

Disturbances in our atmosphere and gravity waves



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- Traveling atmospheric disturbances (TADs) roll through the sky, pushing material as they go. These phenomena play a major role in how energy and mass move around different parts of Earth's atmosphere. **Understanding these atmospheric dynamics is not only important for Earth and other planetary atmospheres including those around other stars.**
- TADs are hard to measure, best observed by flying within them – as some missions have – or by using indirect measures of airglow, which brightens and dims as TADs move through it. These TADs were studied with two missions: NASA and Germany's Challenging Minisatellite Payload (CHAMP) and ESA's Gravity Field and Steady-State Ocean Circulation Explorer (GOCE).
- **For the first time, scientists show that TADs during geomagnetic quiet times are mainly due to gravity waves over the Andes Mountains.** During geomagnetic storms, TADs are excited by particle heating around aurora ovals. This work has implications for how TADs work during between such storms.



The snow-capped peaks of the Andes Mountains in southern Chile, with General Carrera Lake at bottom left, are pictured from the International Space Station as it orbited above South America. Above these mountains is where the tertiary gravity waves occurred.

S., Xu, S. Vadas, and J. Yue (674), 2021: "Thermospheric Traveling Atmospheric Disturbances in Austral Winter From GOCE and CHAMP," *Journal of Geophysical Research: Space Physics*. <https://doi.org/10.1029/2021JA029335>