

Development of a Phase Velocity Spectral Analysis Software Package (M-Transform) for Airglow Imaging Data

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We have developed a user-friendly software based on *Matsuda et al.*, 2014 3D-FFT method (M-Transform) for airglow data analysis as a function on Interactive Data Language (IDL). Input of this function is 3-D array of a time series of airglow image that have already been converted to geographical coordinate (x, y, t). The user can customize the wave parameters (e.g. horizontal wavelength (λ_h), wave period (τ), phase speed (c), image resolution in space (dx, dy) and time (dt)) in one-line command when executing the program, which depends on their analysis purpose. This new function has been applied to airglow data at different observation sites, Syowa Station (40°E, 69°S), Shigaraki (136°E, 35°N), and Tomohon Observatory (122°E, 1°N). The application of this function on airglow data at various locations is expected to reveal the global atmospheric gravity waves (AGWs) propagation direction and energy distribution.

References

Matsuda, T. S., T. Nakamura, M. K. Ejiri, M. Tsutsumi, and K. Shiokawa (2014), New statistical analysis of the horizontal phase velocity distribution of gravity waves observed by airglow imaging, *J. Geophys. Res. Atmos.*, 119, 9707–9718, doi:10.1002/2014JD021543.