

II. Scope of Services.

University shall render Services to County as defined in Exhibit "A" attached hereto and incorporated herein for all purposes.

III. Personnel.

- A. University represents that it presently has, or is able to obtain, adequate qualified personnel in its employment for the timely performance of the Scope of Services required under this Agreement and that University shall furnish and maintain, at its own expense, adequate and sufficient personnel, in the opinion of County, to perform the Scope of Services when and as required and without delays.
- B. All employees of University shall have such knowledge and experience as will enable them to perform the duties assigned to them. Any employee of University who, in the opinion of County, is incompetent or by his conduct becomes detrimental to the project shall, upon request of County, immediately be removed from association with the project.

IV. Time of Performance, Termination.

- A. This Agreement is effective from and after the date of execution by all of the Parties and shall terminate no later than twelve (12) calendar months thereafter.
- B. It is expressly understood and agreed to by the Parties that the period or term of this Agreement may be terminated without cause at any time by either party giving to the other party at least thirty (30) days advance written notice of its intent to terminate, specifying in the notice the effective date of the termination. Such notice shall be given by certified mail, return receipt requested, and shall be effective when mailed to the address stated herein.
- C. If either party defaults in the performance of any of the terms and conditions of this Agreement, the defaulting party shall have 30 days after receipt of written notice of such default within which to cure such default. If such default is not cured within such period of time, then the offended party shall have the right without further notice to terminate this Agreement.
- D. This Agreement may not be altered, modified, or amended except in writing, approved by the Parties.

V. Compensation and Payment

- A. University's fees shall be calculated at the rates set forth in the attached Exhibit A. The Maximum Compensation for the performance of Services described in Exhibit A is One Hundred Thousand and no/100 dollars (\$100,000.00). In no case shall the amount paid by County under this Agreement exceed the Maximum Compensation without written amendment executed by the Parties.
- B. All performance of the Scope of Services by University including any changes in the Scope of Services and revision of work satisfactorily performed will be performed only when approved in advance and authorized by County.
- C. County will pay University based on the following procedures: Upon completion of the tasks identified in the Scope of Services, University shall submit to County staff designated by the Health and Human Services Director, one (1) electronic (pdf) and/or one (1) original copy of invoice showing the amounts due for services performed in a form acceptable to County. County shall review such invoices and approve them within thirty (30) calendar days with such modifications as are consistent with this Agreement and forward same to the Auditor for processing. County shall pay each such approved invoice within thirty (30) calendar days. County reserves the right to withhold payment pending verification of satisfactory work performed.

VI. Inspection of Records

County has the right to audit and inspect records maintained by University relating to work performed under this Agreement during and up to 12 months after the termination of this Agreement.

VII. Limit of Appropriation

- A. University clearly understands and agrees, such understanding and agreement being of the absolute essence of this Agreement, that County shall have available the total maximum sum of One Hundred Thousand and no/100 dollars (\$100,000.00), specifically allocated to fully discharge any and all liabilities County may incur.
- B. University does further understand and agree, said understanding and agreement also being of the absolute essence of this Agreement, that the total maximum compensation that University may become entitled to and the total maximum sum that County may become liable to pay to University shall not under any conditions, circumstances, or interpretations thereof exceed One Hundred Thousand and no/100 dollars (\$100,000.00).

VIII. Relationship of Parties

- A. The Parties agree that in performing services specified in this agreement, that each is an independent contractor and shall have control of its work and the manner in which it is performed. Neither party, its agents, employees, volunteers, help, or any other person operating under this Agreement, shall be considered an agent or employee of the other and neither shall be entitled to participate in any pension or other benefits that the other provides its employees.
- B. Each party shall be responsible for obtaining and maintaining its own liability and property insurance against losses or liability related to this Agreement.

IX. Notice to Parties

- A. Any notice given hereunder by either party to the other shall be in writing and sent by certified mail, return receipt requested.

To County: Fort Bend County Health and Human Services
Attn: Director
4520 Reading Road, Suite A-100
Rosenberg, Texas 77471

Copy to: Fort Bend County
Attn: County Judge
401 Jackson, 1st Floor
Richmond, Texas 77469

To University: The University of Texas at Austin
Office of Sponsored Projects
Peter T. Flawn Academic Center (FAC)
2304 Whitis Ave, Suite 426; (Mail Code A9000)
Austin, Texas 78712-1111

- B. Each party may change the address for notice to it by giving notice of such change in accordance with the provisions of this paragraph.

X. Insurance.

The liability of the University for personal injury and property damage is controlled by the Texas Tort Claims Act, V.T.C.A. Civil Practice and Remedies Code ("Act"), Chapter 101, Section 101.021. The limits of liability are \$250,000 for each person, \$500,000 for each single occurrence for bodily injury or death and \$100,000 for each single occurrence for injury to or destruction of property. The University is financially responsible for the liability imposed under the Act, up to the limits set forth above. By executing this Agreement, University has

not waived its sovereign immunity. The University is self-insured for Workers' Compensation Insurance provided by Chapter 503 of the Texas Labor Code. Benefits are provided in accordance with the provisions of that law.

XI. Indemnification

To the extent allowed by law, University agrees to promptly defend, indemnify, and hold County harmless from and against any and all claims, demands, suits, causes of action, and judgments for (a) damages to the loss of property of any person; and/or (b) death, bodily injury, illness, disease, loss of services, or loss of income or wages to any person, arising out of incident to, concerning, or resulting from the negligent or willful act or omissions of University's agents, officers, and/or employees in the performance of activities of duties pursuant to this Agreement.

XII. Governmental Immunity

It is expressly understood and agreed that the execution of this Agreement, the Parties hereto do not intend to waive, nor shall be deemed to waive, any immunity or defense at law or in equity, that would otherwise be available to each against claims arising in the exercise of governmental powers and functions including the defense of governmental immunity.

XIII. Termination of Contract for Unavailability of Funds

- A. The Parties acknowledge that either party may terminate this Agreement in whole or part if either party learns that funds to pay for the Services will not be available at the time of performance.
- B. County terminates this Agreement for unavailability of funds by giving the University notice of the termination, as soon as it learns of the funding unavailability, and specifying the termination date, which may not be less than 15 calendar days from the notice date. The Agreement terminates on the specified termination date.
- C. If the University terminates this Agreement pursuant to this Article 13, University shall refund any unused funds paid by the County to University within 10 calendar days.

XIV. Miscellaneous Provisions

- A. Entire Agreement. This executed instrument is understood and intended to be the final expression of the Parties' agreement and is a complete and exclusive statement of the terms and conditions with respect thereto, superseding all prior agreements or representations, oral or written, and all other communication between the parties relating to the subject matter of this Agreement. Any oral representations or modifications concerning this instrument shall be of no force or effect excepting a subsequent modification in writing signed by all the parties hereto.

- B. Law and Venue. The laws of the State of Texas govern all disputes arising out of or relating to this Agreement. The parties hereto acknowledge that venue is proper in Fort Bend County, Texas, for all legal actions or proceedings arising out of or relating to this Agreement and waive the right to sue or be sued elsewhere. Nothing in the Agreement shall be construed to waive either party's sovereign immunity.
- C. Assignment. No assignment of this Agreement or of any right accrued hereunder shall be made, in whole or in part, by either party without the prior written consent of the other party.
- D. The undersigned officer and/or agents of the Parties hereto are the properly authorized officials of the party presented and have the necessary authority to execute this Agreement on behalf of the Parties hereto and each party hereby certifies to the other that any necessary approvals have been duly passed and approved and are now in full force and effect.
- E. The Parties to this Agreement do not intend by this Agreement that any specific third-party may obtain a right by virtue of the execution of performance of this Agreement.
- F. Severability. In the event that any one or more of the terms, provisions, or conditions contained in this Agreement shall for any reason be held to be invalid, illegal, or unenforceable in any respect, such invalidity, illegality, or unenforceability shall not affect the other terms, provisions, or conditions; and the Agreement shall be construed as if such invalid, illegal, or unenforceable term, provision, or condition had never been contained in it.
- G. Publicity. Contact with citizens of Fort Bend County, media outlets, or governmental agencies shall be the sole responsibility of County. Under no circumstances whatsoever, shall Consultant release any material or information developed or received in the performance of the Services hereunder without the express written permission of County, except where required to do so by law.
- H. Texas Public Information Act. Both UNIVERSITY and COUNTY expressly acknowledge that both UNIVERSITY and COUNTY are subject to the Texas Public Information Act, TEX. GOV'T CODE ANN. §§ 552.001 et seq., as amended, and notwithstanding any provision in this Agreement to the contrary, both parties shall make any information related to this Agreement, or otherwise, available to third parties in accordance with the Texas Public Information Act. Any proprietary or confidential information marked as such provided to either requesting party shall not be disclosed to any third party, except as directed by the Texas Attorney General in response to a request for such under the Texas Public Information Act, which provides for notice to the owner of such marked information and the opportunity for the owner of such information to notify the Attorney General of the reasons why such information should not be

disclosed. The terms and conditions of the Agreement are not proprietary or confidential information.

IN TESTIMONY OF WHICH, THIS AGREEMENT shall be effective upon execution of all parties.

FORT BEND COUNTY

THE UNIVERSITY OF TEXAS AT AUSTIN

KP George, County Judge

DocuSigned by:
Jessica Fernandez Vizcarra
C990AC2B04404FF...

Authorized Agent – Signature

Date

Jessica Fernandez Vizcarra

Authorized Agent – Printed Name


ATTEST:

Associate Director of Contracting
Title

Laura Richard, County Clerk

2026-02-05 | 09:45:20 PST

Date

Reviewed by:


Letosha Gale-Lowe, M.D.
Director of Health and Human Services

AUDITOR'S CERTIFICATE

I hereby certify that funds are available in an amount sufficient to accomplish and pay the obligations of Fort Bend County (if any) under this Service Agreement.

Robert Ed Sturdivant, Fort Bend County Auditor

i:\agreements\2026 agreements\hhs\university of texas at austin (26-hhs-100491)\ila for air quality monitoring svcs (kcj - 1.12.2026)

EXHIBIT A

(Follows Behind)

Exhibit A

Interlocal Agreement between The University of Texas at Austin and Fort Bend County, Texas for
Spatiotemporal Air Quality Assessment



OFFICE OF SPONSORED PROJECTS
 Vice President for Research, Scholarship and Creative Endeavors

FAC • 2304 Whitis Avenue Ste 426 • Austin, Texas 78712 • (512) 471-6424 • Mail Code A9000

Date: 11/18/2025

To whom it may concern:

The University of Texas at Austin is pleased to endorse the following proposal enclosed for your review.

Title of Application:	Fort Bend spatiotemporal mapping	FP Number:	FP00013310
Principal Investigator:	Pawel Misztal, Ph.D.		
Project Total Costs:	\$100,000	Cost Share Amount:	\$0
DUNS/UEI:	170230239/V6AFQPN18437	Cage Code:	9B981
Project Dates:	12/1/2025 to 11/30/2026		

LEGAL IDENTITY

The University of Texas at Austin is an agency of the State of Texas and a component institution of The University of Texas System, governed by the Board of Regents. All awards and agreements must be executed by an authorized official of The University. Individuals, Departments, or Organized Research Units may not directly enter into sponsored research agreements or legally bind The University.

The Office of Sponsored Projects (OSP) serves as the coordinating office for externally funded research projects submitted by The University of Texas at Austin. All proposals to external funding sources for sponsored projects must be submitted through OSP and all awards received for sponsored research must be processed by OSP.

Mailing Address: The University of Texas at Austin
 Office of Sponsored Projects
 Peter T. Flawn Academic Center (FAC)
 2304 Whitis Ave, Suite 426; MC A9000
 Austin, Texas 78712-1111

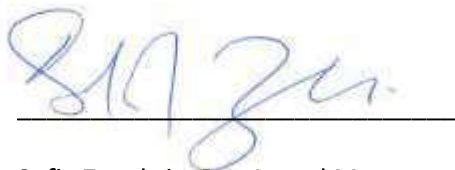
Telephone Number (512) 471-6424
FAX Number (512) 232-6649

AWARD NEGOTIATION

The University of Texas at Austin reserves the right to negotiate the terms and conditions of any awarded grant or contract. As an institution of higher education, The University of Texas at Austin intends to perform the work under any awarded grant or contract as fundamental research and reserves the right to: 1) require that the provider notify the University if it is to provide any export controlled information; 2) to deny receipt of any export controlled materials; and 3) to reject any restrictions on the University's right to publish or otherwise disseminate information relating to this research.

When required by the funding agency, the University verifies senior/key personnel have completed the research security and other support disclosure requirements training mandated by Section 10634 of the CHIPS and Science Act of 2022.

AUTHORIZED OFFICIAL



Sofia Zanabria, Pre-Award Manager, Office of Sponsored Projects
The University of Texas at Austin

ADDITIONAL CONTACTS

Administrative and budgetary matters regarding the proposal:

Sofia Zanabria, Pre-Award Manager
The University of Texas at Austin
Office of Sponsored Projects
Phone: (512) 471-4241
Email: zanabria@austin.utexas.edu

Negotiation and execution of agreement:

The University of Texas at Austin
Office of Sponsored Projects
Peter T. Flawn Academic Center (FAC)
2304 Whitis Ave, Suite 426; (Mail Code A9000)
Austin, Texas 78712-1111
Phone: (512) 471-6424; FAX: (512) 232-6649
Email: osp@austin.utexas.edu

Enclosures:

Proposal Statement of Work
Budget
Budget Justification

Spatiotemporal Air Quality Assessment in Fort Bend County

Principal Investigator: Pawel K. Misztal, Ph.D. (1)

Co-Lead: Kevin Lanza, Ph.D. (2)

Co-Principal Investigators: Sergio Castellanos, Ph.D. (1), Kerry Kinney, Ph.D. (1)

(1) Maseeh Department of Civil, Architectural and Environmental Engineering

Center for Energy and Environmental Resources

The University of Texas at Austin

(2) UTHealth Houston School of Public Health, Austin, TX

Project Duration: December 1, 2025 – November 30, 2026 (12 months)

Field Campaign Period: Two intensive 1-week mobile campaigns separated by 1 week of stationary measurements (3 weeks total field work)

Analysis Period: 1 year following field campaigns, with preliminary analysis at 6 months

Total Budget: \$100,000

Deliverables, Budget, and Budget Justification

Overview & Deliverables

Mobile and Stationary VOC/Criteria Pollutant Data Acquisition and Analysis

.....\$100,000

The team led by Prof. Pawel Misztal (UT Austin Engineering) in collaboration with Prof. Kevin Lanza (UTHealth Houston School of Public Health) and co-PIs will perform an intensive field campaign in Fort Bend County over a 3-week measurement period. The main goal is to assess the spatiotemporal distribution of EPA NAAQS criteria pollutants (O₃, PM_{2.5}, CO, NO_x, SO_x) and spatiotemporal variation of Air Quality Index (AQI) at high temporal (1 second) and spatial resolution (neighborhood scale). In addition, the team will measure a broad suite of hazardous air pollutants (HAPs) including emerging pollutants and other volatile organic compounds (VOCs) to provide comprehensive characterization of air quality across the county across different types of sources.

The field campaign will consist of two intensive 1-week mobile measurement periods separated by 1 week of stationary measurements. This design allows for comprehensive spatial coverage during the mobile phases while the stationary period will capture detailed temporal trends and diel patterns at a preselected key location where the air quality working group team identifies as a priority. The UT electric mobile laboratory (UT EVan) equipped with state-of-the-art gas-phase instrumentation will be deployed for discovery-oriented research to understand sources and impacts on human health and wellbeing.

The comprehensive dataset will enable analysis of air quality patterns, identification of pollution hotspots, source characterization, and assessment of potential health impacts. One year project includes the field campaigns, and comprehensive data processing and analysis, with preliminary findings delivered at 6 months. Monthly meetings with Fort Bend County will occur throughout the project to enhance collaboration and inform decision-making.

Detailed Budget Justification

The total project budget of \$100,000 is allocated across personnel, travel, supplies, tuition, and indirect costs as follows:

Budget Category	Amount
Personnel (Salaries + Fringe)	\$48,414
Travel	\$11,025
Materials and Supplies	\$9,142
Graduate Student Tuition	\$12,919
Subtotal Direct Costs	\$81,499
Indirect Costs (15% MTDC)	\$11,359
TOTAL PROJECT COSTS	\$100,000

Personnel: \$48,414

Personnel costs include salaries and fringe benefits for the project team:

- **PI Pawel Misztal:** 0.5 months summer salary for project oversight, data analysis supervision, and coordination with Fort Bend County
- **Co-PI Sergio Castellanos:** 0.1 months summer salary for spatial analysis and modeling expertise
- **Co-PI Kerry Kinney:** 0.1 months summer salary for air quality engineering advisory and consultation
- **Co-Lead Kevin Lanza (Consulting):** \$8,000 for environmental health assessment and exposure science expertise
- **Senior Research Coordinator (Dori Eubank):** 1 month for administrative and budgetary management
- **Graduate Research Assistant 1:** 9 months at 20 hours/week for lead role in mobile measurements, data processing, and spatial mapping
- **Graduate Research Assistants 2 & 3:** 1 month each at 20 hours/week for support during intensive field campaigns
- Fringe benefits are calculated according to UT Austin rates for full-time, part-time, and graduate student positions

The lead graduate student (Daniel Sung, Misztal group) will take primary responsibility for mobile and stationary measurements of VOCs using the Vocus PTRTOFMS, operation of ancillary instruments, comprehensive data processing, and source apportionment analysis. He will focus on spatial mapping, toxicity-weighted untargeted analysis, and human exposure assessment. Other PhD students (Keuntaek Kim and Hyeongjun Lee) will rotate during the 3-week field campaign to support uninterrupted measurements. A small portion of postdoc time (Chun-Ying Chao) is included for gas chromatography (GC) cartridge/canister sample collection and analysis to aid in speciating isomers.

Travel: \$11,025

Travel costs support the 3-week field campaign period with team members rotating in and out:

- **Hotels:** \$5,376 for accommodations near sampling sites during the intensive measurement periods (3 team members × 14 days × \$128/night)
- **Vehicle Rental:** \$1,150 for support vehicle during campaign
- **Per Diem:** \$2,499 at UT rates (\$51/day) for team members during field work
- **Service Center Charges:** \$2,000 for UT EVan use and maintenance

- Transportation of the UT EVan from Austin to Fort Bend County is included (approximately 4-6 hours driving each way). Charging costs for the electric van are included as well.

Materials and Supplies: \$9,142

Mobile Lab Preparation and Maintenance

Van inspection by an authorized Ford dealer including necessary minor repairs and maintenance. Optimization of van layout for safe instrument distribution and optimal payload configuration.

Sample Collection and Analysis Consumables

VOC-compatible tubing, Swagelok fittings, mounting hardware, heated inlets, shock-absorbing mats, ethernet cables, and wiring for instrument automation. Consumables for the Vocus PTRTOFMS include capillary tubing, filters, and replacement parts. Authentic Apel-Riemer VOC standards pressurized to 25 psi in Silanite canisters for daily calibrations. GC adsorbent cartridges for speciation analysis.

Additional Equipment

Additional marine batteries and inverter capacity to ensure continuous multi-hour measurements. Universal Power Supply system to prevent instrument shutdown during brief power interruptions. These upgrades are critical for reliable operation during the intensive 3-week field campaign.

Graduate Student Tuition: \$12,919

Tuition and fees for graduate student support during the 12-month project period, including fall/spring semester tuition (\$10,942) and summer session tuition (\$1,977). This enables dedicated graduate student time for field measurements and comprehensive data analysis.

Indirect Costs: \$11,359

Indirect costs calculated at 15% of Modified Total Direct Costs (MTDC), which excludes tuition and equipment per UT Austin guidelines. This covers institutional overhead including facilities, administration, and research support infrastructure.

Research Questions

Examples of research questions to be addressed collaboratively with Fort Bend County:

- What is the spatiotemporal distribution of EPA NAAQS criteria pollutants (O₃, PM_{2.5}, CO, NO_x, SO_x) across Fort Bend County at neighborhood scales?
- How does the Air Quality Index vary throughout the sampling period and across different neighborhoods?
- What are the major sources contributing to hazardous air pollutants (HAPs) and volatile organic compounds (VOCs) in the area?
- What is the comprehensive gas-phase chemical composition associated with industrial, agricultural, and urban sources in the areas sampled in Fort Bend County?
- How do factors such as wind direction, temperature, time of day, and emission sources affect the measured distribution of air pollutants?
- What are the locations of air quality hotspots and what sources contribute to elevated pollutant concentrations?
- What are the potential health implications of measured pollutant concentrations and which communities may face elevated exposure risks?

Project Timeline and Field Campaign Design

Total Project Duration: 12 months (December 1, 2025 – November 30, 2026)

Phase 1: Mobile Campaign 1 (1 week)

The first intensive mobile measurement campaign will focus on comprehensive spatial coverage of Fort Bend County. The UT EVan will execute both survey and focused tracks designed in coordination with Fort Bend County (Letosha Gale-Lowe, MD and county and community representatives) to capture:

- Maximal coverage of critical source areas and neighborhoods
- Comprehensive composition of VOCs and criteria pollutants from industrial, agricultural, and mobile sources
- Representative sampling across different census tracts
- Initial identification of pollution hotspots and areas of concern

After initial exploratory tracks, routes will be optimized and repeated to gain statistical power across weekdays and weekends and at different times of day. This repeated sampling approach enables robust characterization of temporal variability.

Phase 2: Stationary Measurements (1 week)

Following the first mobile campaign, the UT EVan will be positioned at key stationary sites identified during Phase 1. During this period:

- Automated continuous sampling will capture complete diel (24-hour) trends
- High temporal resolution measurements will reveal influence of wind direction, meteorology, and time of day
- Detailed characterization of episodic events and emission patterns at priority locations
- Preliminary data analysis to inform optimization of the second mobile campaign

Phase 3: Mobile Campaign 2 (1 week)

The second mobile campaign will build on insights from Phases 1 and 2, with refined sampling strategies:

- Targeted measurements at hotspots identified in Phase 1
- Additional spatial coverage to fill gaps in the dataset
- Optimized routes based on wind patterns and exploratory findings
- Enhanced statistical power through repeated measurements of the repeated track.

Phase 4: Data Processing and Analysis (~37 weeks)

Comprehensive data processing, analysis, and reporting will occur during the year following field campaigns. Large dataset processing including quality assurance/quality control, post-processing, and preliminary analysis. Advanced analysis including source apportionment, spatial mapping, and statistical modeling; preliminary findings summary will be delivered to Fort Bend County at the end of month 6

Phase 5: Dissemination and Sustainability

Comprehensive analysis, health risk assessment, and detailed source characterization. Dataset finalization, final report preparation, visualization development, and deliverable completion. Regular progress meetings and presentations to Fort Bend County will occur throughout the project duration.

Personnel Roles and Responsibilities

Principal Investigators

Pawel K. Misztal, Ph.D. - Principal Investigator

PI responsible for the efficient execution of the project focusing on gas-phase source contribution, plume fingerprinting, and source apportionment in the aspect of factors affecting human health. He will oversee the UT team work and facilitate addressing overarching research questions collaboratively with Fort Bend County.

Kevin Lanza, Ph.D. - Co-Lead

Co-lead will collaborate on study design and provide expertise in environmental health assessment and exposure science, helping to contextualize findings for public health implications.

Sergio Castellanos, Ph.D. - Co-PI

Co-PI will contribute expertise in environmental data analysis and spatial modeling to enhance the understanding of pollutant distribution patterns.

Kerry Kinney, Ph.D. - Co-PI

Co-PI will provide expertise in air quality engineering and environmental systems analysis.

Lead Student

Daniel Sung (Misztal Group)

Will take the lead on mobile and stationary measurements of VOCs by the Vocus, operation of ancillary instruments, and source apportionment analysis. He will be responsible for processing the Vocus data and will focus on spatial mapping, toxicity-weighted untargeted analysis, and human exposure assessment for Fort Bend County.

Supporting Team Members

Hyeongjun Lee (Misztal Group)

Will complement mobile and stationary measurement execution and support data acquisition during the intensive field campaigns.

Keuntaek Kim (Misztal Group)

Will complement mobile and stationary measurement execution and contribute to combined source apportionment analysis integrating multiple data streams.

Chun-Ying Chao (Misztal Group - Postdoc)

Will complement GC analysis of adsorbent cartridge samples to speciate terpenes and other chemical formulas which have multiple isomeric possibilities detected by the Vocus.

Dori Eubank - Senior Research Coordinator

Will manage administrative and budgetary aspects of the study for the UT team, including travel authorizations, purchasing, and reimbursements.

Mobile and Stationary Campaign Planning

We propose various driving approaches to capture maximal coverage of the most critical sources and areas of concern in Fort Bend County. We will include suggestions from the Fort Bend County team (represented by Letosha Gale-Lowe, MD) and will discuss the sequence of the tracks at planning meetings. Both survey and focused tracks will be executed to measure the comprehensive composition of VOCs and criteria pollutants from a

range of area and mobile sources including industrial facilities, agricultural operations, major roadways, and residential areas.

We will optimize tracks based on further discussion with the county team, prevailing wind directions, and exploratory survey tracks to scan for major hotspots and areas of elevated pollution. Measurements will be planned to maximize data support for individual research questions and to cover representative portions of each census tract and neighborhood. This will enable robust spatial mapping and identification of environmental justice concerns.

Regular daily calibrations will be conducted with authentic Apel-Riemer VOC standards pressurized to 25 psi in Silanite canisters to prevent driving with compressed gas cylinders. The composition of canisters will be compared against the cylinder after filling and at the end of the campaign to assess potential losses or transformations. Quality assurance/quality control (QA/QC) procedures will be rigorously followed throughout the campaign.

The tracks will be added as a layer on the Fort Bend County map for visualization and planning:

https://www.google.com/maps/d/edit?mid=1Y_jPSH3IUULqm0cqbYrXD7CKSLCyQ3Y&usp=sharing

Instrumentation and Methodology

UT EVan Mobile Laboratory

The UT electric mobile laboratory (UT EVan) is a custom-built electric vehicle platform designed for high-resolution air quality measurements. The van is equipped with:

- Vocus 2R Proton Transfer Reaction Time-of-Flight Mass Spectrometer
- GPS and meteorological instruments for geolocating measurements
- Criteria pollutant monitors for EPA NAAQS parameters
- Data acquisition and processing systems
- Marine battery power system for extended autonomous operation

Vocus 2R Proton Transfer Reaction Time-of-Flight Mass Spectrometer

Comprehensive real-time VOC analysis by proton transfer reaction mass spectrometry (PTR-MS) has led to major advances in atmospheric sciences, environmental engineering and air quality (Park et al., 2013; Li et al., 2020). Given that the technology to measure chemicals at ppt levels has been developed recently over the last decade and has been precision fine-tuned only over the last few years (Krechmer et al., 2018), it holds unprecedented potential in characterizing emission factors from different types of biogenic and anthropogenic sources (e.g., Misztal et al., 2018).

The state-of-the-art UT Vocus 2R Proton Transfer Reaction Time-of-Flight Mass Spectrometer (Vocus PTRTOFMS; aka the 'Sniffer') is used to monitor the real-time composition of the full VOC spectrum detectable by H₃O⁺ or NH₄⁺ ionization. The Vocus 2R is ultrasensitive to volatile and semivolatile compounds, owing to a highly efficient design of the ion-molecule resistive glass drift-tube reactor which can be heated up to 150 degrees C.

With sub-ppt (less than 10⁻¹²) detection limits, Vocus can detect and quantify thousands of individual VOC and SVOC ions in the ambient air at high mass and time resolution. This capability is specifically useful to understand the chemical composition of gases from fugitive, episodic or uncharacterized sources. The high time resolution (less than 1 second) and mass resolution (15,000 m/delta-m) allows for air quality monitoring and evaluation of changes in response to environmental or micrometeorological variables.

At this low detection limit, the Vocus PTRTOFMS can quantify approximately 100 times more chemicals in the air than the previous generation of PTR-ToF and conventional gas chromatography instruments. Specifically advantageous in high humidity environments such as Houston is that the Vocus source uses a high amount of absolute water in the reaction cell (greater than 15% H₂O by volume) for both the NH₄⁺ and H₃O⁺ reagent ions. The high absolute humidity means that changes in sample air humidity lead to comparatively small humidity changes in the reactor. Thus, in contrast to other mass spectrometric instruments, the Vocus PTR-MS has no quantitative humidity dependence, greatly simplifying quantification of species sampled in air where humidity can be high and change quickly.

The PI has been one of the early contributors to the developments of this new technology which surpasses current standards used by the EPA. Canister samples will be collected for comparison with EPA methods as well as collocations with TCEQ monitoring stations to provide validation and method comparison.

Ancillary Instrumentation and Measurements

In addition to the Vocus PTRTOFMS, the UT EVan will be equipped with instrumentation to measure EPA NAAQS criteria pollutants including:

- Ozone (O₃) monitor
- Particulate matter (PM_{2.5}) monitor
- Carbon monoxide (CO) analyzer
- Nitrogen oxides (NO_x) analyzer
- Sulfur dioxide (SO₂) analyzer

High-resolution GPS and meteorological measurements (temperature, humidity, wind speed/direction, solar radiation, pressure) will be collected continuously to enable geolocated analysis and understanding of transport and dispersion patterns.

Data Analysis and Deliverables

Comprehensive data processing and analysis will occur during the year following field campaigns. The analysis will include:

- High-resolution spatial mapping of all measured pollutants
- Temporal trend analysis including diel patterns and weekday/weekend differences
- Identification and characterization of pollution hotspots
- Preliminary source apportionment using multivariate factor analysis techniques
- Non-targeted analysis to identify unexpected or emerging pollutants
- Health risk assessment using toxicity-weighted exposure metrics
- Statistical analysis of relationships between pollutants and meteorological conditions

Deliverables will include:

- Preliminary findings summary at 6 months after field campaigns
- Comprehensive final report with findings and recommendations at 12 months
- GIS-enabled maps showing spatial distribution of pollutants
- Data visualization products for public communication
- Regular progress meetings and presentations to Fort Bend County
- Quality-assured dataset for future analysis and regulatory purposes

References

Krechmer, J., Lopez-Hilfiker, F., Koss, A., Hutterli, M., Stoerner, C., Deming, B., Kimmel, J., Warneke, C., Holzinger, R., Jayne, J. and Worsnop, D.: Evaluation of a new reagent-ion source and focusing ion–molecule reactor for use in proton-transfer-reaction mass spectrometry. *Analytical Chemistry*, 90(20), pp.12011-12018, 2018.

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