

## A new mass correction scheme for atmospheric energy transport

\*Haruyama Akinori<sup>1</sup>, Jinro Ukita<sup>2</sup>, Meiji Honda<sup>2</sup>

1. Graduate School of Science and Technology, Niigata University, 2. Faculty of Science, Niigata University

Polar amplification is one of the key climate research questions. In the context of polar amplification and global warming poleward atmospheric energy transport (AET) is of fundamental importance. Yet we are facing difficulties when we estimate changes in poleward AET. Part of the problem is the fact that any atmospheric data, re-analyses or model outputs, are subject to discrete error and uncertainties, which require a mass correction.

Here we present a new mass correction scheme and discuss the results from its applications to monthly re-analysis data of ERA-Interim and JRA55 for the period of 1979 to 2010. We found that there is much discrepancy in the stationary AET between two re-analysis products when conventional calculation is carried out without a mass correction. When we apply a new mass correction scheme, based on the area of lateral vertical wall at given latitude, this discrepancy largely disappears. We further discuss the results from trend analysis on thus corrected data.

In particular we show that at low-latitude there is a decrease in dry static energy component in monthly time-scale, which is nearly cancelled by an increases in latent heat transport. This is in comparison to a decrease in both components at high-latitude.

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