# AGU: Geophysical Research Letters

## Editors' Highlight

### Balloon-borne sensor finds equatorward thermospheric wind

Emanating from atomic oxygen in the thermosphere, the faint light of airglow means that Earth's atmosphere is never completely dark. More than that by measuring subtle shifts in airglow's observed frequency researchers have developed a method to track the motion of the upper atmosphere. Using High-Altitude Interferometer Wind Observation (HIWIND), a balloon-borne interferometer, *Wu et al*. (2012) measured the observed wavelength of airglow given off by excited atomic oxygen, which peaks in intensity in the upper thermosphere at 250-km altitude. The light emitted from atomic oxygen has a consistent wavelength of 630 nm. So by looking for deviations from this value due to the Doppler effect, the authors were able to calculate the relative motion of the source oxygen atoms and thus the speed and direction of the thermospheric wind. The properties of the thermospheric wind can have important effects on the chemical composition and structure of the ionosphere. The faint light of thermospheric airglow is all but drowned out during the day by sunlight scattering off Earth's thick atmosphere. This drove the authors to the balloon-borne HIWIND, which at a cruising altitude of 40 km sits well above the vast majority of this scattered light. During its maiden journey from Kiruna, Sweden, to the Boothia Peninsula in northern Canada the authors measured the thermospheric wind during both day and night, a difficult feat for previous techniques. The authors found a nearly persistent equatorward wind which at times peaked above 200 m $s^{-1}$. This observation was contrary to the National Center for Atmospheric Research's Thermosphere-Ionosphere Electrodynamics General Circulation Model, which calculated that the wind should have been poleward. The authors suggest that additional HIWIND measurements could be used to improve thermosphere and ionosphere models.

**View abstract**

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