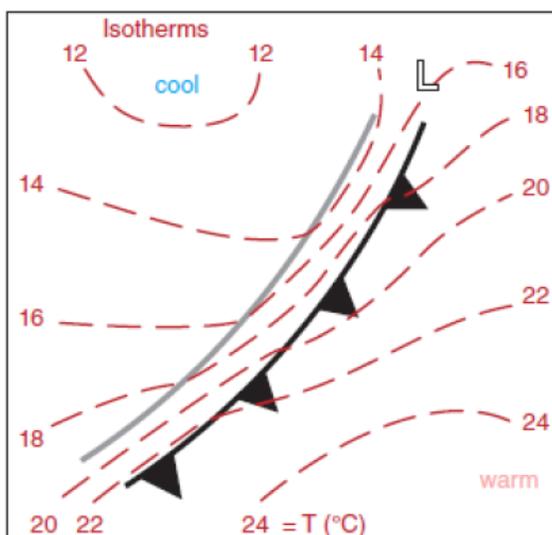


Warm front

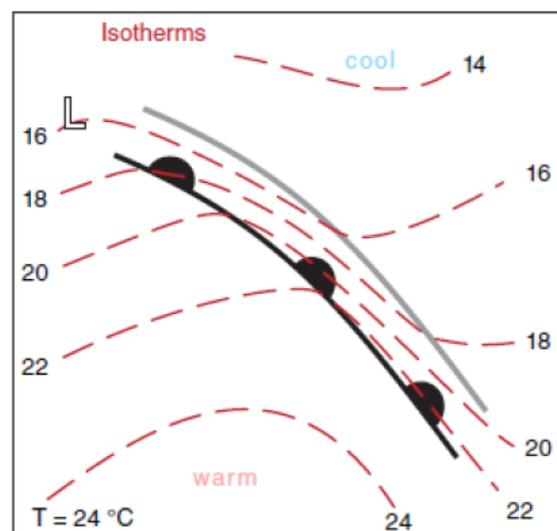


Cold front

Or by drawing isotherm lines and defining the thermal gradient area so that the front area is located between the colder region and the warmer region, as in the following figure:

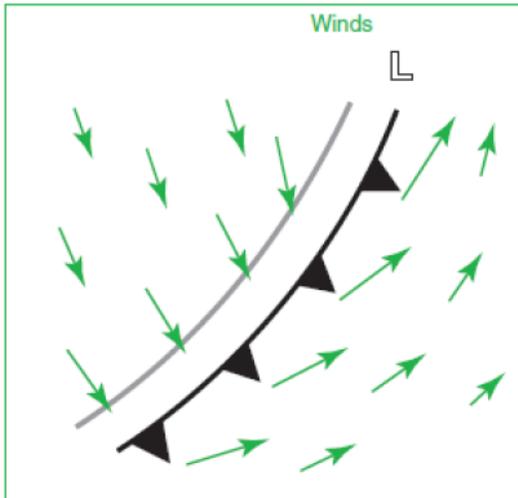


Cold front

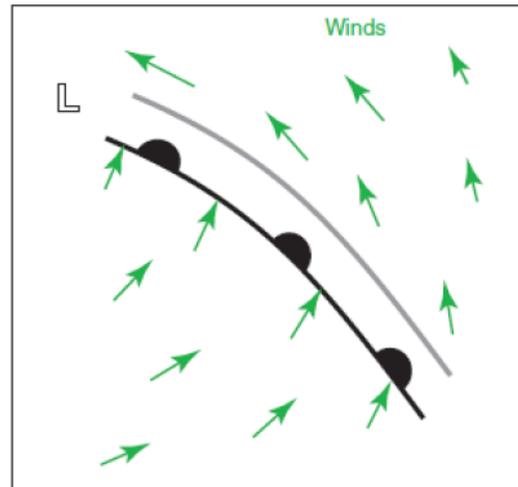


Warm front

The location of front can also be determined by the direction of the wind, where the wind direction suffering a sudden change on both sides of the front, as shown in the figure:



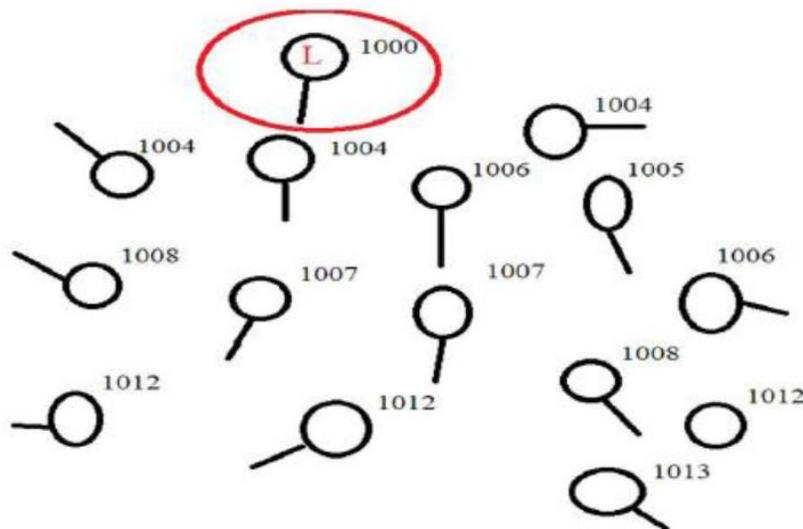
Cold front



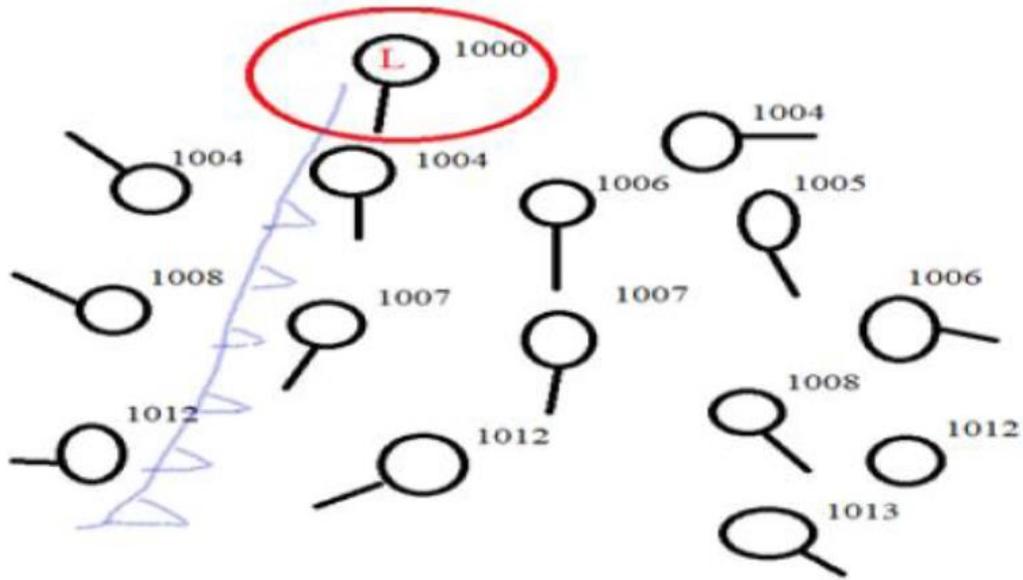
Warm front

### How to draw a front on the map?

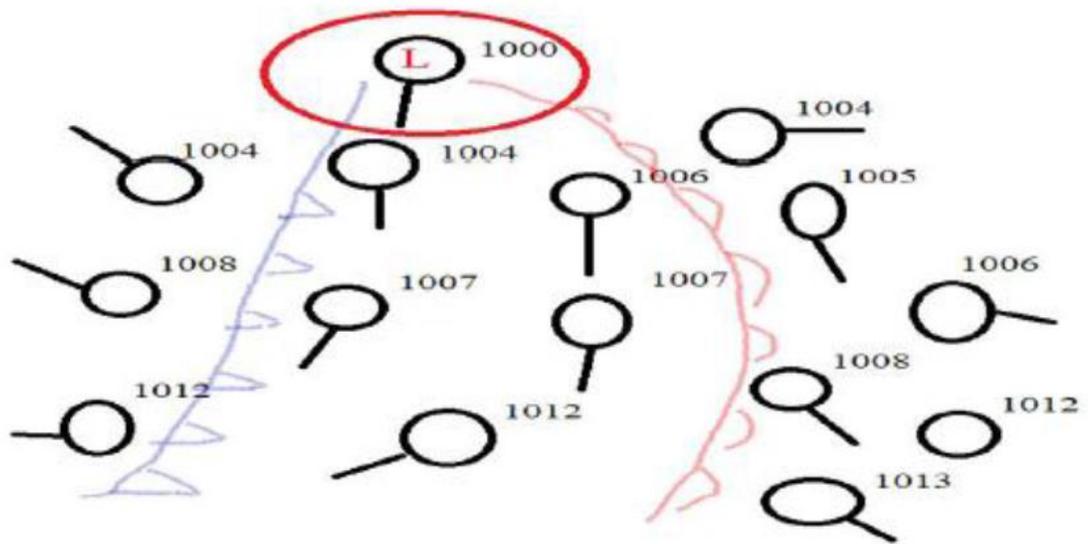
We use a surface map that contains stations that include values for pressure, temperature, speed and wind direction. The center of the depression is determined by identifying the station with the lowest pressure value and symbolized by the letter L.



drawing a cold front line in blue color with blue triangles on the advance of front, the front line starting from the center of depression, where this line separates the adjacent stations that different in temperatures and wind direction from north and northwest in the left side of the cold front line from the stations with high temperatures and wind direction from southwest to south, which located in the warm sector in the right side of the cold front line.



The warm front is determined by drawing a warm front line in red color with red semicircles on the advance of front, the front line starting from the center of depression separating adjacent stations on both sides of the front line with different temperatures, where the stations located to the left of the line it has high temperatures and wind direction is southwest to the south in the warm sector, from the stations with colder temperatures which located to the right of warm front line, where the winds direction is southeast to east.



**The practical part:**

- 1 - Draw geopotential height contours on weather map of 850mb surface pressure.
- 2 - Mark the wind directions in different colors.
- 3 - Try to determine the front on the map using the techniques above.