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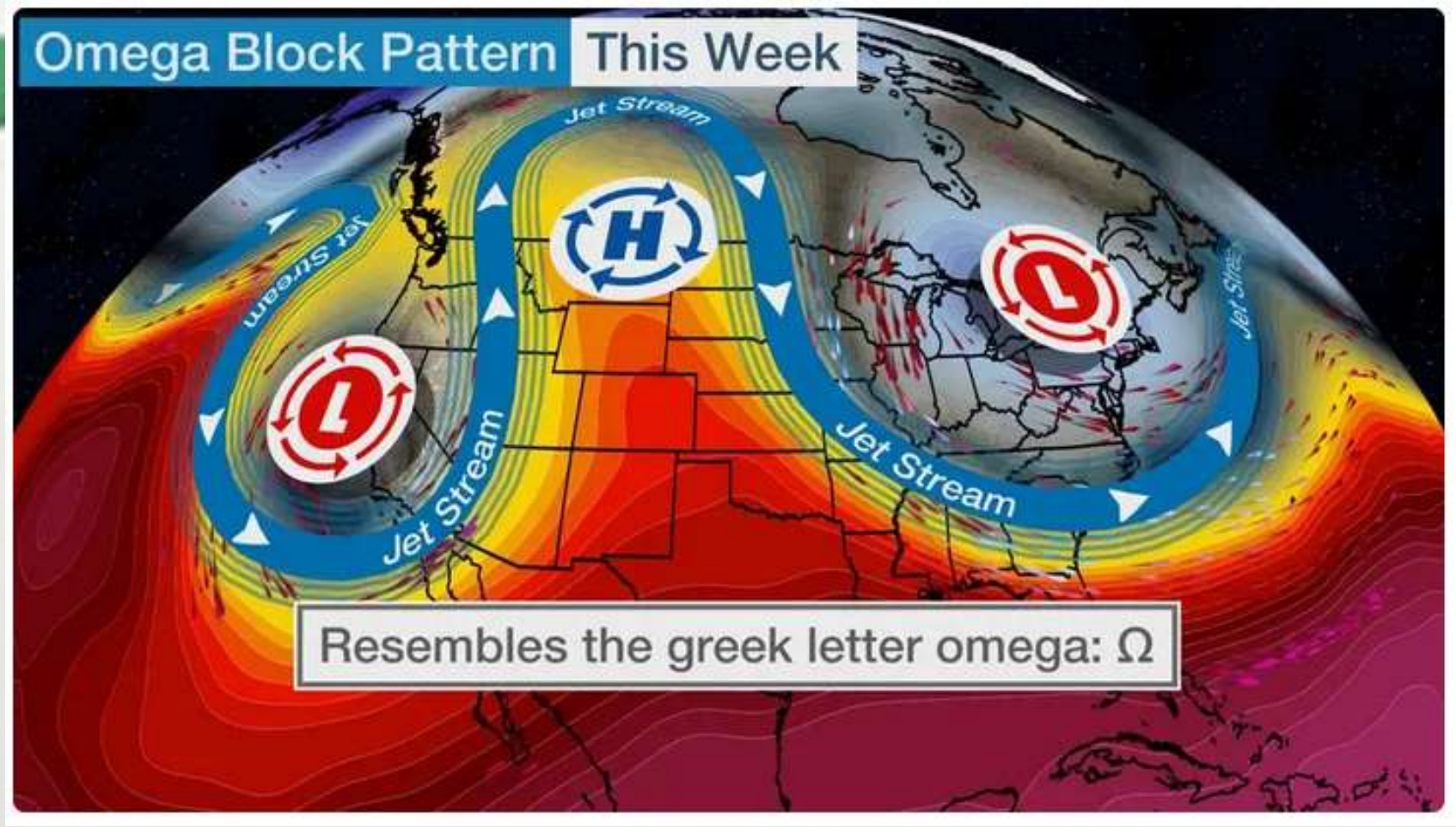
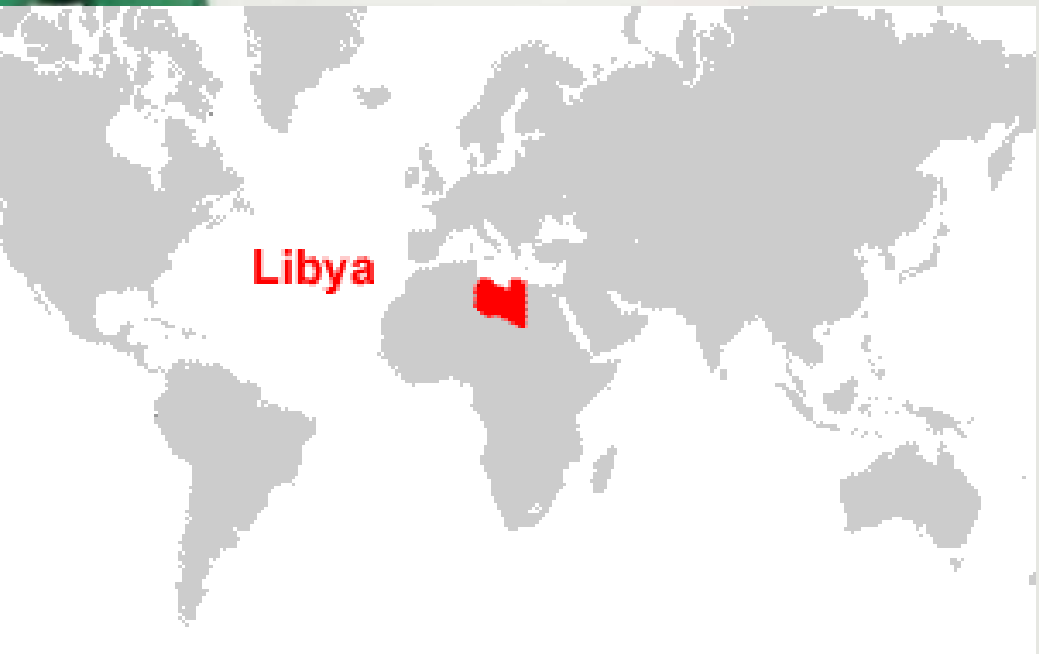
OMEGA BLOCKING

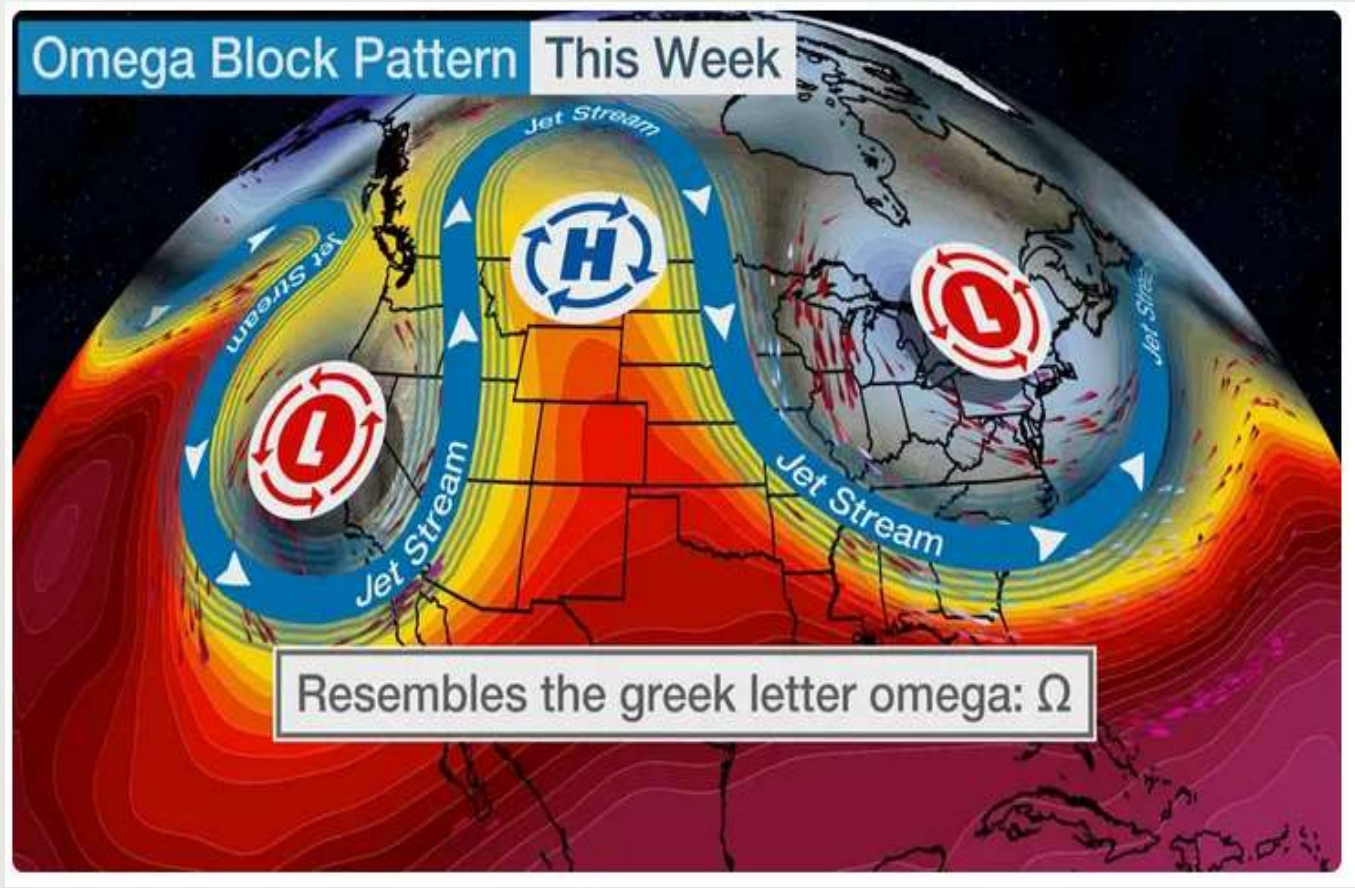


- According to a study, floods in the Mediterranean regions were caused by low-pressure systems forming around an Omega Block centred over the Netherlands.

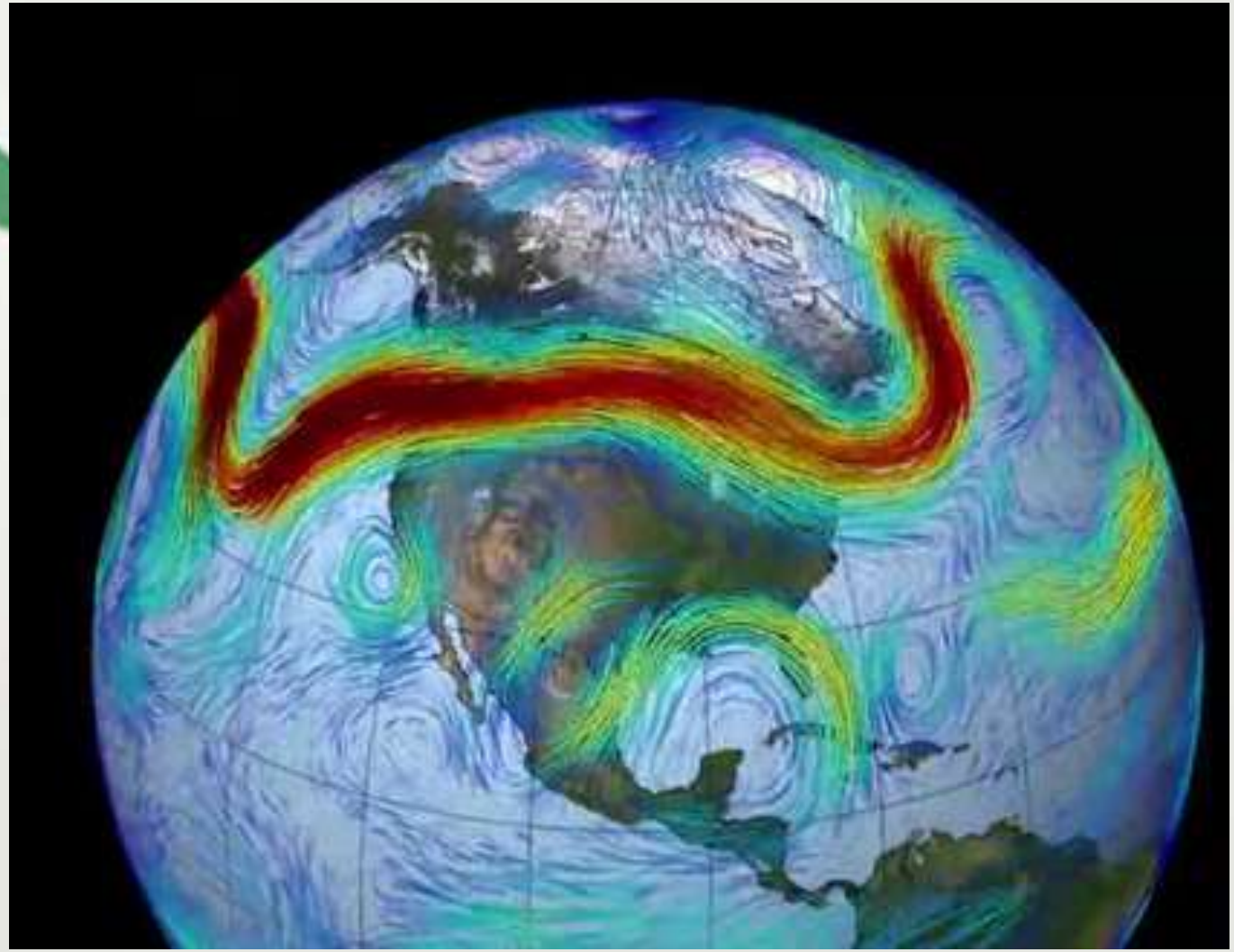


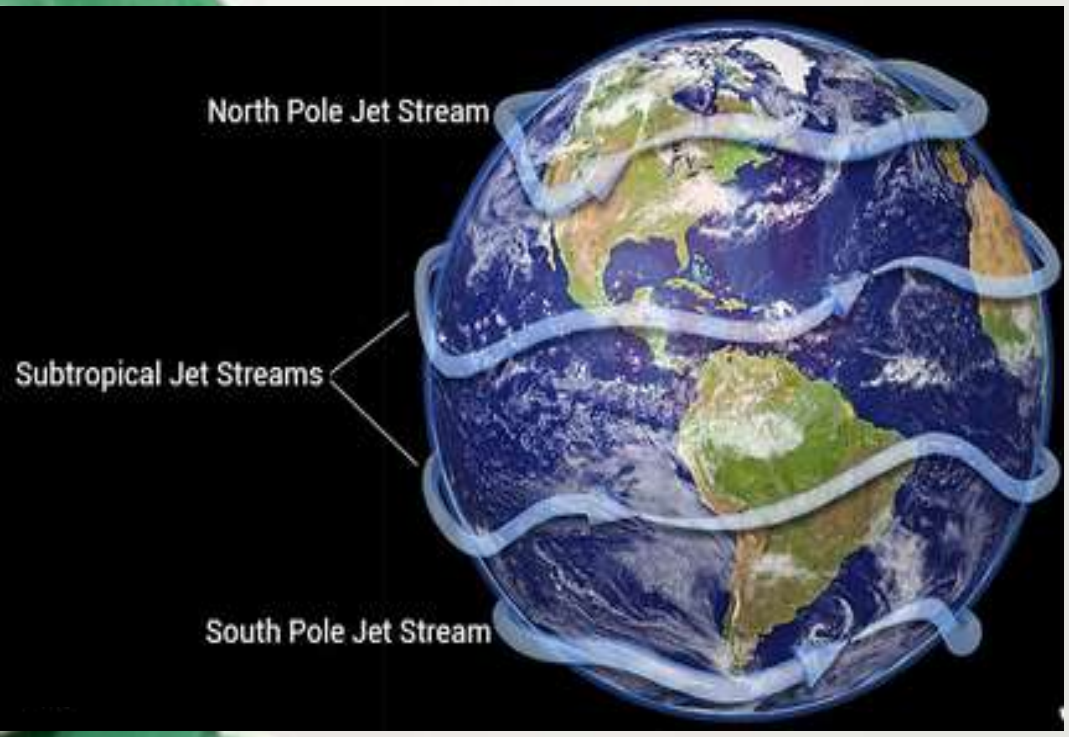
- Also devastating floods in Libya were attributed to the occurrence of an Omega atmospheric blocking event.

- Omega block occurs when two low-pressure systems become cut off because of jet stream, sandwiching a high-pressure system between them.
- It resembles the Greek letter Ω on a weather map.
- It can cause extreme weather events, such as heat waves, droughts, and floods, depending on the location and season.
- Western Europe's weather is largely governed by the jet stream.



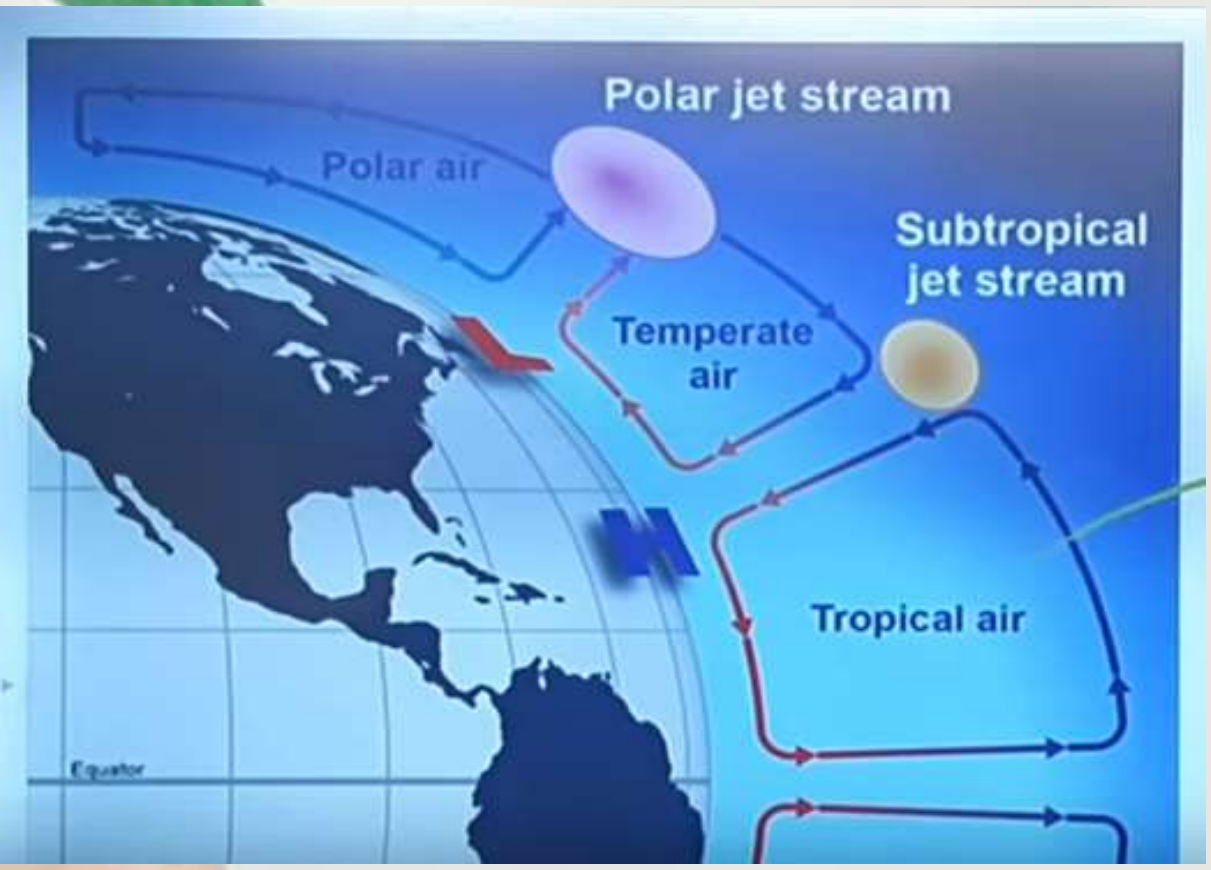
Jet stream





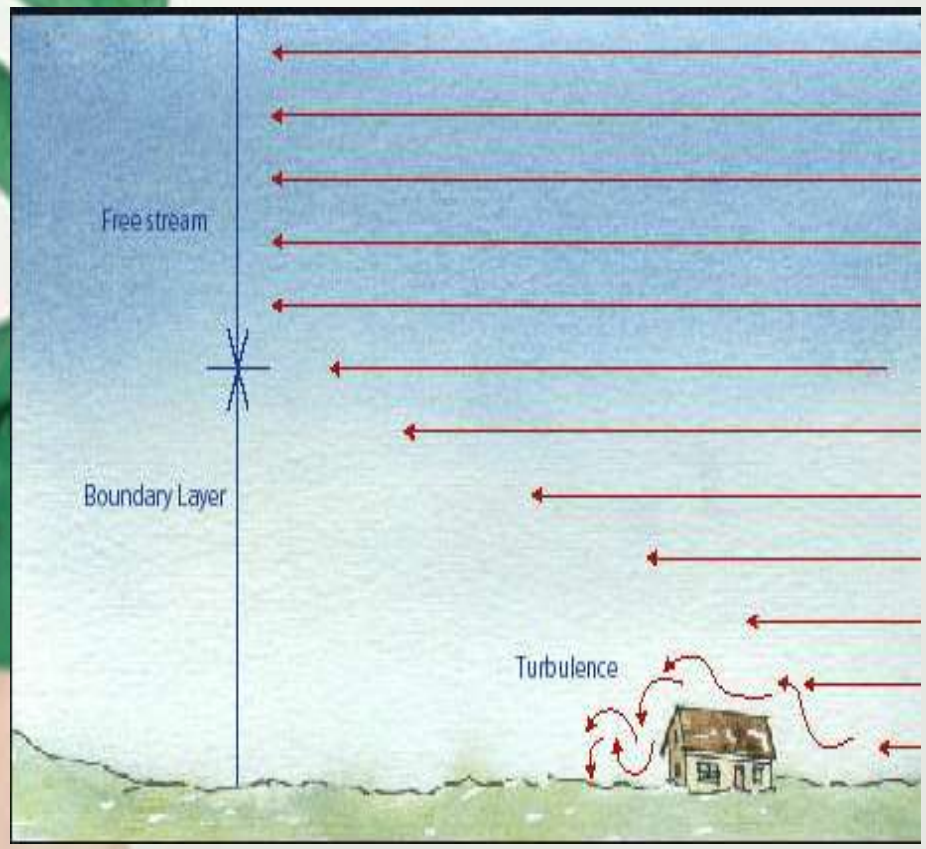
- **Jet streams are high-speed winds that occur in narrow bands of upper air westerlies.**
- **The width of this airband can be 160-480km wide and 900-2150 m thick,**
- **with core speed exceeding 300km/hr.**
- **such is their strength that aircraft routes which run counter to jet movements are generally avoided.**

Formation

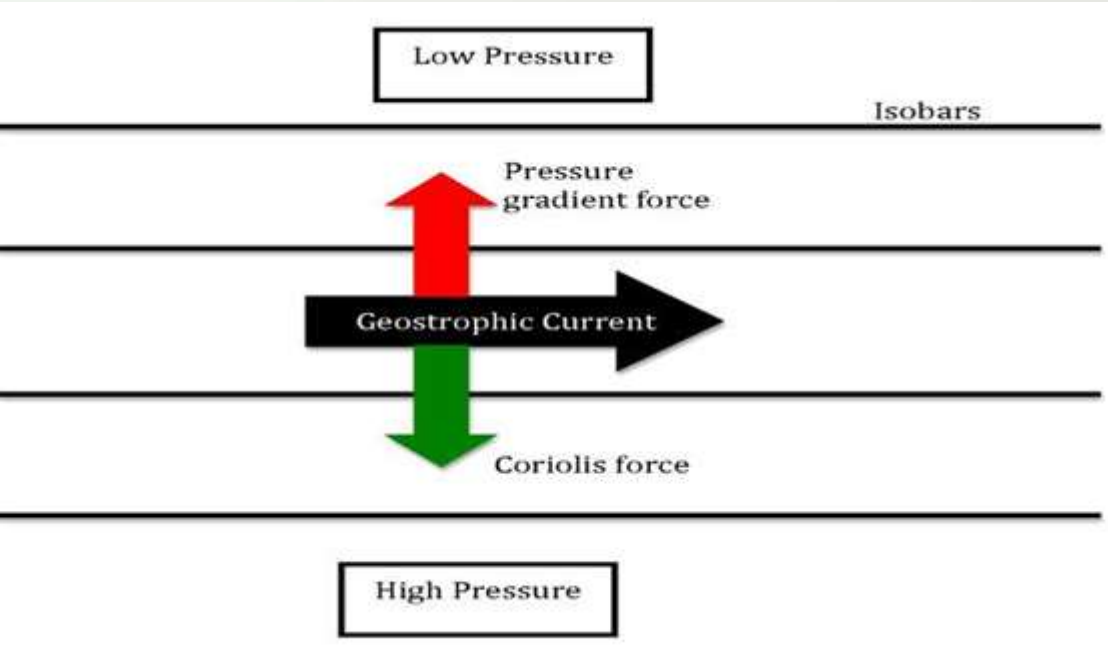


- Jet Streams develop where air masses of differing temperatures meet.
- Form when warm air masses meet cold air masses in atmosphere
- Greater the difference in temperature, faster is the wind velocity inside the jet stream.

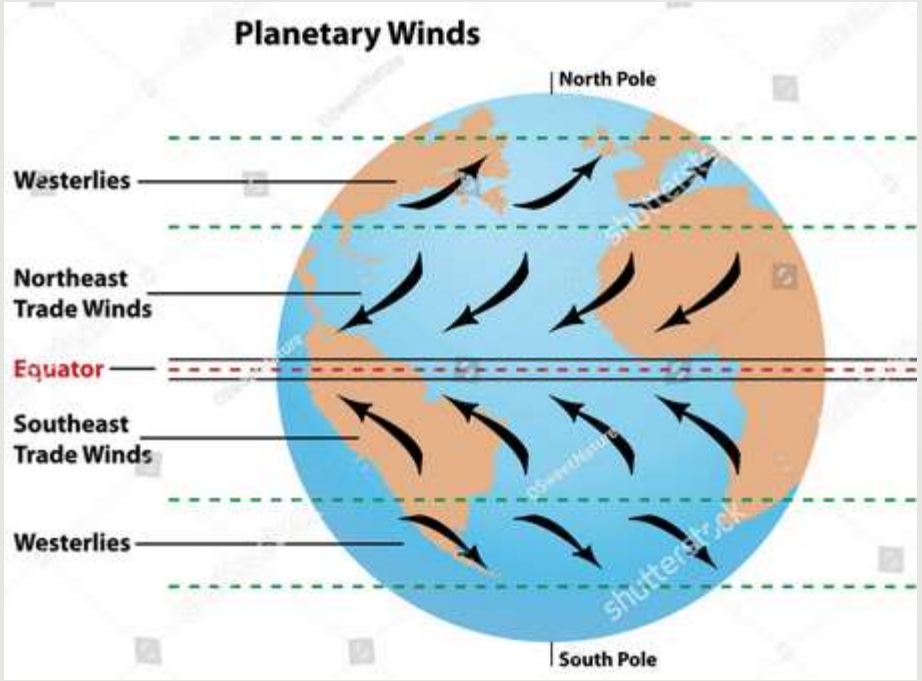
Frictional Force and Wind Movement



- The irregularities of the earth's surface offer resistance to the wind movement
- It affects the speed of the wind.
- The jet stream in the upper atmosphere, 2 – 3 km above the surface, are free from frictional effect of the surface
- Because friction is less - high speed exceeding 300km/hr.

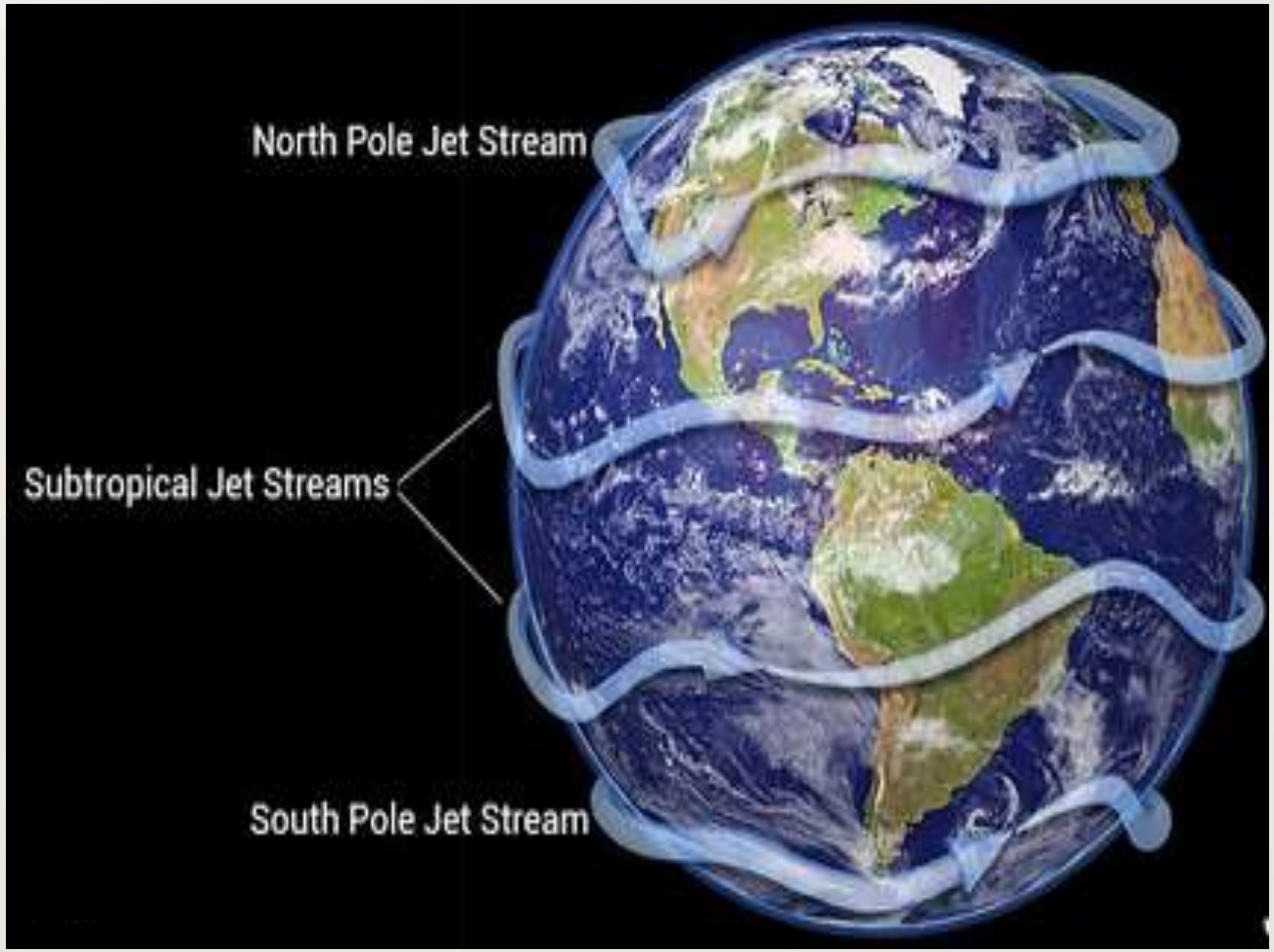


- Jet stream result from an **exact balance between the Coriolis force and the pressure gradient force.**
- So the **deflection is 90 degree**
- the **resultant wind blows parallel to the isobar.**



Jet streams are Circumpolar

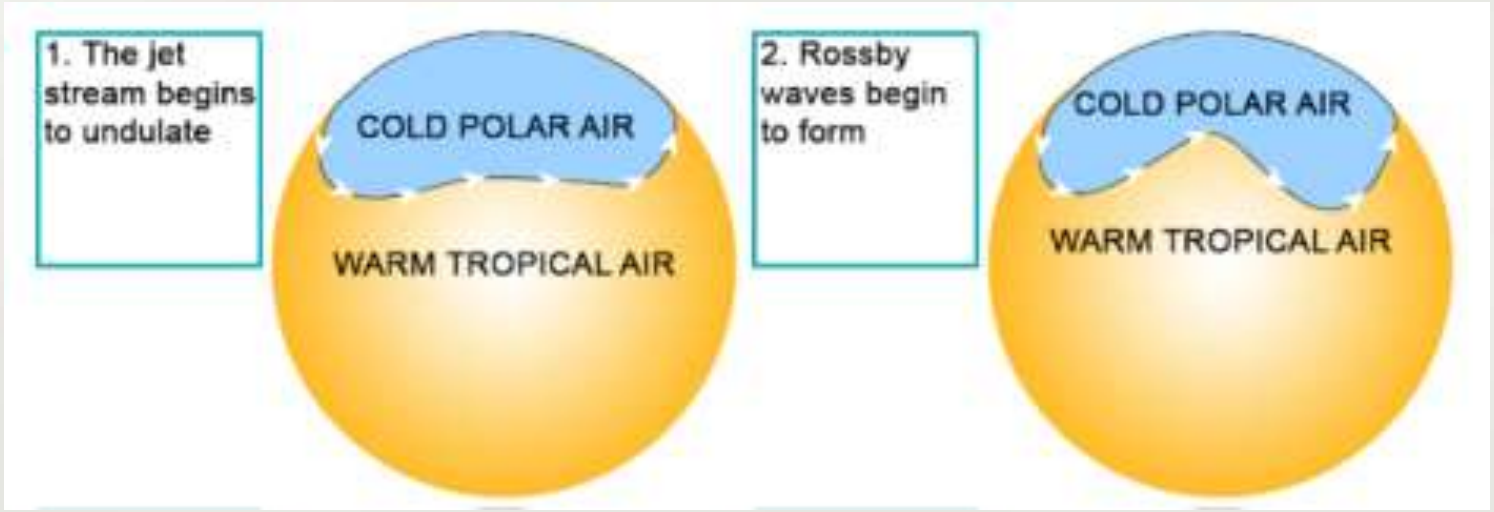
situated around or inhabiting around one of the **earth's poles**



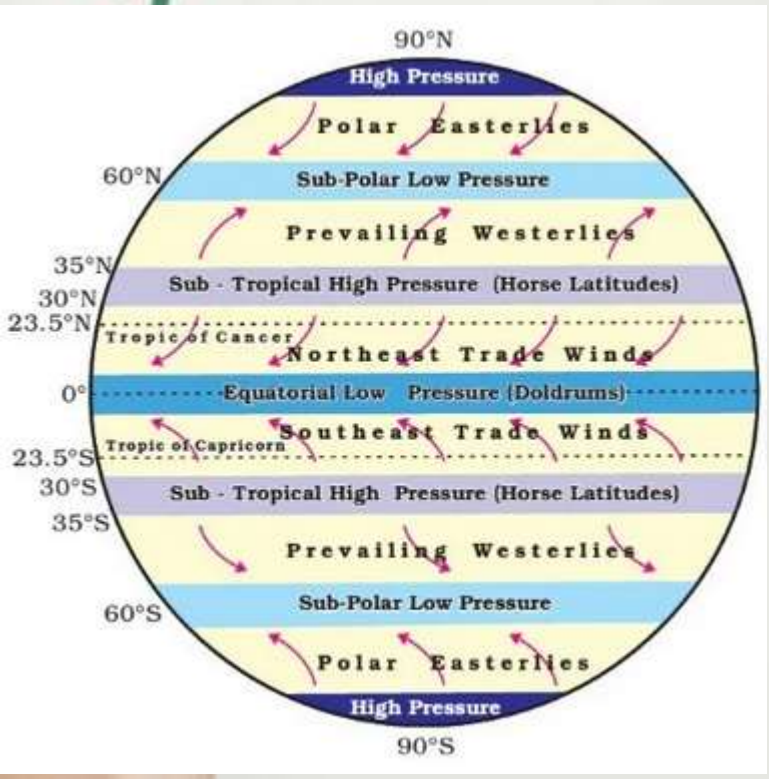
Index cycle of jet streams

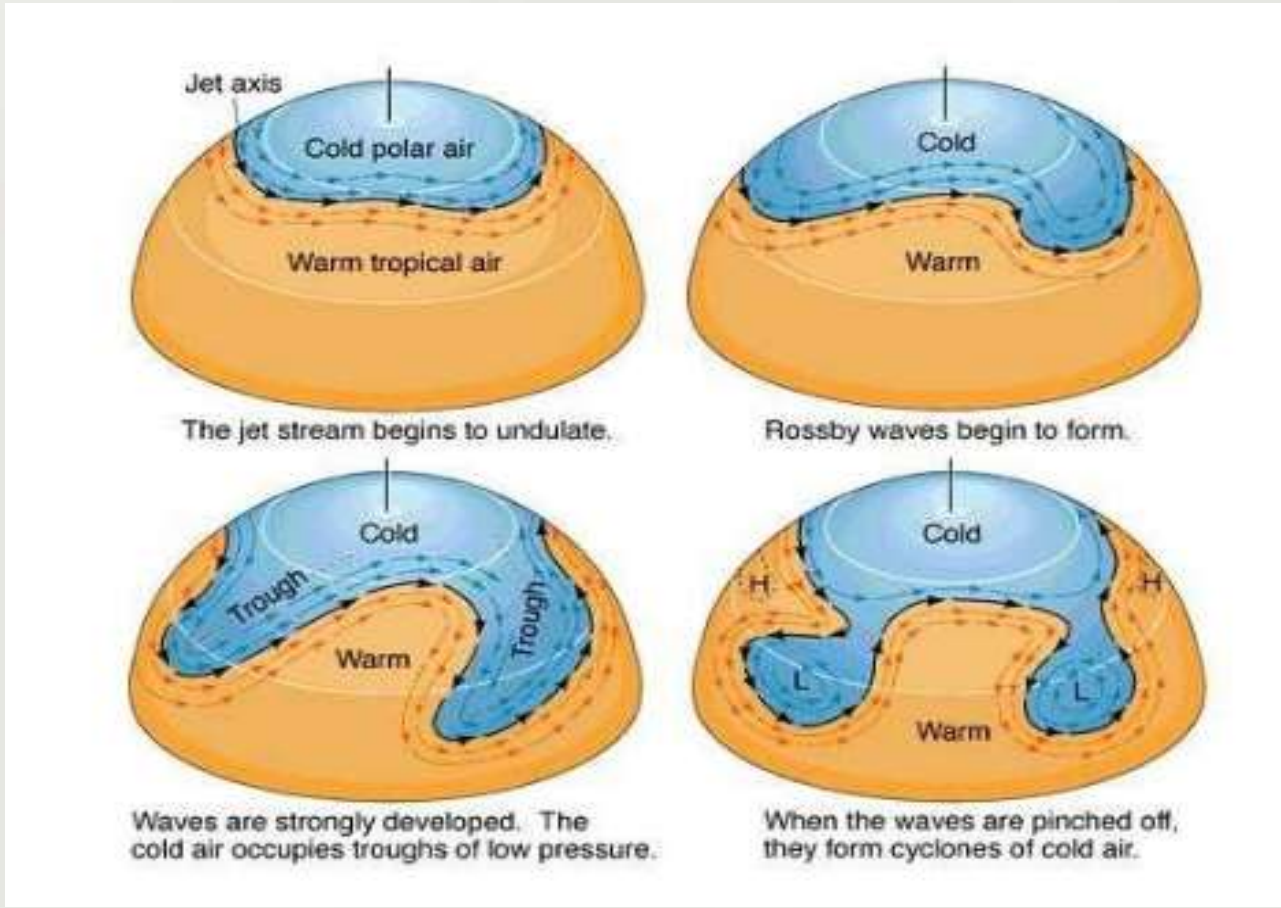
- **Stage 1-**
- **In sub polar low-pressure belt, the cold air from poles and warm air from subtropics converge along a horizontal line**

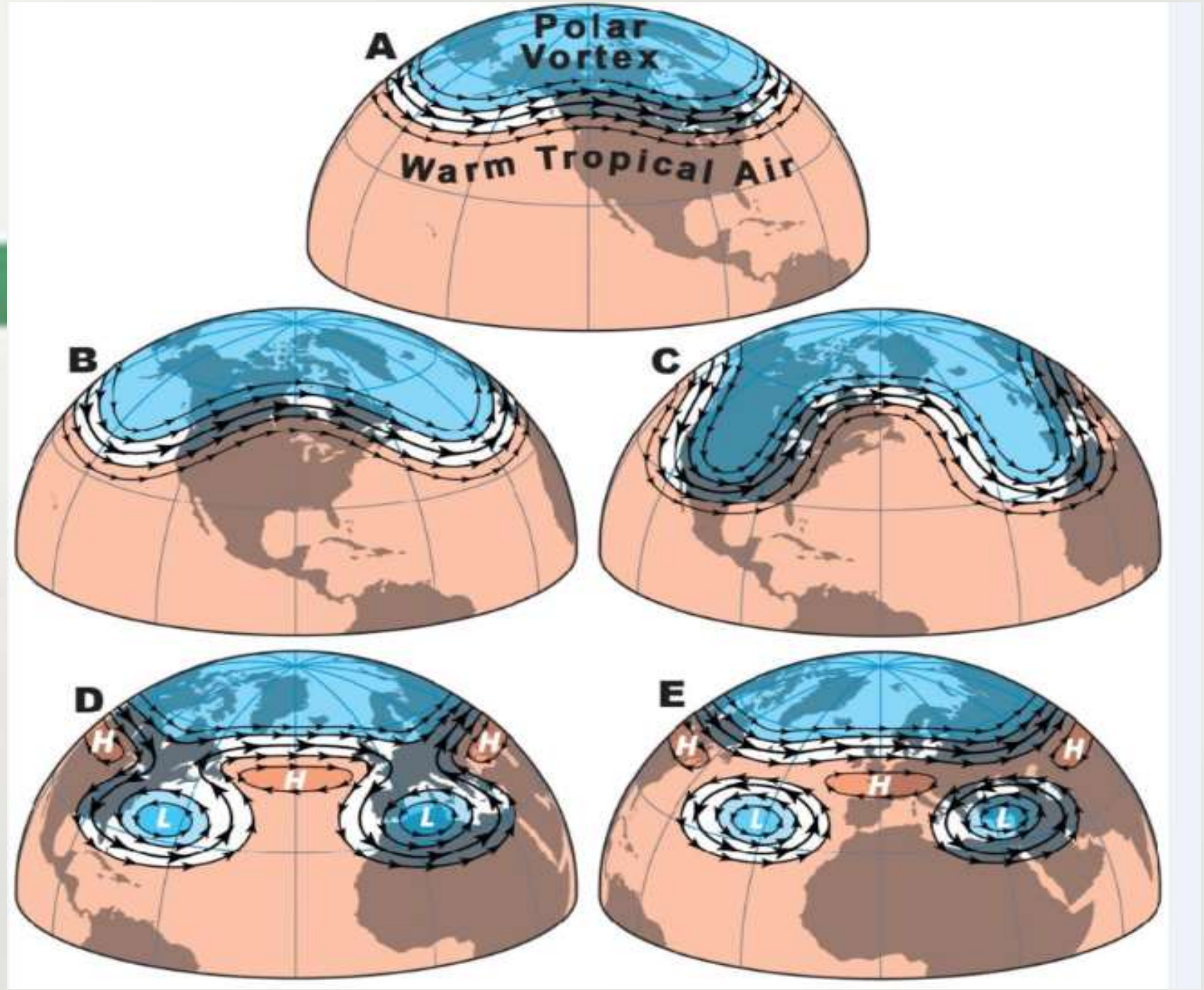
- **Due to the great thermal contrast and differences in the physical properties, they don't mix up.**



- **Stage 2-**
- **Cold polar air is pushed by the easterlies and warm air is pushed by westerlies.**
- **The stationary situation is transformed into an oscillating wave.**
- **These are known as Rossby waves**

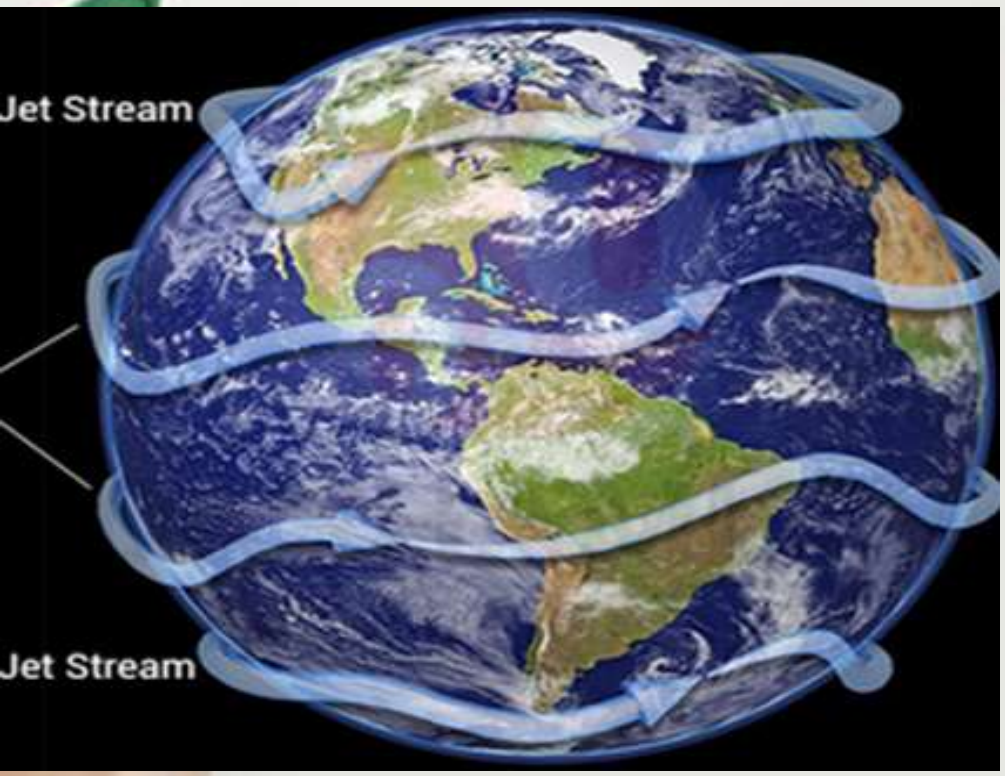


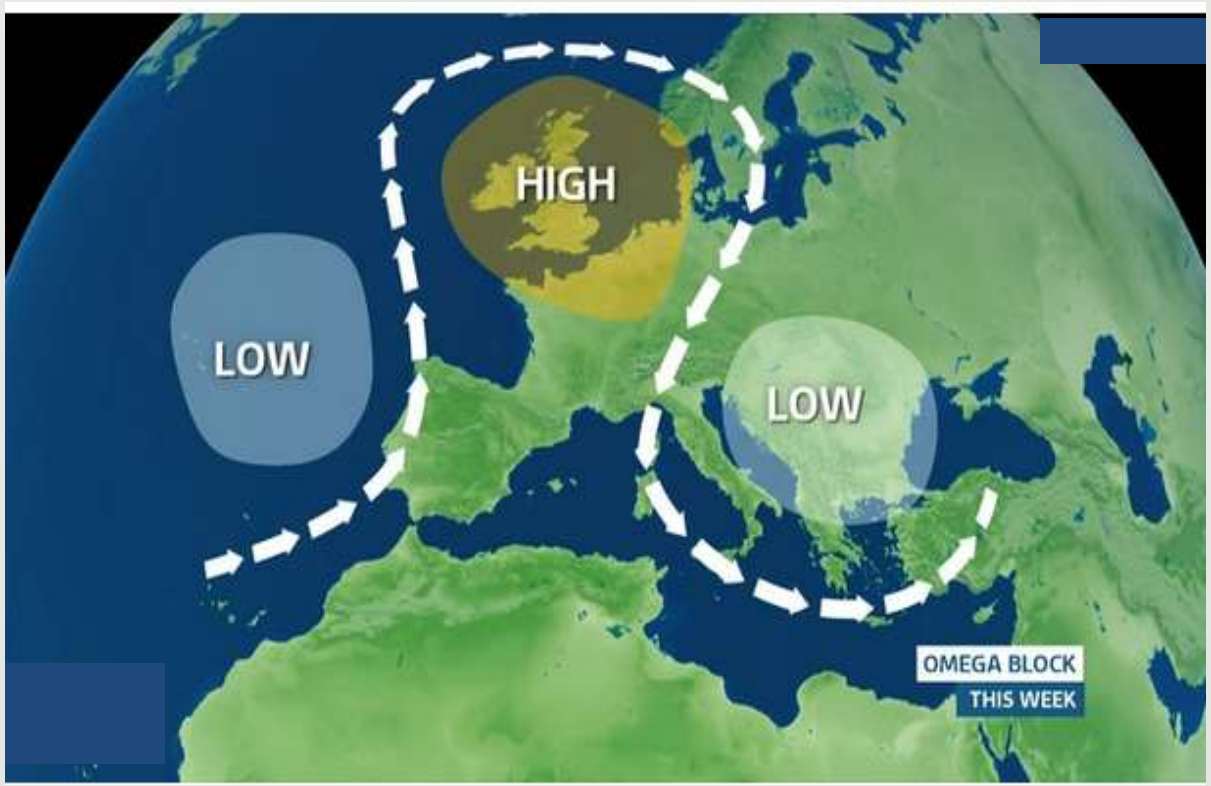


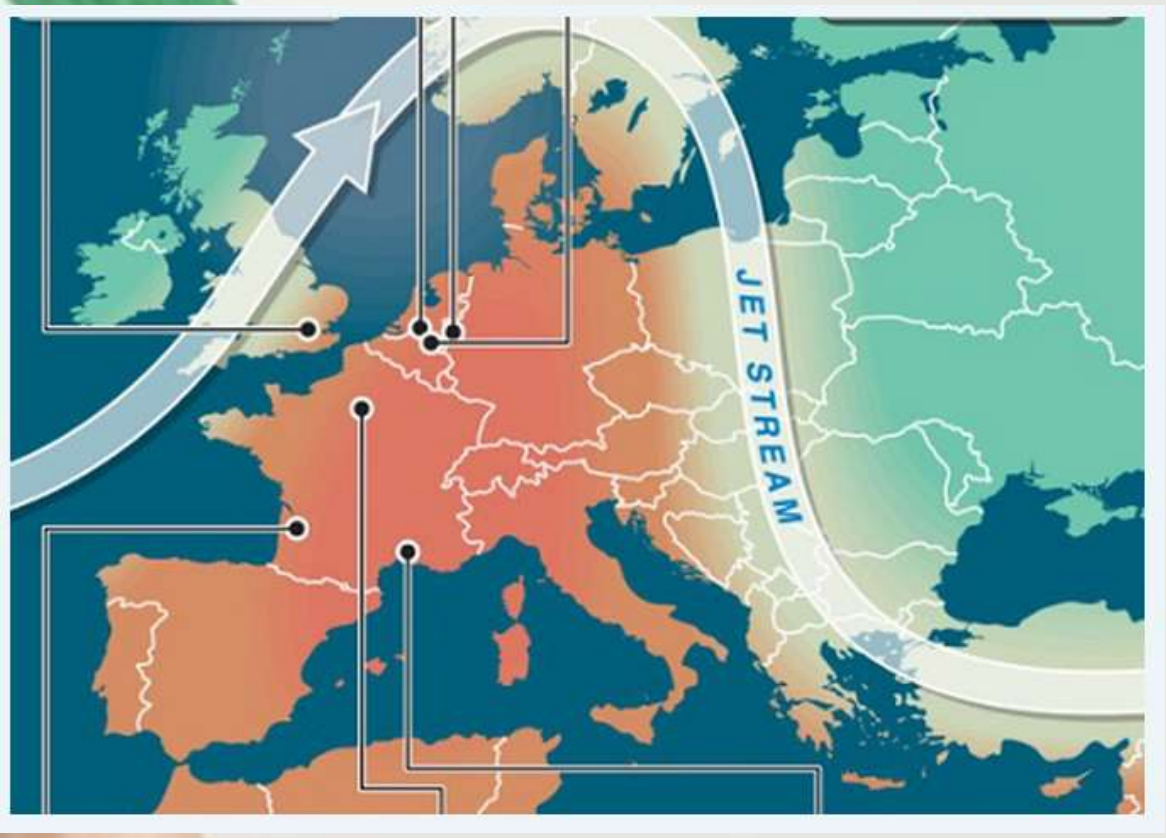

A
Polar
Vortex
Warm Tropical Air
B
C
D
H
H
H
L
L
E
H
H
H
L
L

- When an omega-shaped wave is present on the jet stream which arcs over Europe, warm dry air from southern Europe and Africa can be pulled north, pushing temperatures higher than normal.

- If this upper level feature coincides with high pressure at the surface with relatively low pressure to the east and west of an omega block is formed.







- Omega Blocking has been linked to past extreme weather events, including the
- Pakistan floods in 2011,
- extreme rainfall in northwestern Iran in 2008,
- heatwaves in France and Germany in 2019.
- 2019 heatwaves during May in France and July in Germany etc
- IN 2019, Belgium, Germany and the Netherlands have recorded their highest ever

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