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_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 $2^{o}C$. India is the third largest CO_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 ($29.4^{o}N$, $79.5^{o}E$, 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_2, CH_4, CO, N_2O, and SF_6 for the period of 2006 to 2017. CO_2, N_2O and SF_6 show a very consistent increase in their levels, unlike those of CO and CH_4. Seasonal amplitude in CO_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.