

# Unexpected cooling effect in Saturn's upper atmosphere

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Saturn. Photo by NASA.

UK researchers from University College London, along with colleagues from Boston University, have found that the hotter than expected temperature of Saturn's upper atmosphere – and that of the other giant planets – is not due to the same mechanism that heats the atmosphere around the Earth's Northern Lights. Reporting in *Nature* (25th January) the researchers findings thus rule out a long held theory.

A simple calculation to give the expected temperature of a planet's upper atmosphere balances the amount of sunlight absorbed by the energy lost to the lower atmosphere. But the calculated values don't tally with the actual observations of the Gas Giants: they are consistently much hotter.

It has long been thought that the culprit behind the heating process was

the ionosphere, being driven by the planet's magnetic field, or magnetosphere. By using numerical models of Saturn's atmosphere the researchers found that the net effects of the winds driven by polar energy inputs is not to heat the atmosphere but to actually cool it.

Professor Alan Aylward, of the UCL Department of Physics & Astronomy, and an author of the study, explains: "The aurora has been studied for over a hundred years, yet our discovery takes us back to first principles. We need to re-examine our basic assumptions about planetary atmospheres and what causes the observed heating."

"Studying what happens on planets such as Saturn gives us an insight into what happens closer to home. Planets can lose their atmospheres as we see with Mars. Do we completely understand how this happens? Are there mechanisms heating the gas and causing it to escape that we do not yet fully understand? By studying what happens in other atmospheres we may find clues to Earth's future."

Source: Particle Physics & Astronomy Research Council

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