Energetics for the Pacific and Atlantic Storm Tracks on Subseasonal Variability

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The seasonal variability and the associated energetics of the two storm tracks in the Northern Hemisphere are compared. The storm track intensity is represented by the root-mean-square of 2-8 day band-pass filtered geopotential height. The Pacific storm track (PASTM) weakens and shifts southward from fall to midwinter, whereas the core region and intensity of the Atlantic storm track (ATSTM) remain steady throughout the winter.

For both the storm tracks, in the initiation region of strong synoptic scale activity, the high frequency eddies obtain kinetic energy from the mean flows. However, the initiation of ATSTM is related to the barotropic energy conversion contributed by the stretching deformation of the mean flows, whereas the term associated with shearing deformation is important for the initiation of PASTM. At the upstream of the two storm track cores the potential energy conversion from the mean flow to eddies reaches maximum and acts as an energy source for developing of the storm tracks. The suppression of PASTM in midwinter is partly attributed to weak conversion rate from eddy potential energy to eddy kinetic energy during midwinter. The enhancement of the ATSTM in midwinter is benefited from the effective conversion from eddy potential energy to eddy kinetic energy. In addition, in relation to the midwinter minimum of the PASTM and midwinter maximum of the ATSTM, the shape and orientation of eddies, jet activity and moist effect are discussed.

Keywords: Storm track, Barotropic energy conversion, Baroclinic energy conversion, Eddy-mean flow interaction