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Comparison of multiple tropopause characteristics during warm and cold ENSO phases

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The El Niño-Southern Oscillation (ENSO) phenomenon has an impact on weather and climate on a global scale. Temperature variations connected with ENSO are not only observed in the tropical troposphere, but also at mid and high latitudes and in the stratosphere.

Tropopause properties strongly depend on atmospheric conditions and they are sensitive to both tropospheric and stratospheric variations. Thus temperature changes in troposphere and stratosphere due to ENSO lead to variations of tropopause characteristics.

In this study, we use GPS Radio Occultation (RO) data of several missions to observe the connection between ENSO warm/cold phases and the occurrence of Multiple Tropopauses (MTs). The RO technique provides high-quality observational data on a global scale. Characteristics of RO data include high accuracy and precision, a high vertical resolution, global coverage, all-weather capability, and long-term stability. The high vertical resolution of RO temperature profiles allows to determine MTs precisely. Global coverage allows to study the impact of ENSO on tropopause characteristics thoroughly.

We use data from 2006 to 2012 when there are more than 30000 RO measurements globally available per month. During this period, warm ENSO events occurred in 2006/2007 and 2009/2010. Cold ENSO phases occurred in 2007/2008, 2010/2011, and 2011/2012. We will compare characteristics of MTs such as altitude, temperature, and occurrence on a monthly basis, with focus on low and mid latitudes.