

Access

To read this story in full you will need to login or make a payment (see right).

Letters to Nature

Nature **433**, 498-500 (3 February 2005) | doi:10.1038/nature03243; Received 13 September 2004; Accepted 6 December 2004

Creation of visible artificial optical emissions in the aurora by high-power radio waves

Todd R. Pedersen¹ & Elizabeth A. Gerken²

1. Space Vehicles Directorate, Air Force Research Laboratory, Hanscom Air Force Base, Massachusetts 01731, USA
2. Department of Electrical and Computer Engineering, Cornell University, Ithaca, New York 14853, USA

Correspondence to: Todd R. Pedersen¹ Correspondence and requests for materials should be addressed to T.R.P. (Email: todd.pedersen@hanscom.af.mil).

Generation of artificial light in the sky by means of high-power radio waves interacting with the ionospheric plasma has been envisaged since the early days of radio exploration of the upper atmosphere, with proposed applications ranging from regional night-time street lighting to atmospheric measurements¹. Weak optical emissions have been produced for decades in such ionospheric 'heating' experiments, where they serve as key indicators of electron acceleration, thermal heating, and other effects of incompletely understood wave-particle interactions in the plasma under conditions difficult to replicate in the laboratory². The extremely low intensities produced previously have, however, required sensitive instrumentation for detection, preventing applications beyond scientific research. Here we report observations of radio-induced optical emissions bright enough to be seen by the naked eye, and produced not in the quiet mid-latitude ionosphere, but in the midst of a pulsating natural aurora. This may open the door to visual applications of ionospheric heating technology or provide a way to probe the dynamics of the natural aurora and magnetosphere.

To read this story in full you will need to login or make a payment (see right).

MORE ARTICLES LIKE THIS

These links to content published by NPG are automatically generated.

NEWS AND VIEWS

[Atmospheric physics A new dawn for aurora](#)

Nature News and Views (14 Aug 2003)

[Space physics Rhythms of the auroral dance](#)

Nature News and Views (13 Dec 2001)

[See all 17 matches for News And Views](#)

RESEARCH

[Pulsating aurora induced by upper atmospheric barium releases](#)

Nature Letters to Editor (12 May 1977)

ARTICLE LINKS

[Figures and tables](#)

SEE ALSO

[Editor's Summary](#)

ARTICLE TOOLS

[Send to a friend](#)

[Export citation](#)

[Export references](#)

[Rights and permissions](#)

[Order commercial reprints](#)

[Bookmark in Connotea](#)

SEARCH PUBMED FOR

[Todd R. Pedersen](#)

[Elizabeth A. Gerken](#)

open innovation challenges

[Optimizing Sub-cellular Localization Tags](#)



Deadline: Nov 29 2009

Reward: **\$20,000**

USD

The Seeker is looking for methods to optimize sub-cellular localization tags for protein expression...

[Definition of Region for Clinical Trials](#)



Deadline: Nov 02 2009

Reward: **\$10,000**

USD

Ideas for new definitions of regions for clinical trials are desired.

[More Challenges](#)

Powered by: INNOCENTIVE

naturejobs

Lecturer / Senior Lecturer in Environmental Engineering

University of Glasgow
Glasgow, UK

Clinical Safety Team Leader

Novartis Healthcare Private Limited
Hyderabad, A.P. 500081 India

[Photometric Observations from the Southern Hemisphere of 5577Å Emission from the Aurora on October 28, 1961](#)

Nature Letters to Editor (09 Mar 1963)
[See all 49 matches for Research](#)

More science jobs
Post a job for free

Nature ISSN 0028-0836
EISSN 1476-4687

© 2009
Nature

About NPG
Contact NPG
RSS web feeds
Help

Privacy policy
Legal notice
Accessibility statement

Publishing Group,
a division of
Macmillan
Publishers
Limited. All

Nature News
Naturejobs
Nature Asia
Nature Education

Rights Reserved.
partner of AGORA, HINARI, OARE, INASP, CrossRef and COUNTER

Search: