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# Multi-scale Atmospheric CO2 Variabilities over Southern Africa

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Carbon sinks play an important role in absorbing almost half of the $CO_2$ emissions emanating from anthropogenic activities. However, regional contributions of atmospheric $CO_2$ are not well known in Southern Africa. This is partly attributed to a shortage of in-situ data, data gaps, and limitation in the theory in modeling atmospheric $CO_2$ dynamics. The shortage of in-situ observations and poor model skills have created a need for assimilation of observations into models to assess the variability of atmospheric levels in near real-time globally. In this study, we investigated the variabilities of $XCO_2$ at multi-temporal scales based on reanalysis data from the carbon tracker (CT) assimilation model over Southern Africa from the year 2000 to 2016. The ensemble empirical mode decomposition (EEMD) statistical technique was used to decompose the $CO_2$ time series into signals with different periodicities. The results demonstrate that the different component signals are driven by atmospheric, surface and oceanic forcings (e.g., rainfall, temperature, soil moisture, and SST).