Daily current affairs

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New method to forecast geostorms developed

- The storms are serious and **interfere** with a number of important technologies, **including GPS signalling and satellite communications.**
- Scientists say they have developed a new method for analysing the Earth's magnetic field data that could provide better short-term forecasting of geomagnetic storms.
- The Earth's magnetic field extends from pole to pole and is strongly affected by solar wind from the Sun, according to the research published in the journal Chaos.
- This "wind" is a stream of charged particles constantly ejected from the Sun's surface.

Solar Flares

- **Occasional sudden flashes of brightness** known as solar flares release even more particles into the wind, said researchers at Potsdam Institute for Climate Impact Research in Germany.
- Sometimes, the flares are followed by coronal mass **ejections that send plasma into space.**
- The resulting flux of charged particles travels millions of miles from the Sun to the Earth.
- The storms are serious and interfere with a number of important technologies, including GPS signalling and satellite communications.
- **They can also cause damage to surface electrical grids.**
- Solar activity **appears random,** making it difficult for us to predict these storms.

Geomagnetic storm

- A geomagnetic storm (commonly referred to as a solar storm) is a **temporary disturbance of the Earth's magnetosphere.**
- Associated with solar coronal mass ejections, coronal holes, or solar flares, a geomagnetic storm is caused by a solar wind shock wave which typically strikes the Earth's magnetic field 24 to 36 hours after the event.
- **A geomagnetic storm is defined by changes in the Dst(disturbance – storm time) index.**
- The Dst index estimates the globally averaged change of the horizontal component of the Earth's magnetic field at the magnetic equator based on measurements from a few magnetometer stations.
- **Dst is computed once per hour and reported in near-real-time.**

New six-sided jet stream spotted at Saturn's north pole

- The mystery and extent of the hexagon continue to grow, even after Cassini's 13 years in orbit around Saturn.
- The edges of this newly-found vortex appear to be hexagonal, precisely matching a famous and bizarre hexagonal cloud pattern we see deeper down in **Saturn's atmosphere.**
- Using data from **NASA's Cassini spacecraf**t, scientists have spotted a surprising feature emerging at Saturn's northern pole as it nears summertime — a warming, high-altitude jet stream with a hexagonal shape.

Jet streams

- Jet streams are **fast flowing, narrow, meandering air currents in the atmospheres of some planets, including Earth.**
- **On Earth**, the main jet streams are located near the **altitude of the tropopause** and are westerly winds (flowing west to east).
- Their paths typically have a **meandering shape.**
- Jet streams may start, stop, split into two or more parts, combine into one stream, or flow in various directions including opposite to the direction of the remainder of the jet.
- The **strongest jet streams are the polar jets**, at 9–12 km (30,000–39,000 ft) above sea level, and the higher altitude and somewhat weaker subtropical jets at 10–16 km (33,000–52,000 ft).
- The Northern Hemisphere and the Southern Hemisphere each have a polar jet and a subtropical jet.
- The northern hemisphere polar jet flows over the middle to northern latitudes of North America, Europe, and Asia and their intervening oceans, while the southern hemisphere polar jet mostly circles Antarctica all year round.
- Jet streams are the **product of two factors:**
    - the atmospheric heating by solar radiation that produces the large scale Polar, Ferrel, and Hadley circulation cells.
    - the action of the Coriolis force acting on those moving masses.
- The Coriolis force is caused by the planet's rotation on its axis.
- **On other planets, internal heat rather than solar heating drives their jet streams.**
- **The Polar jet stream forms near the interface of the Polar and Ferrel circulation cells; the subtropical jet forms near the boundary of the Ferrel and Hadley circulation cells.**
- Other jet streams also exist. During the Northern Hemisphere summer, easterly jets can form in tropical regions, typically where dry air encounters more humid air at high altitudes.
- Low-level jets also are typical of various regions such as the central United States. **There are also jetstreams in the thermosphere.**
- Meteorologists use the location of some of the jet streams as an **aid in weather forecasting.**
- The main **commercial relevance** of the jet streams is in **air travel,** as flight time can be dramatically affected by either flying with the flow or against, which results in significant fuel and time cost savings for airlines.


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