

Home

Online Library ACP

- Recent Final Revised Papers
- Volumes and Issues**
- Special Issues
- Library Search
- Title and Author Search

Online Library ACPD

Alerts & RSS Feeds

General Information

Submission

Review

Production

Subscription

Comment on a Paper

Impact
Factor
4.865

ISI
indexed



▣ Volumes and Issues ▣ Contents of Issue 4

Atmos. Chem. Phys., 6, 1091-1104, 2006
www.atmos-chem-phys.net/6/1091/2006/

© Author(s) 2006. This work is licensed
under a Creative Commons License.

Small-scale gravity waves in ER-2 MMS/MTP wind and temperature measurements during CRYSTAL-FACE

L. Wang¹, M. J. Alexander¹, T. B. Bui², and M. J. Mahoney³

¹NorthWest Research Associates, Inc., Colorado Research Associates Div., 3380 Mitchell Lane, Boulder, CO 80301, USA

²NASA Ames Research Center, Moffett, CA 94035, USA

³Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA 91109, USA

Abstract. Lower stratospheric wind and temperature measurements made from NASA's high-altitude ER-2 research aircraft during the CRYSTAL-FACE campaign in July 2002 were analyzed to retrieve information on small scale gravity waves (GWs) at the aircraft's flight level (typically ~20 km altitude). For a given flight segment, the S-transform (a Gaussian wavelet transform) was used to search for and identify small horizontal scale GW events, and to estimate their apparent horizontal wavelengths. The horizontal propagation directions of the events were determined using the Stokes parameter method combined with the cross S-transform analysis. The vertical temperature gradient was used to determine the vertical wavelengths of the events. GW momentum fluxes were calculated from the cross S-transform. Other wave parameters such as intrinsic frequencies ω were calculated using the GW dispersion relation. More than 100GW events were identified. They were generally high frequency waves with vertical wavelength of ~5 km and horizontal wavelength generally shorter than 20 km. Their intrinsic propagation directions were predominantly toward the east, whereas their ground-based propagation directions were primarily toward the west. Among the events, ~20% of them had very short horizontal wavelength, very high intrinsic frequency, and relatively small momentum fluxes, and thus they were likely trapped in the lower stratosphere.

Using the estimated GW parameters and the background winds and stabilities from the NCAR/NCEP reanalysis data, we were able to trace the sources of the events using a simple reverse ray-tracing. More than 70% of the events were traced back to convective sources in the troposphere, and the sources were generally located upstream of the locations of the events observed at the aircraft level. Finally, a probability density function of the reversible cooling rate due to GWs was obtained in this study, which may be useful for cirrus cloud models.

▣ [Final Revised Paper](#) (PDF, 1310 KB) ▣ [Discussion Paper](#) (ACPD)

Citation: Wang, L., Alexander, M. J., Bui, T. B., and Mahoney, M. J.: Small-scale gravity waves in ER-2 MMS/MTP wind and temperature measurements during CRYSTAL-FACE, Atmos. Chem. Phys., 6, 1091-1104, 2006. ▣ [Bibtex](#) ▣ [EndNote](#) ▣ [Reference Manager](#)

Search ACP

Library Search

Author Search

News

- Sister Journals AMT & GMD
- Financial Support for Authors
- Journal Impact Factor
- Public Relations & Background Information

Recent Papers

01 | ACP, 23 Dec 2008:
Measurement of glyoxal using an incoherent broadband cavity enhanced absorption spectrometer

02 | ACPD, 23 Dec 2008:
Single particle characterization using a light scattering module coupled to a time-of-flight aerosol mass spectrometer

03 | ACP, 23 Dec 2008:
Corrigendum to "Modeling the effect of plume-rise on the transport of carbon monoxide over Africa with NCAR CAM" published in

