



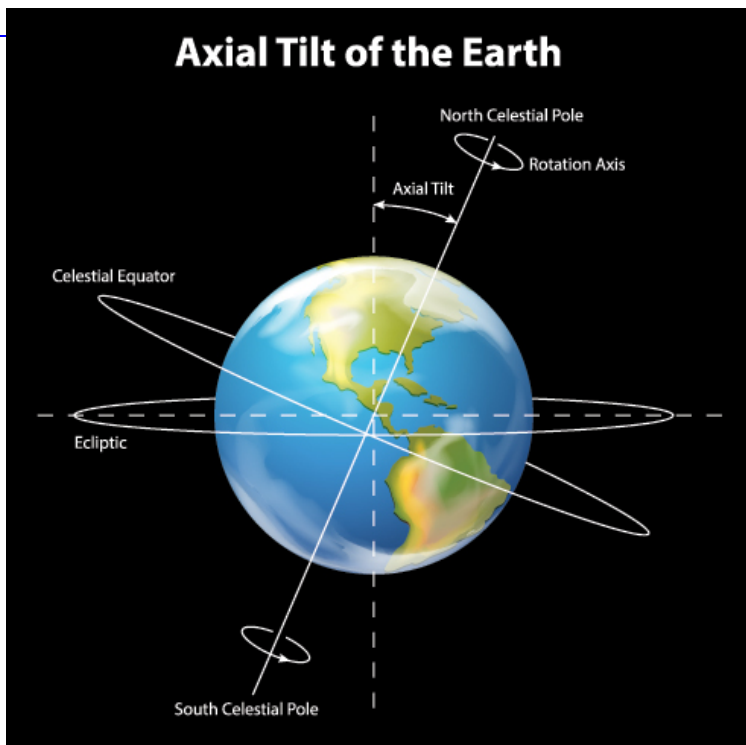
Climate Change Causing Shift in Earth's Axis

Why in News

A study published in Geophysical Research Letters of the American Geophysical Union (AGU) says that **due to the significant melting of glaciers** because of global temperature rise, **Earth's axis of rotation has been moving more than usual** since the 1990s.

- While this change is **not expected to affect daily life**, it can **change the length of the day by a few milliseconds**.

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Key Points

- **Earth's Axis of Rotation:**
 - It is the **line along which it spins around itself** as it revolves around the Sun.
 - **Earth's axial tilt** (also known as the obliquity of the ecliptic) is about **23.5 degrees**. Due to this axial tilt, the sun shines on different latitudes at different angles throughout the year. This **causes the seasons**.
 - The **points** on which the **axis intersects the planet's surface** are the **geographical north and south poles**.
 - The **location of the poles is not fixed**. The **axis moves** due to **changes in how**

the Earth's mass is distributed around the planet. Thus, the **poles move when the axis moves**, and the movement is called "**polar motion**".

- Generally, polar motion is **caused by** changes in the hydrosphere, atmosphere, oceans, or solid Earth. But now, climate change is adding to the degree with which the poles wander.
 - According to NASA, data from the **20th century** shows that the **spin axis drifted about 10 centimetres per year**. Meaning over a century, **polar motion exceeds 10 metres**.
- **Findings from the New Study:**

- Since the **1990s, climate change has caused billions of tonnes of glacial ice to melt** into oceans. This has **caused the Earth's poles to move in new directions**.
- The **north pole has shifted in a new eastward direction** since the 1990s, **because of changes in the hydrosphere** (meaning the way in which water is stored on Earth).
- From 1995 to 2020, the average speed of drift was **17 times faster** than from 1981 to 1995.
- Also, in the last four decades, the **poles moved by about 4 metres in distance**.
- The calculations were based on satellite data from **NASA's Gravity Recovery and Climate Experiment (GRACE) mission**.
- **Causes of Polar Drift:**

- **Ice Melting:**

- The faster ice melting under global warming was the most likely cause of the directional change of the polar drift in the 1990s.
- As glaciers melt, water mass redistributes, causing shifts in the planet's axis.

- **Change in Non-Glacial Regions (Terrestrial Water Storage):**

- Due to climate change and unsustainable consumption of groundwater for irrigation and other anthropogenic activities.

- **Groundwater Depletion:**

- As millions of tonnes of water from below the land is pumped out every year for drinking, industries or agriculture, most of it eventually joins the sea, thus redistributing the planet's mass.

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