

M-transform Analysis of Gravity Waves and TIDs: Application of Horizontal Phase Velocity Spectra to Various Airglow Imaging Data

Takuji Nakamura^{1,5}, Masaru Kogure², Septi Perwitasari³, Mitsumu K. Ejiri^{1,5}, Yoshihiro Tomikawa^{1,5}, Masaki Tsutsumi^{1,5} and Kazuo Shiokawa⁴

¹*National Institute of Polar Research (NIPR), Tachikawa, Tokyo, Japan*

²*Department of Earth and Planetary Science, Kyushu University, Fukuoka, Japan*

³*National Institute of Information and Communications Technology (NICT), Koganei, Japan*

⁴*Institute for Space-Earth Environmental Research (ISEE), Nagoya University, Nagoya, Aichi, Japan*

⁵*Graduate University for Advanced Studies, SOKENDAI, Japan*

The 2-D (two dimensional) horizontal phase velocity spectrum using 3-D Discrete Fourier Transform (DFT) has been introduced by Matsuda et al. (2014). They analyzed the gravity waves observed in the airglow image data obtained at Syowa station (69S, 40E) collected for one winter season. Horizontal phase velocity spectra between four stations in ANGIN (Antarctic Gravity Wave Instrument Network), Halley (76S, 27W), McMurdo (78S, 167E), Davis (69S, 78E) and Syowa have been compared on the gravity wave energy and propagation direction (Matsuda et al., 2017). The software to calculate the horizontal phase velocity spectrum for common use has been developed and delivered by NIPR as a function written for IDL (Perwitasari et al., 2018). This phase velocity analysis, M-transform, has been applied to various airglow images at various locations. M-transform has further been used to analyze GPS/TEC map, and SuperDARN HF radar data.

In this presentation, the M-transform analyses of the different imagers and instruments are reviewed, and we discuss how the M-transform could be widely applied to different dataset with different observational setup and parameters.

References

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