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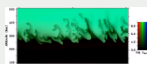
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DAVID LEE HYSELL

Biography

David Hysell earned his Ph.D. from Cornell in 1992. Hysell investigates ionospheric plasma physics with a focus on plasma instabilities, ionospheric irregularities, and their effects on radio wave propagation. Communication outages caused by ionospheric irregularities are a central component of the National Space Weather Program. The instabilities of interest are found in the equatorial and auroral electrojets, in the midlatitude E region ionosphere, and in equatorial and midlatitude spread F. The research is both experimental and theoretical and has a substantial computational component and has a substantial computational component. An important research tool for studying the equatorial ionosphere is the Jicamarca Radio Observatory near Lima, Peru, the world's largest radar. In the spring of 2005, Hysell became the PI for the NSF Cooperative Agreement that supports Jicamarca.

Research Interests

The ionosphere and the instabilities and irregularities that inhabit it are mainly studied with remote sensing using radar. Processing and interpreting both kinds of signals turns out to be demanding, and conventional analysis techniques are fraught with artifacts and ambiguity. Hysell's research focuses mainly on redefining the way radars are used to study the ionosphere and on improving closure between theory and experiment. As the radar techniques developed by Hysell's group are often applicable in other disciplines, including commercial and defense-related fields, this work has overtones outside



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aeronomy. Much of Hysell's research is conducted at the Jicamarca Radio Observatory, the world's largest radar, located outside Lima, Peru. Jicamarca is owned by the Peruvian government but funded mainly through a cooperative agreement between the National Science Foundation and Cornell University. Hysell became the PI for the cooperative agreement in 2005, helping to maintain Cornell's leadership in aeronomy, space physics, and radar remote sensing. Jicamarca provides an ideal environment for developing, prototyping, and testing new radar techniques, modes, and instrumentation. Once developed, Hysell strives to migrate new radar techniques to different geographic regions for wider application. The strategy is accomplished through the construction and deployment of portable radar systems to middle- and high-latitude sites (the Caribbean and Alaska in particular). These deployments make it possible to address a wide range of problems in aeronomy and to collaborate with different agencies and institutions. Much of the research is also suitable material for the classroom.

Teaching Interests

Hysell continues to teach EAS/ECE 4870, Introduction to Radar remote sensing, each year. Every other year, Hysell teaches EAS 4840/5840, an introduction to inverse methods. In between years, Hysell alternates between teaching an advanced radar course (EAS 5880) and courses on upper atmospheric physics. Hysell has also taught introductory plasma physics in ECE.

Service Interests

Outreach is conducted under the auspices of a number of research projects that involve instrument deployments to remote or underdeveloped geographic regions. These include radar stations in the Kenai Peninsula of Alaska, the island of St. Croix in the U. S. Virgin Islands, and the island state of Dominica. In each case, we endeavor to work with local universities and/or nonprofits to promote our research among undergraduate students, including underrepresented minorities, who would otherwise have little access to federally-funded research projects and major research facilities.

Selected Publications

- ▶ Hysell, David Lee, Robert Miceli, Jens Munk, Donald Hampton, Craig Heinselman, Michael Nicolls, Steven Powell, Kristina Lynch, Mark Lessard. 2012. "Comparing VHF coherent scatter from the radar aurora with incoherent scatter and all-sky auroral imagery." *Journal of Geophysical Research-Space Physics* 117 (A10313).
- ▶ Hysell, David Lee, Eliana Nossa, Miguel F. Larsen, John Munro, Steven Smith, Michael Sulzer, Sixto Golzalez. 2012. "Dynamic instability in the lower thermosphere inferred from irregular sporadic E layers." *Journal of Geophysical Research-Space Physics* 117 (A08305).
- ▶ Aveiro, Henrique, David Lee Hysell, Ronald Caton, Keith Groves, Jeff

Klenzing, Robert Pfaff, Russell Stoneback, Roderic Hellis. 2012. "Three-dimensional numerical simulations of equatorial spread F: Results and observations in the Pacific sector." *Journal of Geophysical Research-Space Physics* 117 (A03325).

- ▶ Hysell, David Lee, Roger Varney, Michael Vlasov, Eliana Nossa, Todd Pedersen, Brenton Watkins, Joseph Huba. 2012. "[Estimating the electron energy distribution during ionospheric modification from spectrographic airglow measurements.](#)" *Journal of Geophysical Research-Space Physics* 117 (A2): A02317.
- ▶ Aveiro, H., David Lee Hysell, J. Park, H. Lühr. 2011. "[Equatorial spread F-related currents: Three-dimensional simulations and observations.](#)" *Geophysical Research Letters* 38 (21): L21103.

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Selected Awards and Honors

- ▶ Sonny Yau Excellence in Teaching Award 2006
- ▶ CEDAR Prize Lecture Award 1999
- ▶ URSI Young Scientist Award 1996
- ▶ Radio Science Citation for Excellence in Refereeing 1996

Websites

- ▶ [Upper Atmospheric Research](#)

Education

- ▶ BS (ELECTR & COMMUNICATION ENG), PENN STATE UNIV, 1987
- ▶ Ph D (ELECTR & COMMUNICATION ENG), CORNELL UNIVERSITY, 1992

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