

UPSC Civil Services Examination

UPSC Notes [GS-I]

Topic: General Circulation of the Atmosphere [Geography Notes for UPSC]

The pattern of the movement of the planetary winds is called general circulation of the atmosphere.

Factors for General Circulation of the Atmosphere

- The pattern of planetary winds largely depends on:
 - Latitudinal variation of atmospheric heating
 - The emergence of pressure belts
 - The migration of belts following the apparent path of the sun
 - The distribution of continents and oceans
 - The rotation of the earth
- The general circulation of the atmosphere also sets in motion the marine water circulation which affects the climate of the Earth.
- The air at the ITCZ (Inter Tropical Convergence Zone) upsurges because of convection caused by high insolation and low pressure is generated.
- The winds from the tropics join at this low-pressure zone.
- The joined air upsurges along with the convective cell.
- It reaches the top of the troposphere up to an altitude of 14 km.
- It further moves toward the poles. This causes accumulation of air at about 30° North and South.
- Another reason for sinking is the cooling of air when it reaches 30 degrees North and South latitudes.
- Downward near the land surface, the air flows towards the equator as the easterlies.
- The easterlies from either side of the equator converge in the Inter-Tropical Convergence Zone (ITCZ).
- Such circulations from the surface up and *vice-versa* are called cells.
- This type of a cell in the tropics is called *Hadley Cell*.
- In the mid-latitudes, the circulation is that of dipping cold air that comes from the poles and the mounting warm air that blows from the subtropical high.
- At the surface, these winds are called westerlies and the cell is known as the *Ferrel cell*.
- At polar latitudes, the cold dense air subsides near the poles and blows towards middle latitudes as the polar easterlies. This cell is called the *polar cell*.

- These Ferrel cells, Hadley Cell, and polar cell set the configuration for the general circulation of the atmosphere.

General Atmospheric Circulation and its Effects on Oceans

- The general circulation of the atmosphere also influences the oceans.
- Warming and cooling of the Pacific Ocean is most significant in terms of general atmospheric circulation.
- The warm water of the central Pacific Ocean gradually drifts towards the South American coast and substitutes the cool Peruvian current.
- Such presence of warm water off the coast of Peru is known as the El Nino.
- The El Nino is associated with the pressure variations in Australia and Central Pacific.
- This variation in pressure condition over the Pacific is known as the southern oscillation.
- The combined phenomenon of El Nino and southern oscillation is known as ENSO.

