

# **An assessment of the CAM5/CARMA model's TTL cirrus cloud representation through comparisons with ATTREX 3 and CALIPSO observations**

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The Tropical Tropopause Layer (TTL) over the Western Pacific is a region known to be crucial in facilitating the exchange of tropospheric and lower stratospheric air. From satellite observations we can see that large amounts of upwelling occurs in the Western Pacific that transports water vapor into the lower stratosphere. These characteristics make this region important to Earth's hydrological cycle and climate. Unfortunately, until recently there has been an overwhelming lack of in situ observations for the Western Pacific. Consequently, it is difficult to assess the performance of global climate models (GCM's) in this region. Due its importance however, it is imperative that GCM's properly represent this region when simulating Earth's climate. The completion of the ATTREX 3 campaign centered in Guam, USA has addressed this issue by providing a comprehensive and unique set of observations of the TTL over the Western Pacific. In our study we use this new data set alongside the long running CALIPSO satellite mission to perform model comparisons and assess model performance. We use the National Center for Atmospheric Research's (NCAR) CAM5 model coupled with an advanced sectional microphysics cloud model CARMA. In our investigation two separate comparisons with observational data are performed. The first evaluation assesses the model's ability to represent higher resolution features seen by aircraft observations. We study some of the unique cloud features seen during ATTREX 3 supported by CALIPSO observations. The second model comparison looks at 5-year model climatology of the Western Pacific against 5 years of CALIPSO observational data. The use of a satellite simulator, COSP, allows CAM5/CARMA output to be directly compared to CALIPSO observations by forcing the model to simulate the CALIPSO retrieval methods. For this study the model was run a 1x1 degree resolution. We present our results here.