

## **Troposphere-stratosphere interaction diagnostics of the 3D Eliassen-Palm flux and its association with the North Pacific SST in different NWP products.**

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We provide a comparative assessment of the magnitudes of the three-dimensional Eliassen-Palm (EP) flux and its association with the sea surface temperature (SST) anomalies in the North Pacific as revealed by several reanalyses. Our diagnostics was based on the daily data of the 3D structure of the zonal stratospheric circulation. We found that an event of strong upward propagation of planetary waves from the troposphere to stratosphere over the northern Eurasia region leads by approximately one month the starting data of the Sudden Stratospheric Warming (SSW). Amplification of the penetration of planetary waves into the stratosphere in December is strongly associated with the changes in the stratospheric dynamics in January, hinting on the “preconditioning” of the stratospheric warming. This linkage is clearly observed in the early winter (November-December), however was not identified during the mid-to-late winter (January-March).

In order to link the phenomenon to the ocean signal we analysed correlations between the characteristics of stratospheric dynamics and the SST anomalies in the North Pacific and found these correlations to be significant implying potential influence of the diabatic heating over the North Pacific on the magnitudes of 3D Eliassen-Palm flux.

The prominent downward propagation of the signal from the stratosphere was found in Labrador and South Greenland region. The intensity of this signal correlates with the NAM index, hinting (although still implicitly) on the link between stratospheric dynamics and blocking events in the troposphere.