Research Development Fund – Cover Page
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Application Title: A universal trace gas analyzer facility

Lead contact for RDF Application:
Dr. Gunnar W. Schade
Atmospheric Sciences
gws@geos.tamu.edu
(979) 845-0633

Key Participating Units:
College of Geosciences, College of Agriculture and Life Sciences, College of Engineering, Texas Transportation Institute - Environmental & Emissions Research Facility, TAMHSC School of Public Health

Anticipated Request Amount ($): $600,000

Executive summary of the intended application to utilize Research Development Funds

We propose to purchase a universal trace gas analyzer based on chemical ionization with time-of-flight mass spectrometry, a PTR-ToF-MS. The instrument is semi-portable, and its measurements are highly flexible (up to four ionization methods, large dynamic analysis range), highly sensitive (sub-parts-per-billion), well mass-resolved (>5000 m/Δm), and highly time resolved (faster than 10 Hz if needed). Though centrally housed at the College of Geosciences, the instrument would be made available to Texas A&M PIs for a fee including training. A preliminarily list of potential users includes faculty from the colleges of Geosciences, Agriculture and Life Sciences, Engineering, TTI, and the School of Public Health. In all these cases, the availability of a universal trace gas compound analyzer would improve analytical capabilities both with respect to analytes currently not accessible and/or with respect to the time resolution of measurements, or by eliminating sample preparation steps. In addition, the availability of a portable instrument, alongside flexible calibration options such as a liquid calibration unit, allows PIs to include the new facility in future proposals for research requiring onsite, laboratory or field, usage using real-time measurements, dramatically increasing capabilities and competitiveness over off-line measurements. The user community would include atmospheric scientists (atmospheric chemistry and trace gas research, disaster response), environmental scientists (biogeochemical flux and environmental contamination/degradation research), engineers (energy efficiency, chemical kinetics, biofuels research), plant scientists (plant physiology and signaling research), and public health scientists (contamination, breath composition and screening for disease research).

We anticipate that the facility will dramatically enhance external funding competitiveness due to vastly improved analytical capabilities with respect to breadth, sensitivity and time resolution. Both disciplinary and interdisciplinary research through collaboration may be enhanced, as well as education, as the instrument could be used in geoscience, engineering and chemistry laboratory courses. There currently exists no equivalent analytical technique or capability on campus. Therefore, this facility will not only enhance existing research, but also create new infrastructure and opportunities as PIs discover new ways to probe existing systems.