



NASA's Atmospheric Waves Experiment

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Why in News?

[NASA's](#) unveiling of the **Atmospheric Waves Experiment (AWE)** emerges amidst escalating disruptions in satellite communication and [GPS systems](#), **spotlighting the critical need to comprehend [space weather](#)**.

- With Earth's extreme weather events influencing space phenomena via **Atmospheric Gravity Waves (AGWs)**, AWE's imminent launch promises groundbreaking insights into these interconnected dynamics.

What is Space Weather?

- **Space weather** is the term used to describe the **dynamic conditions in the space environment** around the Earth and other planets, which are **influenced by the activity of the Sun** and the interactions between the solar wind and the planetary magnetic fields.
- Space weather can affect various aspects of human activities and technologies, such as [satellite-based communication, navigation, and power systems](#), as well as astronaut health and safety, and aviation and space exploration.

What are Atmospheric Gravity Waves (AGWs)?

- **Gravity Waves:** In a **stable atmosphere**, [gravity waves](#) are created when temperature contrasts between **rising air and the surrounding atmosphere** generate a force that pushes the air back to its initial location.
- **Atmospheric Gravity Waves: AGWs** are waves that travel within a stable atmospheric layer, particularly thriving in regions where air is moving upward, facilitating the creation of distinctive cloud formations.
 - Remarkably, **these AGWs extend into space**, playing a role in shaping space weather.
 - They are mostly generated by **extreme weather events or disturbances** causing **vertical displacement** of stable air.
 - [Thunderstorms, hurricanes, and regional topography](#) contribute to the **generation of AGWs** in the lower atmosphere.

What is NASA's Atmospheric Waves Experiment?

- **About:** As a pioneering NASA experiment under the **Heliophysics Explorers Program**, AWE aims to study the connections between **lower atmospheric waves and space weather**.
- **Operational Mechanism:** Mounted on the [International Space Station \(ISS\)](#), AWE will observe the **colorful air glows in the Earth's atmosphere**, specifically at the [mesopause](#) (about 85 to 87 km above the Earth's surface).
 - Equipped with an **Advanced Mesospheric Temperature Mapper (ATMT)**, AWE will

scan the mesopause using imaging radiometers to capture specific wavelengths' brightness.

- **Mission Objective:** Understanding the **forces driving space weather** and investigating the potential impact of **terrestrial weather** on it.
 - Data obtained by AWE will contribute as inputs for weather models, improving weather forecasts.

UPSC Civil Services Examination, Previous Year Question (PYQ)

Q. If a major solar storm (solar flare) reaches the Earth, which of the following are the possible effects on the Earth?(2022)

1. GPS and navigation systems could fail.
2. Tsunamis could occur at equatorial regions.
3. Power grids could be damaged.
4. Intense auroras could occur over much of the Earth.
5. Forest fires could take place over much of the planet.
6. Orbits of the satellites could be disturbed.
7. Shortwave radio communication of the aircraft flying over polar regions could be interrupted.

Select the correct answer using the code given below:

- (a) 1, 2, 4 and 5 only
- (b) 2, 3, 5, 6 and 7 only
- (c) 1, 3, 4, 6 and 7 only
- (d) 1, 2, 3, 4, 5, 6 and 7

Ans: (c)

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