STAR and other ORD Supported Research

The following tables list projects that are relevant to the Charge Questions and supported through the Science to Achieve Results (STAR) extramural grants and other supplemental internal ORD programs.

Research to Inform Decision Making and Plans to Meet NAAQS (CQ1)

Solicitation or Project Title (PI, Institution)		Start date of grant	# journal articles
Solicitation: Chemical Mechanisms to Address New Challenges in Air Quality Modeling			
Leveraging comprehensive organic oxidation experiments for the development of improved atmospheric chemical mechanisms (Jesse Kroll, MIT)	STAR	August 2020	-
Development, validation and integration of a new model-ready parameterization of N_2O_5 heterogeneous chemistry (Tim Bertram, University of Wisconsin)	STAR	August 2020	-
Scalable chemical mechanisms of emerging sources for community air quality predictions (Kelley Barsanti, University of California - Riverside)	STAR	August 2020	-
Developing mechanisms for secondary organic aerosol from oxygenated volatile organic compounds in biomass burning and volatile chemical product emissions (Jathar Shantanu, Colorado State University) (early career)	STAR	August 2020	-
Evaluating chemical mechanisms with recent field data to account for the contributions of volatile chemical product emissions to urban ozone pollution (Matt Coggon, University of Colorado - Boulder) (early career)	STAR	August 2020	-
A diagnostic package to facilitate and enhance chemical mechanism implementations within regional and global atmospheric chemistry models (Julie Nicely, University of Maryland - College Park)	STAR	August 2020	-
Machine-learned atmospheric chemical mechanisms (Chris Tessum, University of Illinois - Urbana-Champaign) (early career)	STAR	August 2020	-

Solicitation or Project Title (PI, Institution)		Start date of grant	# journal articles
Automated model reduction for atmospheric chemical mechanisms (V. Faye McNeill, Columbia University)	STAR	August 2020	-
Improving chemical mechanisms for regional/global models in support of US air quality management: application to the GEOS-Chem model (Daniel Jacob, Harvard University)	STAR	August 2020	2
Solicitation: Air, Climate And Energy (ACE) Centers: Science Supporting Solutions			
SEARCH: Solutions to Energy, AiR, Climate, and Health (Michelle Bell, Yale University) (Project 2: Assessment of Energy-Related Sources, Factors and Transitions Using Novel High-Resolution Ambient Air Monitoring Networks and Personal Monitors)	STAR	October 2015	69
Center for Air, Climate, and Energy Solutions (CACES) (Allen Robinson, Carnegie Mellon) (Project 1: Mechanistic Air Quality Impact Models for Assessment of Multiple Pollutants at High Spatial Resolution & Project 2: Air Quality Observatory)	STAR	May 2016	90
Solicitation: Particulate Matter and Related Pollutants in a Changing World			
Rethinking the Formation of Secondary Organic Aerosols (SOA) Under Changing Climate by Incorporating Mechanistic and Field Constraints (Jose Jimenez, University of Colorado - Boulder)	STAR	January 2016	30
Effects of Ammonia on Secondary Organic Aerosol Formation in a Changing Climate (Donald Dabdub, University of California - Irvine)	STAR	January 2016	8
The Effect of Ammonia on Organic Aerosols in a Changing Climate (Rodney Weber, Georgia Tech)	STAR	January 2016	9
Solicitation: Air Pollution Monitoring for Communities			
Shared Air/Shared Action (SA2): Community Empowerment through Low-cost Air Pollution Monitoring (Wendy Griswold, University of Memphis)	STAR	May 2016	3
The Hawai'i Island Volcanic Smog Sensor Network (HI-Vog): Tracking air quality and community engagement near a major emissions hotspot (Jesse Kroll, MIT)	STAR	May 2016	2

Solicitation or Project Title (PI, Institution)		Start date of grant	# journal articles
Putting Next Generation Sensors and Scientists in Practice to Reduce Wood Smoke in a Highly Impacted, Multicultural Rural Setting (NextGenSS) (Catherine Karr, University of Washington)	STAR	August 2016	3
Engage, Educate, and Empower California Communities on the Use and Applications of "Low-cost" Air Monitoring Sensors (Andrea Polidori, South Coast Air Quality Management District)	STAR	May 2016	5
Monitoring the Air in Our Community: Engaging Citizens in Research (Seung-Hyun Cho, Research Triangle Institute)	STAR	May 2016	-
Democratization of Measurement and Modeling Tools for Community Action on Air Quality, and Improved Spatial Resolution of Air Pollutant Concentrations (Albert Presto, Carnegie Mellon)	STAR	May 2016	8

Supplemental ORD Projects	Lead Region	Project Type[1]	Fiscal Year(s)
Development of a next generation high volume sampler for direct measurement of emission rates at oil and natural gas production facilities	Region 8	RARE	2018
Dallas-Fort Worth Ozone -- Investigation of emissions variability on base case performance	Region 6	RARE	2018
Deployment and performance testing of next-generation air sensors during wildland fire smoke events (at Region 10 sites)	Region 10	RARE	2018
Using low-cost sensors to ensure and document improvements in indoor air pollution after stove replacement and home weatherization on the Navajo Nation	Region 9	RARE	2018
Sensor pod loan trial to investigate community air quality	Region 5	RARE	2018
Understanding Emerging Ambient Air Sensing Technologies and Applications of Skills for the Houston Village Green station in Region 6	Region 6	R2P2	2018

[1] Project types are defined at the end of this document.

Supplemental ORD Projects	Lead Region	Project Type[1]	Fiscal Year(s)
Community Participation in Classifying Odors from Air Pollution Emissions	Region 4	RESES	2018
Exploring the cause of persistent high ozone in Connecticut	Region 1	RARE	2019
Advanced fugitive measurements of ethylene oxide emissions	Region 5	RARE	2019
AirQAST Portable Automated Air Quality Monitoring		SBIR	2019
Black Carbon and UV Particulate Matter, Multi-gas, Multi-pollutant Sensor Platform		SBIR	2019
Remote Air Quality Reporting (RAQR) Device		SBIR	2019
Ultralow Power Sensor Package for Ground Level Air Pollution Levels from Wildland Fires		SBIR	2019
Fuel testing, emissions analysis, and modeling to improve Fairbanks PM2.5	Region 10	RARE	2020
A Low-Cost Handheld Sulfur Dioxide Tester with a Hybrid Nanomaterials-Based Sensor Chip		SBIR	2020
Compact High-Performance Sulfur Dioxide Monitor		SBIR	2020
Ethylene-Oxide Monitor With Ultra-Low Limit of Detection		SBIR	2020
Grassland Smoke Emission Measurement Supporting Multi-Modeling Framework Simulation of Rangeland Burning Practices for the Kansas Flint Hills: Phase II	Region 7	RARE	2020
Utilizing low-cost Next Generation Emissions Measurement (NGEM) tools to develop a near-source monitoring and modeling approach for air toxics emissions	Region 4	R2P2	2020
Demonstration of advanced fenceline VOC monitoring systems in New Mexico	Region 6	RARE	2020
Black Carbon and UV Particulate Matter, Multi-gas, Multi-pollutant Sensor Platform		SBIR	2020
Remote Air Quality Reporting (RAQR) Device		SBIR	2020
Ultralow Power Sensor Package for Ground Level Air Pollution Levels from Wildland Fires		SBIR	2020
Next Generation Emissions Measurements and Source Modeling at Gasoline Bulk Terminals	Region 4	RARE	2021
Characterization of EtO Emissions Downwind of a Chemical Facility Using Innovative Realtime Measurement Technologies	Region 7	RARE	2021
Modeling Platform Development for Fairbanks ALPACA Winter Air Quality Study	Region 10	RARE	2021
Predicting Ozone Levels and Ozone Source Contributions in the Denver, CO Non-Attainment Area Using EPA's Air Quality Model	Region 8	R2P2	2020, 2021
Development and testing of fenceline sensor system in EPA Region 4	Region 4	RARE	2017, 2018
Predicting Source Contributions to Background Ozone in the Western United States Using EPA's Air Quality Model	Region 8	R2P2	2019, 2020

Supplemental ORD Projects	Lead Region	Project Type[1]	Fiscal Year(s)
Measurement of combustion efficiency of enclosed combustor devices (ECDs) at oil and natural gas production facilities	Region 8	RARE	2020, 2021
Quantification of Landfill Gas Emissions using next generation emission measurement (NGEM) approaches	Region 5	RARE	2021, 2022
Comparison of Particulate Metals Passive Air Samplers Against Semi-Continuous Metals Monitor near Steel Mills and Other Metal Emitting Facilities	Region 5	RARE	2021, 2022
Demonstration of a Tribal Air Sensor Loan Program	Region 10	RSTIP	2020
Demonstration of Air Sensor Loan Programs for Rural Communities and Living/Nature Museums	Region 5	RSTIP	2020
Collocated Air Sensor Shelters for Tribes and Citizen Science	Region 4 and Region 6	RSTIP	2020
Evaluating Air Pollution Sensors for Hot Spot Monitoring by Citizen Scientists	Region 2	RSTIP	2020
Best Practices Guide for Library Air Sensor Loan Programs	Region 9	RSTIP	2019
Improving Tribal and Citizen Science with Collocated Low-Cost Air Sensor Shelters	Region 4	RSTIP	2019
New Test Method for Community Mapping of Radon in Puerto Rico	Region 2	RSTIP	2019
Los Angeles Public Library Air Sensor Loan Program	Region 9	RSTIP	2019
Multi-component VOC Sensor System for Fugitive Emissions and Odor Identification	Region 4	RSTIP	2019

Considerations for the Greatest Public Health and Environmental Benefits (CQ2)

Solicitation or Project Title (PI, Institution)		Start date of grant	# journal articles
Solicitation: Long-term Exposure to Air Pollution and Development of Cardiovascular Disease			
The Multi-Ethnic Study of Atherosclerosis and Air Pollution (MESA Air): Next Stage (Joel Kaufman, University of Washington	STAR	September 2017	37
Solicitation: Air, Climate And Energy (ACE) Centers: Science Supporting Solutions			
SEARCH: Solutions to Energy, AiR, Climate, and Health (Michelle Bell, Yale University) (Project 4: Human Health Impacts of Energy Transitions: Today and Under a Changing World)	STAR	October 2015	69
Regional Air Pollution Mixtures: The past and future impacts of emissions controls and climate change on air quality and health (Petros Koutrakis, Harvard University) (Project 3: Causal Estimates of Effects of Regional and National Pollution Mixtures on Health: Providing Tools for Policy Makers)	STAR	December 2015	150
Center for Air, Climate, and Energy Solutions (CACES) (Allen Robinson, Carnegie Mellon) (Project 5: Health Effects of Air Pollution and Mitigation Scenarios)	STAR	May 2016	90

Supplemental ORD Projects	Lead Region	Project Type	Fiscal Year(s)
NH3 Bidirectional Flux Study and Rocky Mountain National Park Initiative	Region 8	RARE	2021, 2022

Research for Understanding Fire Emissions and Their Locations and Health and Environmental Impacts and Potential Mitigations (CQ3)

Solicitation or Project Title (PI, Institution)		Start date of grant	# journal articles
Solicitation: Particulate Matter and Related Pollutants in a Changing World			
Interplay Between Black and Brown Carbon from Biomass Burning and Climate (Shane Murphy, University of Wyoming) (early career)	STAR	January 2016	3
Wildfires in the Rocky Mountains Region: Current and Future Impacts on $PM_{2.5}$, Health, and Policy (Yang Liu, Georgia Tech)	STAR	January 2016	8
Particulate Matter Prediction and Source Attribution for U.S. Air Quality Management in a Changing World (Xin-Zhong Liang, University of Maryland – College Park)	STAR	April 2016	6
Effects of Changes in Climate and Land Use on U.S. Dust and Wildfire Particulate Matter (Loretta Mickley, Harvard University)	STAR	January 2016	8
Planning for an Unknown Future: Incorporating Meteorological Uncertainty into Predictions of the Impact of Fires and Dust on US Particulate Matter (Emily Fischer, Colorado State University) (early career)	STAR	January 2016	6
Solicitation: Interventions and Communication Strategies to Reduce Health Risks of Wildland Fire Smoke Exposures			
N/A (anticipated awards start date: Sep 2021)	STAR		

Supplemental ORD Projects	Lead Region	Project Type	Fiscal Year(s)
DIY air cleaners effectively reduce wildfire smoke exposure indoors?	Region 9	RARE	2020
Effect of Escalating Instruction Levels on Mask Filtering Efficiency and Protectiveness	Region 9	RARE	2021

Supplemental ORD Projects	Lead Region	Project Type	Fiscal Year(s)
How Wildland Fire Aerosolizes Microbial Communities		PIP	2020
The Effects of Paternal Exposures on Children's Health		PIP	2020
Effects of Wildland Fire-Generated PM2.5 on Cognitive Performance		PIP	2020
When we have to use PFAS in fire-fighting, how can we minimize its environmental impact?		PIP	2020
Woodsmoke AOP Activation in the Human Airway: A Live View		PIP	2020
Effectiveness of Messaging Strategies to Decrease Wood Stove Pollution	Region 10	RSTIP	2019

STAR and Other ORD Programs Providing Supplemental Funding

Extramural Research funded through EPA's Science to Achieve Results (STAR) grants provides invaluable engagement between the agency and scientific community, fostering a collaboration and knowledge-sharing platform. These grants not only engage top scientists throughout the U.S., resulting in a strong scientific foundation to support the Agency in meeting its mission, but the resulting funded research provides the underlying scientific and engineering knowledge needed to address environmental and human health issues and to improve decision-making, problem detection, and problem-solving.

EPA's Small Business Innovation Research (SBIR) Program is the small program with a big mission: to protect human health and the environment. Broad areas of focus typically stay the same and include clean and safe water, air quality, land revitalization, homeland security, sustainable materials management and safer chemicals. More specific subtopics under each of these broad areas change from year to year.

Regional Applied Research Effort (RARE) Program: The RARE program provides a mechanism for ORD and the regions to collaborate on near-term regional research priorities. RARE research addresses a wide range of environmental issues, from human health concerns to ecological effects of various pollutants. The RSLs coordinate RARE activities and ensure that research results are effectively communicated and used within the regions.

Regional Research Partnership Program (R2P2): R2P2 provides short-term training opportunities for regional technical staff to work directly with ORD scientists in ORD laboratories, centers, and offices. The program builds technical capacity in the regions, enhances the skills and knowledge of regional and ORD staff, and promotes the development of stronger ties between ORD and the regions. The RSLs and headquarters staff facilitate the process of soliciting applicants and helping candidates establish the necessary contacts throughout ORD.

The Regional Sustainability and Environmental Sciences (RESES) program, led by EPA's Office of Research and Development (ORD), matches Agency scientific and technical expertise with high-priority, short-term research needs in each of the Agency's ten Regions across the nation.

Regional/ State/ Tribal Innovation Projects: The RSTIP program provides competitive funding for regional/state/tribal projects that use innovative approaches to address regional, state, and/or tribal science priorities. The program encourages the use of innovative approaches – citizen science and crowdsourcing, advanced monitoring technologies, and social science – which can expand and diversify EPA's work, engage the public, and foster creative solutions to important environmental problems. This also provides a valuable opportunity to continue strengthening the relationship between ORD, regions, states, and tribes.

Pathfinder Innovation Projects (PIPs) challenge EPA scientists to explore the leading edge of environmental science and work to turn innovations in science and technology into new environmental protection capabilities. This internal competition provides staff with additional research time and funding in pursuit of high-risk, high reward research ideas.