



# **JPL SCIENCE HIGHLIGHT: Science Mission Directorate (SMD)**

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## **JPL Science Highlight: Planetary Program Support**

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## Man-Made Aurora Helps Predict Space Weather



The processes that cause space weather have been researched extensively for the past 25 years, and deal with understanding the role that nitrogen, the most abundant gas in Earth's atmosphere reacts when it collides with electrons produced by energetic ultraviolet sunlight and 'solar wind.'

In 1985, researchers devised limited, yet well-respected experiments to measure these collisions, and their research set a standard at that time for helping to understand the nature of space weather.

Now, new research published June 8, 2010, in IOP Publishing's *Journal of Physics B: Atomic, Molecular and Optical Physics* describes how scientists at NASA's Jet Propulsion Laboratory (JPL) have modified traditional experiments of measuring ultraviolet light emitted by these collisions. The team fired electrons of differing energies through a cloud of nitrogen gas to measure the ultraviolet light emitted by this collision. In their new ability to control and create these collisions, the results from the team at JPL suggest that the intensity of a broad band of ultraviolet light emitted from the collision changes significantly less with bombarding electron energies than previously thought.

## Man-Made Aurora Helps Predict Space Weather (Cont'd)



### Implications:

As the ultraviolet light from the 'Lyman-Birge-Hopfield' (LBH) band emission is used by NASA, the US Department of Defense and the European Space Agency can better understand physical and chemical processes occurring in our upper atmosphere and in near-Earth space, the results will give some immediate cause to reflect.

### Significance to Solar System Exploration:

Understanding terrestrial space weather has been one of the most critical areas of atmospheric research throughout the past 25 years. Greater understanding of the physical and chemical properties of space weather helps protect our space-based assets, and helps us understand phenomena such as Aurora Borealis (Northern Lights), and Aurora Australis (Southern Lights).