Warm conveyor belts in a global climate model with a complex representation of aerosol-cloud interactions

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Extratropical cyclones (ETCs) are weather systems that are responsible for most of the precipitation in midlatitudes. More precisely, within ETCs warm conveyor belts (WCBs) are responsible for transport of moisture and aerosols from the surface to the upper troposphere and the formation of clouds and precipitation. The interactions between aerosols and cloud processes within the WCB may alter precipitation.

In this study the ECHAM6-HAM model is used to look at the effects of aerosols on precipitation formation in WCBs. The ECHAM6-HAM is a global climate model with a two-moment cloud microphysics and aerosol scheme. The model results are used as an input for the Lagrangian model LAGRANTO to calculate 48h forward trajectories identifying the WCB as the trajectories that ascend 600hPa or more in the 48h. Furthermore, only trajectories that ascend in the vicinity of an ETC are considered. The area of interest is the northwestern Pacific Ocean because of the high frequency of ETCs and the strong increase of anthropogenic aerosols in East Asia since the 1950's.

With conducting present day and preindustrial simulations we analyse how individual WCBs look like in the Pacific Ocean. This study will show how microphysical processes look like along the Lagrangian evolution of WCBs and how cloud structures and precipitation in WCBs are changed with different aerosol loadings.