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Upscaling the impact of convective overshooting (COV) through BRAMS: a continental and wet-season scale study of the water vapour (WV) budget in the tropical tropopause layer (TTL).

Abhinna Behera (1), Emmanuel Rivière (1), Virginie Marécal (2), Jean-François Rysman (3), Chantal Claud (3), and Jérémie Burgalat (1)

(1) University of Reims Champagne-Ardenne, GSMA, Reims, France (abhinna-kumar.behera@etudiant.univ-reims.fr)., (2) CNRM GAME, URA CNRS Météo-France, CNRS, Toulouse, France., (3) LMD, IPSL, CNRS, Palaiseau, France.

The stratospheric water vapour (WV) has a conceding impact on the radiative and chemical budget of Earth's atmosphere. The convective overshooting (COV) at the tropics is well admitted for playing a role in transporting directly WV to the stratosphere. Nonetheless, its impact on the lower stratosphere is yet to be determined at global scale, as the satellite and other air-borne measurements are not of having fine enough resolution to quantify this impact at large scale. Therefore, efforts have been made to quantify the influence of COV over the WV budget in the tropical tropopause layer (TTL) through modelling. Our approach is to build two synthetic tropical wet-seasons; where one would be having only deep convection (DC) but no COV at all, and the second one would be having the COV, and in both cases the WV budget in the TTL would be estimated. Before that, a French-Brazilian TRO-pico campaign was carried out at Bauru, Brazil in order to understand the influence of COV on the WV budget in the TTL. The radio-sounding, and the small balloon-borne WV measurements from the campaign are being utilized to validate the model simulation.

Brazilian version of Regional Atmospheric Modeling System (BRAMS) is used with a single grid system to simulate a WV variability in a wet-season. Grell's convective parameterization with ensemble closure, micro-physics with double moment scheme and 7 types of hydrometeors are incorporated to simulate the WV variability for a wet-season at the tropics. The grid size of simulation is chosen to be 20 km x 20 km horizontally and from surface to 30 km altitude, so that there cannot be COV at all, only DC due to such a relatively coarse resolution. The European Centre for Medium-range Weather Forecasts (ECMWF) operational analyses data are used every 6 hours for grid initialization and boundary conditions, and grid center nudging. The simulation is carried out for a full wet-season (Nov 2012 – Mar 2013) at Brazilian scale, so that it would coincide with the TRO-pico campaign measurements. As of first step, we have already shown that, this model with only DC is well capable of producing key features of the TTL. Hence in the second step, keeping all the settings same in the model, a sub-grid scale process/parameterization is being developed in order to reproduce COV in the model. Then, we would be able to compare these two atmospheres, and it would describe quantitatively the impact of COV on the WV budget in the TTL at a continental scale. This on-going work reports about the further advancement done to introduce the COV parameterization in BRAMS by incorporating the information from satellite-borne and balloon-borne measurements. The preliminary results of the simulation with COV nudging, achieved till date of EGU assembly, will be presented.