

Transport across midlatitude tropopause in a global atmospheric model with the horizontal grid size of 20 km

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Transport process across the tropopause including filamental structure is investigated using a atmospheric global climate model with the horizontal grid size of about 20 km. Idealized tracer which is initialized to 1 above 2 PVU surface and 0 below that (following Gray,2006) is advected for 24 hours. Transport across the tropopause is evaluated by comparing the tracer and 2 PVU surface at the final time. Calculation is 3D online with semi-Lagrangian, same as the model dynamics.

Net transport does not depend on the horizontal resolution and consistent with the estimation from residual mean circulation. However, stratosphere to troposphere transport and troposphere to stratosphere transport depend on the horizontal resolution. Above 400hPa, about a half of the transport is simulated in TL959 compared with TL95. In contrast, more transport is below 500hPa in TL959. Difference in water vapor transport by synoptic disturbances can cause the resolution dependence. Relationships between their horizontal distributions and synoptic disturbances are also investigated.