On the relation between three-dimensional wave activity flux and pseudo momentum without using intrinsic phase velocities

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The middle-atmosphere general circulation is driven by various wave activities. The transformed Eulerian-Mean (TEM) are the useful tools to diagnose interaction between waves and mean state. The three-dimensional (3D) extension of TEM equations has been conducted since 1980s and the recent study uses the 3D wave activity flux for the analysis of special structure of Rossby wave activities during Stratospheric Sudden Warming. It was proved that divergence of wave activity flux corresponds to the time variation of pseudo momentum in the TEM equations (Eliassen-Palm relation). Also, this relation is proved in the 3D-TEM equations. However, the pseudo momentum used in the relation is defined as the wave energy divided by intrinsic phase velocities and is difficult to use in the data analysis. In this study, referring Double Impulse pseudo momentum of Aiki et al. (2015), the pseudo momentum without using intrinsic phase velocities are introduced and the relation between 3D wave activity flux divergence and time variation of pseudo momentum in the middle atmosphere is reported.

Keywords: wave activity flux, pseudo momentum

