Extended Abstract

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Study on carbon dioxide atmospheric distribution over the Southwest Indian Ocean islands using satellite data: Part 2 –the influence of meteorology and air transportation

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Abstract:
Statement of the Problem: The forests of the Southwest Indian Ocean (SWIO) islands States are large carbon sinks. Rapid population growth in these islands is responsible for deforestation, which in turn is the main source of carbon dioxide (CO2) emissions. The SWIO region plays an important role in the carbon cycle. However, there is inadequate operational long-term monitoring of atmospheric chemical constituents in this region. This study establishes and compares the seasonal vertical and surface spatial distribution of CO2 over the SWIO islands, and it also demonstrates the influence of meteorology and the associated air transport on CO2 spatial and vertical distribution. The contrasting wet austral summer and dry spring seasons were selected to demonstrate this. Methodology & Theoretical Orientation: A 3-dimensional CO2 atmospheric loading over the islands of SWIO during the austral summer and spring seasons were established and compared. The CO2 data was measured by the Tropospheric Emission Spectrometer (TES) on board the Aura Satellite. The Hybrid Single-Particle Lagrangian Integrated Trajectories (HYSPLIT) atmospheric model backward trajectories were used to determine the long-range air transport impacting on SWIO islands CO2 atmospheric loading at various levels, and to trace the origin of the air masses impacting on the atmosphere of SWIO islands. Findings: There is a general shift to higher concentrations from summer to spring season and the CO2 concentration is highest at the southern part of Madagascar in both seasons. Long-range air transport from different source regions at the upper atmospheric levels between the 700 and 500 hPa stable layers and the layer above 500 hPa strengthen the inhomogeneity in the vertical distribution of CO2, caused by the decoupling effect of the upper atmosphere stable layers. Recommendations are made for further studies to be undertaken to determine the evolution of atmospheric CO2 distribution in this region.

Biography:
Xolile Ncipha has his expertise and interest in interrelationship between atmospheric constituents and weather/climate. His background ranges from hydroscopic nuclei cloud seeding rainfall enhancement and air pollution monitoring experiments. He has been exposed to meteorological and atmospheric chemistry observations from ground, airborne and satellite platforms. He is currently developing skills in terrestrial ecosystems carbon cycle observations.

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