Title of the Proposal: Development of a QCL-based robust and transportable infrared spectrometer suitable for measurements of HONO at atmospheric levels and probing HONO production in trace quantities in some laboratory reactions

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Summary: The project will be implemented in two phases. In phase-1 (1^{st} and 2^{nd} years), the aim is to build a robust QCL based high-resolution mid-infrared spectrometer, and optimization of its performance for making it suitable to measure atmospheric abundances of HONO, the precursor of the atmospheric detergent, OH radical at sub-ppbv level. Proposal is also made to measure quantitatively the production of HONO from a number of light-induced as well as dark reactions as potential sources for atmospheric HONO. Basically, those reactions involve hydration of NO_2 on various surfaces, including soot particles. In phase-II, we have proposed to deploy the apparatus at Lothian Island, in Sundarbans, the largest mangrove forest on the planet, for direct measurement of HONO in the ambient atmosphere. The specific deliverables of the project are (1) building of a QCL based high-resolution mid-infrared spectrometer suitable for quantitative estimation of atmospheric HONO at ppb level, and commissioning of the apparatus. (2) Using the newly built apparatus, data concerning yields for atmospheric formation of HONO from a number of vital atmospheric reactions will be obtained. (3) The findings of the studies will appear in reputed atmospheric journals. (4) Quantitative data concerning atmospheric abundances of HONO in pristine atmosphere of Sundarbans in different seasons will be reported.