Quadrant II – Transcript and Related Materials

Programme: Bachelor of Arts (Third Year)

Subject: Geography

Course Code: GEC 106

Course Title: Climatology and Oceanography

Unit No.: 1, Atmospheric Circulation

Module Name: Planetary Pressure System

Name of the Presenter: Ms. Sunayana Haldankar

Notes

Introduction

Atmospheric Pressure or the Air Pressure can be defined as force exerted in all directions by virtue of the air weight which comprises of air, water vapour and other aerosols. Air pressure is measured by barometer and is its unit of measurement is millibars. Pressure is represented on map with the help of isobars. Isobars are the lines joining places having equal air pressure. The atmospheric temperature leads for variation in density as well as pressure. In simple words air pressure is inversely proportional to the temperature.

The distribution of pressure is not uniform on the earth surface.

Air pressure varies vertically, horizontally, seasonally and diurnally.

High pressure is observed near surface and pressure decreases at upper levels with increasing altitude.

Horizontal Distribution also termed as Global Pressure Distribution is the variation of air pressure across the latitudes.

In all there are Seven Alternating Low and High Pressure Belts.

They are:

1. Equatorial Trough of Low Pressure
2. Subtropical High Pressure Belt (N. Hemisphere)
3. Sub-tropical High Pressure Belt (S. Hemisphere)
4. Sub-polar Low Pressure Belt (N. Hemisphere)
5. Sub-polar Low Pressure Belt (S. Hemisphere)
6. Polar High Pressure Belt (N. Hemisphere)
7. Polar High Pressure Belt (S. Hemisphere)

- **Equatorial Low Pressure Belt or Doldrum:** This pressure belt is Thermally induced. It lies between 5°N to 5°S latitudes and is characterized by extreme low pressure with calm conditions. This is the zone of convergence of north-east & south-east trade winds and hence called Inter Tropical Convergence Zone (ITCZ).
- **Sub-tropical High Pressure Belt or also called as Horse Latitudes:** This belt is dynamically induced. It extends approximately between 25° - 35° N & S Latitude. Is characterized by anti-cyclonic conditions. The air descends along this belt which is drier, heavier and denser. It is called "Horse Latitude" because of the prevalence of frequent calms. This zone of high pressure is not a continuous belt but is broken into a number of high pressure centres or cells.
- **Sub-polar Low Pressure Belt:** This belt is also dynamically induced and is located approximately between 55° - 65° latitudes in both the hemispheres. More developed and regular in both the hemispheres. Also called as Frontal Zone.
- **Polar High Pressure Belt:** Persist at the poles throughout the year. However their strengths varies depending on apparent movement of the sun. Both, thermal and dynamic factors operate at the poles.

Seasonal distribution of pressure, also called as Annual Pressure variation

It is related to the changes in pressure system especially during summer and winter season. The variation of pressure from place to place and from season to season over the earth plays an important role in affecting the weather and climate.Tropical and sub-tropical areas record largest seasonal variation due to extreme weather conditions.

In January, with the south-ward apparent movement of the Sun, the equatorial low pressure belt shifts a little south of the mean equatorial position. Thus low pressure is formed over South America, Southern Africa and Australia.

In July, the equatorial low pressure belt shifts a little north of the mean equatorial position creating low pressure over the continent of Asia.

Diurnal distribution of pressure is hourly or day today changes in the atmospheric pressure and are common due to occurrence of atmospheric storms. During the day time air gets heated over land and rise creating low pressure. In the upper reaches of the atmosphere the warm air cools and starts descending creating high pressure over sea. Thus the sea breeze blows from water (high pressure) towards land (low pressure). During night time land has high pressure while the sea has comparatively low pressure area. Gentle wind begins to blow from land (high pressure) towards sea (low pressure) as land breeze.

All the above distribution patterns of air pressure are controlled by various factors. Such that

- ✓ Thermal Factors: When air is heated, it expands and, hence, its density decreases, leading to the formation of low pressure. On the contrary, cooling results in contraction, its density increases thus leads to high pressure formation.
- ✓ Dynamic Factors: Apart from variations of temperature, the formation of pressure belts could cause by dynamic factors arising out of pressure gradient forces and rotation of the earth (Coriolis force).
- ✓ Latitudes: Air pressure becomes more and more as one moves away from equator towards poles.

- ✓ Altitude: Air pressure decreases with increase in height. Lowest layer of the atmosphere comprises of dense air due to the gravity as well as compressibility of the air.
- ✓ Convergence and Divergence: When the air converge, it becomes denser and heavier forming high pressure. On the contrary when the air diverge, it becomes low in density and hence low pressure.

Conclusion

- ✓ Atmospheric pressure as one of the weather conditions is controlled by temperature variation, differential heating, latitude, altitude and circulation of wind.
- ✓ As a weather element, pressure shows lot of spatio-temporal variations and set the air in motion as well as it affects the direction, velocity and intensity of wind.
- ✓ Taking the average conditions of both weather and climate and their shifting characters the pressure belts on the earth are divided into seven broad belts which are relatively consistent and bring in global level change in the characteristics of atmospheric aspects.