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Post-equinoctial observations of the ionosphere of Uranus - updates from the 2012 observing campaign

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Abstract

We analyze ground-based infrared observations of H3+ emission from the upper atmosphere of Uranus using Gemini North/GNIRS, NASA IRTF/SpeX and VLT/ CRIRES. These observations were obtained on 15 different nights in late 2011, between day-of-year 251 (5th of September) and 340 (6th of December). The equinox of Uranus occurred in late 2007 and these recent observations quantify the behavior of the planet's upper atmosphere 4 years after equinox, equivalent to 15° of circumsolar rotation. We also present preliminary results from the 2012 observing campaign using the NASA IRTF and Gemini telescopes.

The mean temperature of the ionosphere from these measurements is 520 ± 32 K, which is cooler than any of the temperatures determined by the precursor to this study (Melin, H., Stallard, T., Miller, S.,Trafton, L.M., Encrenaz, T., Geballe, T.R. [2011]. Astrophys. J. 729, 134). Thus, the cooling trend that has been observed since the first H3+ observation in 1992 has continued, even as the planet traversed equinox. This suggests that the driver of the elevated thermospheric temperatures cannot be linked to purely seasonal mechanisms, and we consider other sources of variability, such as the changing geometry between the planet, magnetosphere and solar wind.