3.132 Observations of long-lived trace gases over the central Himalayas.

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Abstract:

The increase in anthropogenic emissions of greenhouse gases since industrial revolution have led to enhanced positive radiative forcing and thereby greenhouse gases are now widely recognized as a major driver of the climate change. The Asian continent is home to some of the fastest growing economies and consequently CO\textsubscript{2} emissions in the world. The 2015 UNFCCC (United Nations Framework Convention on Climate Change) Conference of the Parties (COP-21 and COP-22) discussed that the emerging economies have to play a significant role for reliable budget estimate and mitigation of greenhouse gas emissions and thereby keeping the global average temperatures rise below 2\textdegree C. India is the third largest CO\textsubscript{2} emitter (~0.61 PgC/yr) after China (~2.81 PgC/yr) and USA (~1.43 PgC/yr) in the world but the current estimates of greenhouse gases emissions based on both the top-down and bottom-up approaches show large uncertainty over south Asia compared to other developed countries. In view of this, observations of long-lived radiatively active trace gases have been initiated at a high altitude central Himalayan site (29.4\textdegree N, 79.5\textdegree E, 1950 m amsl) located in Nainital at the Aryabhatta Research Institute of Observational Sciences (ARIES), in collaboration with National Institute of Environmental Studies (NIES), Tsukuba, Japan. Regular weekly air samples are collected in a flask (1.5 L glass) and are sent to NIES, where they are analyzed using non-dispersive infrared analyzer and a gas chromatograph. Here, we present the results of observations of CO\textsubscript{2}, CH\textsubscript{4}, CO, N\textsubscript{2}O, and SF\textsubscript{6} for the period of 2006 to 2017. CO\textsubscript{2}, N\textsubscript{2}O and SF\textsubscript{6} show a very consistent increase in their levels, unlike those of CO and CH\textsubscript{4}. Seasonal amplitude in CO\textsubscript{2} is observed to be reasonable greater than other observation sites. The contribution of different emission sources is also studies utilizing the correlation analysis. More details, including trend analysis will be presented.