Indian Monsoon-Underlying story

Indian Monsoon Onset and the Role of the Tropical Easterly Jet (TEJ)

1. Onset of the Indian Monsoon

The **Indian monsoon** is a seasonal reversal of winds caused by differential heating between land and ocean. It typically **onsets around June 1st over Kerala** and gradually spreads across India.

🔹 **Key Factors Driving Monsoon Onset:**

- **Intense heating of the Indian subcontinent** (May-June) creates a **low-pressure zone** over North India.
- **The Intertropical Convergence Zone (ITCZ)** shifts northward, drawing in moist air from the Indian Ocean.
- **High-pressure area in the southern Indian Ocean** (Mascarene High) strengthens the southwest monsoon winds.
- **The Tibetan Plateau heats up**, intensifying low pressure and pulling monsoon winds inland.
- **Upper atmosphere winds**, especially the **Tropical Easterly Jet (TEJ)**, play a crucial role.

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2. Role of the Tropical Easterly Jet (TEJ) in Monsoon Onset

The **Tropical Easterly Jet (TEJ)** is a strong easterly wind current at about **12–17 km altitude (near the tropopause)**, flowing from the **Tibetan Plateau to Africa** during the summer months.

🔹 **How TEJ Affects Monsoon Onset:**

✅ **Enhances Low Pressure Over India:**

- The TEJ strengthens the **upper-level divergence**, which helps in maintaining a strong low-pressure system over the Indian subcontinent.
- This intensifies **rising air currents**, pulling in more moisture-laden winds from the Indian Ocean.

✅ **Links to Tibetan Heating:**

- The **Tibetan Plateau acts as a heat source**, warming the upper troposphere.
- This strengthens the TEJ, indirectly boosting the monsoon circulation.

✅ **Suppresses Subtropical Westerly Jet (STWJ):**

- In winter, the **Subtropical Westerly Jet (STWJ)** dominates over India, preventing monsoon flow.
- As summer approaches, the TEJ replaces the STWJ, allowing monsoon winds to advance.

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3. TEJ and Monsoon Strength

- **Strong TEJ → Strong Monsoon** → Enhances low-pressure systems and leads to **good rainfall**.
- **Weak TEJ → Weak Monsoon** → Causes **delayed or deficient monsoon**, increasing the risk of drought.

✓ Conclusion

The **Tropical Easterly Jet (TEJ) is a critical factor in monsoon onset**, as it enhances low-pressure formation over India and ensures strong moisture transport. Any **weakening of TEJ** (due to climate change or global warming) can lead to **monsoon failure or droughts**.

~Flyingwizbee | On-mission