NOTICE: In addition to the 8-page Science/Technical/Management Section, proposals must include a "Societal Impact" of up to two pages, see Section 4.4. Proposers must use the Earth Science standard templates for the table of work effort and current and pending support (see Section 4.4).

1. Overview

The NASA Earth Science Division (ESD) Applied Sciences Program seeks proposals to form a Health and Air Quality Applied Sciences Team (HAQAST). This team will apply Earth observations to improve and develop decision-making activities and enable transition and adoption by public- and/or private-sector organization(s) for sustained use in decision making and services to end users in the areas of public health and air quality.

This team will focus on specific applications and demonstrations required to advance the health and air quality management communities’ uses of Earth science observations and models in decision making. An emphasis of the team is on responsiveness to managerial and end user needs, as well as pursuit of multiple applications of varied durations. Awardees will receive baseline funding to be a team member; a separate amount, representing a significant portion of funds overall, will be allocated to team members for "tiger team" projects during the course of the HAQAST. Submissions to this solicitation shall not propose any "tiger team" activities.

2. Scope of Program

2.1 Applied Sciences Program Objectives

The ESD Applied Sciences Program promotes efforts to discover and demonstrate innovative and practical uses of Earth observations. The Program funds applied science research and applications projects to enable near-term uses of Earth observations, formulate new applications, integrate Earth observations and related products in practitioners’ decision-making and transition the applications. The projects are carried out in partnership with public- and private-sector organizations to achieve sustained use and sustained benefits from the Earth observations. For more information visit the Applied Sciences Program website at http://AppliedSciences.NASA.gov/.

The Program supports projects that develop and demonstrate improvements to decision-making from the use of an array of Earth observations and related products. The Program considers that Earth observations broadly include a range of products and capabilities, including Earth-observing satellite measurements (NASA in-orbit and planned satellites, as well as foreign, commercial, and other U.S. Government satellites), outputs and predictive capabilities from Earth science models, algorithms, visualizations, knowledge about the Earth system, and other geospatial products. Hereinafter, this set is referred to collectively as "Earth observations".

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1 Examples include companies, humanitarian organizations, regional associations, international organizations, government agencies, multinational financial institutions, philanthropic institutions, tribal organizations, and not-for-profit organizations.
The Applied Sciences Program has three primary lines of business: Applications, Capacity Building, and Satellite Mission Planning. The Applications themes are currently focused on five of the eight Societal Benefit Areas (SBA) of the international Group on Earth Observations (GEO): Health (including Air Quality), Disasters, Ecological Forecasting, Food Security and Sustainable Agriculture, and Water Resources. The Program includes the influences, risks, and impacts of a changing climate within each of these themes.

2.2 Health and Air Quality Applications Area

The Health and Air Quality application area is managing this program element. This application area supports the use of Earth observations in air quality management and public health, particularly regarding infectious disease and environmental health issues. The area addresses issues of toxic and pathogenic exposure and health-related hazards and their effects for risk characterization and mitigation. The area promotes uses of Earth observing data and models regarding implementation of air quality standards, policy, and regulations for economic and human welfare. The Health and Air Quality Applications area also addresses risks and effects of climate change on public health and air quality to support managers and policy makers in their planning and preparations.

The Health and Air Quality applications area website is available at https://appliedsciences.nasa.gov/programs/health-air-quality-program.

3. Purpose and Scope of Solicitation

The objective of this solicitation is to select a Health and Air Quality Applied Sciences Team (HAQAST). The Health and Air Quality area supports the formation of this team to execute projects on specific applied topics and demonstrations required to advance the health and air quality management communities’ sustained use and application of Earth science observations and models in decision making.

This solicitation is a re-compete of the Health and Air Quality Applied Sciences Team (HAQAST) competed in ROSES-2015. HAQAST will continue to address topics at the intersection of the health and air quality communities, but will also address issues unique to each community.

3.1 Team Purpose

The HAQAST will be expected to connect Earth observations and related products with health and air quality management issues, challenges, and decision-making through 1) active partnerships with health and air quality managers with deliverables/outcomes; 2) self-organization of team members to respond quickly to end user needs; and 3) flexibility in how the team allocates resources. Overall, the team will use multiple satellite observations, especially multisensor fusion products, to better connect research knowledge and results with health and air quality activities of Government agencies, businesses, and other organizations.

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2 The eight GEO SBAs are: Agriculture, Ecosystems/Biodiversity, Disasters, Energy/Minerals, Health, Infrastructure/Transportation, Urban Development, and Water Resources.
Objectives of the HAQAST team include:

- Broaden and deepen the awareness, familiarity, and use of Earth observations by the health and air quality communities;
- Deliver applications and test proofs-of-concept for possible applications;
- Deliver prototypes, activities, demonstrations, etc. that support and complete the transition of applications to operational and end-user organizations;
- Provide technical feedback on Earth observations (especially NASA products) from applications-oriented perspectives and end users in health and air quality communities;
- Identify and/or develop new data products with strong applications and applied research potential;
- Integrate expertise on natural sciences, engineering, data systems, social sciences, and human factors to enable applications to organizational decision making;
- Showcase innovative uses of Earth observations to improve decision-making and environmental health outcomes; and
- Articulate specific applied needs and actual or possible societal benefits stemming from research and applications.

3.2 Team Scope and Composition

This team will focus on specific applied topics required to advance the health and air quality management communities’ use and application of Earth observations decision making. The HAQAST team will conduct new, focused applied science activities on emerging and urgent needs in the health and air quality communities.

The team-generated applications can use all relevant NASA satellite mission observations and can include data products from non-NASA satellites, including foreign satellites. The team will coordinate with other competitively-selected projects within the Health and Air Quality area’s portfolio. The team will likely interact with appropriate mission science teams and with the ESD Research and Analysis Program’s science focus areas, such as the Tropospheric Composition science focus area.

The collective composition of the HAQAST team is expected to include Earth science researchers, modelers, and applications specialists as well as representative experts of the environmental health and air quality communities, such as epidemiologists, statisticians, social scientists, public health officers, atmospheric modelers, air quality forecasters, and air quality policy and regulatory managers. The team will be led by a single Team Leader (see Section 4.3).

Members are expected to have a high level of scientific and technical capability in an applicable area and/or have significant expertise on environmental health and/or air quality management and policy topics. Suggested areas and topics include:

- Regional atmospheric chemical and transport modeling capability as applied to environmental health and air quality issues, including air quality forecasting;
- Emissions and emissions inventory evaluation and improvement;
- Technical aspects of national and international environmental health and air quality policy, including long range transport, air quality management approaches.
in the U.S. and other countries; evolving policy needs arising from interactions among air pollution, health, and climate change; and the national and international organizations that address these issues;

- Assessment of the information content of satellite observations by comparisons with data from other satellite sensors, calibration/validation activities, and well-calibrated existing ground-based sensors;
- Environmental health and air quality trends, regulatory compliance, policy analysis, policy efficacy, and accountability;
- Issues of toxic exposure and health-related hazards and their effects for risk characterization and mitigation;
- Urban heat islands and their impact on air quality and health;
- Epidemiology;
- Other environmental health issues, policies, and impacts (e.g., particulate matter, ozone, wildfires, controlled burns, etc.).

Note: Although the overall Health and Air Quality applications area portfolio includes projects on vector-borne and infectious diseases, as well as on water quality, the HAQAST is not expected to address these topics.

3.3 Team Structure

The structure of the HAQAST will be composed of team members and "tiger teams," which are made up of groups of team members. The tiger teams will conduct ad hoc projects of mixed duration and size to address the priority needs identified through HAQAST engagement with end users. The intent is to provide for agile, rapid, short-term action on emerging needs. These tiger team projects provide flexibility for coordinated efforts to advance systematic, sustained use of Earth observations in the health and air quality communities.

The members of the team will be funded at a baseline level, with additional, supplemental funds available for the tiger team activities (see Section 4.2). Tiger team proposals will be reviewed by members of the health and air quality communities and other subject matter experts. A slate of tiger teams will be periodically recommended by the Team Leader to the Health and Air Quality area Program Manager. The Program Manager will review these inputs and then present his recommendations to the ESD Steering Committee. Team members, especially through the tiger teams, will work in collaboration with end users and managers from the health and/or air quality communities. Please note that submissions to this solicitation shall not propose any "tiger team" activities.

4. Programmatic Information

This Section provides information about the expectations of team members (4.1), budget and eligibility (4.2), team leadership (4.3), content to include in a proposal (4.4), as well as other suggestions (4.5).

4.1 HAQAST Team Members

The HAQAST team is expected to consist of 12 to 15 members whose expertise collectively spans aspects addressed in Section 3.2. The Principal Investigator (PI) of each selected project will serve as sole official member of HAQAST; however, the PI is
welcome to include other individuals, e.g., Co-Investigators (Co-Is), collaborators, graduate students, postdoctoral students in the proposal to support the PI's roles, duties, and contributions to the HAQAST. Team membership is for a period of four (4) years.

Team members will be expected to:

- Work with managers in the health and air quality communities to assess priority needs and issues;
- Translate and interpret research knowledge to managers and end users to assist in applications and developing solutions to current and future challenges;
- Maintain knowledge of research progress by the Earth science community related to the team’s activities;
- Maintain knowledge on emerging and continuing management and policy issues in health and air quality for possible opportunities for applied research and applications;
- Provide information to NASA on a variety of technical matters associated with health and air quality measurements, instruments, algorithms, data products, etc.; and
- Participate in technical interchange meetings, Health and Air Quality Applied Sciences Team meetings (planned semiannually), relevant science team meetings, and more frequent teleconference calls (proposers should budget for ~four domestic trips per year for meetings);

It is expected that the participation at all HAQAST team meetings and NASA-supported reviews will be by the team member or a named Co-Investigator.

4.2 Budget and Eligibility

Awardees will receive annual baseline funding for their membership on the team; this baseline funding enables the core activities of the team membership. NASA will provide additional, supplemental funds for the "tiger teams." The distribution of tiger team funds is decided postaward. The allocation is based on the nature of the needs, tiger team project focus, required expertise from within the team, and other relevant factors. Individual team members will not necessarily receive equal allocations of the supplemental funds.

The expected annual program baseline budget for awards is approximately $2 million per year. Proposers are strongly encouraged to keep the total cost per investigation to approximately $100,000 - $125,000 per year, depending on the complexity of the proposed effort.³

³ This includes NASA civil servant salaries and indirect costs, despite the fact that these costs may be redacted in the proposal. (For more information on this, see Section I c of the ROSES Summary of Solicitation and the SARA website at https://science.nasa.gov/researchers/sara/how-to-guide/nspires-CSlabor/). Thus, any NASA civil servant Co-Investigators on proposals submitted by other organizations must share their total costs, including salaries and indirects, with the submitting organization.
Cost sharing is allowed and encouraged; however, cost sharing is not part of the evaluation criteria. Cost sharing may become a factor at the time of selection when deciding between proposals of otherwise equal overall merit.

The Team will be self-organizing under the direction of the HAQAST Team Leader (see Section 4.3). The Team will create a prioritized list of additional activities to address needs within the health and air quality community that the Team is qualified to address through the tiger teams. Periodically, an expert review of tiger team proposals will occur, followed by a recommendation of a slate of teams and topics by the Team Leader, and a review of these inputs by the Health and Air Quality area Program Manager. The Program Manager will then present his recommendations for tiger team topics to the ESD Steering Committee.

Additionally, the ESD Steering Committee will review the members of each tiger team and the associated budget per team member. After these actions, the tiger team activities will access additional funding per tiger team per member. It is expected that approximately $1.5 million will be available for these tiger teams in FY 2021; however, these potential funds must not be reflected or addressed in the proposal.

All interested people and organizational sectors are eligible to apply, including academia, private, Government, and nonprofit sectors. Representatives of foreign entities are eligible to propose members on a no exchange of funds basis.

Representatives from commercial organizations are eligible and should refer to terms in Sections III(a) and III(d) of the ROSES Summary of Solicitation.

Representatives from interested Federal Government agencies are expected to have labor costs (including indirects) covered by their respective agencies.

4.3 HAQAST Team Leadership

The HAQAST team will be led by a Team Leader, who will be selected by NASA from awarded proposers. The Team Leader will organize the Team, track progress by team members and tiger teams, plan and organize and lead the Team meetings, coordinate development of annual Team work plans (coordinated with the Health and Air Quality area program leadership), and report on achievements of the Team’s work, including a public-facing website and other outreach activities. The Team Leader will perform in close association with the NASA Health and Air Quality area program leadership and relevant R&A program scientists.

Proposers may request consideration for selection as the Team Leader, who will receive additional funds for this leadership role. Interested proposers should articulate their qualifications to be Team Leader and their approach to managing the team. Proposals requesting consideration as team lead are allowed one extra page to cover these items. The team leader will receive approximately $225,000 - $250,000 per year (baseline plus leadership funds). Proposals requesting consideration as team lead should budget for $225,000 - $250,000, understanding that if selected as a member of HAQAST, but not team lead, this budget will have to be re-negotiated.
4.4 Mandatory Proposal Information

Because of the novel nature of this Applied Sciences team, care should be taken to document the PI's qualifications for membership and additional expertise of his/her proposed group. Investigators will have two main roles on the Team: 1) to pursue baseline activities facilitated through core funding and, 2) to participate in tiger team activities appropriate to their background and expertise.

The proposer should provide evidence of expertise and knowledge in areas highly relevant to the primary scientific goals and related applications activities of the Team. The types of expertise and knowledge desired were listed in Section 3.2; however, appropriate expertise is not limited to the examples given there. All proposers must explain the knowledge and skills they have to offer and why they are important for HAQAST activities. Proposals should include a section on which aspects of HAQAST the investigator would be able to help develop and why (i.e., what activities the investigator would pursue with baseline funding). Proposers should articulate their experience with and skill in engaging end-users and managers to identify and successfully address needs. Proposers should include information illustrating their experience, skill, and success with working in team settings.

Proposals should contain a list of references to scientific or technical papers the investigator has published and/or positions held and work conducted that establish her/him as a leader in their area(s) of expertise.

Proposals must also include an additional two-page section titled "Societal Impact," which will be used to clearly identify how the proposed work will complement and improve decision-making activities in the health and air quality communities. The societal impact of the proposed work and planned approaches to qualify or quantify the work’s impacts on decision-making should be illustrated. This section must directly follow the 8-page Science/Technical/Management section of the proposal.

Proposal budgets must allow for a minimum of two HAQAST meetings per year, travel to approximately two conferences or symposia per year, particularly ones organized by community end users, and any proposed additional travel to meet with end users and managers to address applications and project progress.


4.5 Other Suggestions and Considerations

Within the HAQAST and the tiger team projects, NASA will strongly encourage the use of visualizations and visualization techniques to illustrate alternative scenarios and support decision-making activities, so proposers may wish to highlight their ideas and experience with these items. NASA strongly encourages the use of Earth system science models and coupled models (e.g., physical-biological-ecological models) in team activities. Additionally, NASA will encourage the team to consider and use products from recently launched NASA missions, as well as commercial sources, if they meet project requirements.
The public health and air quality communities have developed networks and websites to share information. Proposers are encouraged to utilize these resources to gather information, make contacts to community representatives, understand key needs and issues, understand existing decision support tools, etc. Examples include:

- California Air Resources Board, [http://www.arb.ca.gov/homepage.htm](http://www.arb.ca.gov/homepage.htm);

In addition, the remote sensing and Earth science communities have developed numerous resources to support the application of Earth observations to health and air quality issues. Proposals are encouraged to utilize these resources, as appropriate. Examples include:

- Group on Earth Observations (GEO) Health Community of Practice, [http://geohealthcop.org](http://geohealthcop.org);
- Interagency Cross Cutting Group on Climate Change and Human Health (part of the US Global Climate Research Program (USGCRP)), [https://www.globalchange.gov/about/iwgs/cchhg](https://www.globalchange.gov/about/iwgs/cchhg);
- NASA Health and Air Quality Applied Sciences Team, [http://haqast.org](http://haqast.org);

5. Proposal Format and Evaluation

All proposals submitted to ROSES must strictly conform to the formatting rules in Section IV of the ROSES Summary of Solicitation and the NASA Guidebook for Proposers. Proposals that violate those rules may be rejected without review.

Proposals will be evaluated by a peer-review panel for relevance, intrinsic merit, and cost, as defined in Appendix D of the NASA Guidebook for Proposers and consistent with Section VI(a) of the ROSES Summary of Solicitation, with the following additions.

The evaluation of relevance of a proposal will be not to NASA or Earth Science generally, but specifically to this program element, e.g., as described in Sections 2 and 3. Moreover, the evaluation of Relevance includes the following factors:

- Demonstration of the applicability of Earth observations (and related products) to address a topic of importance to the Applied Sciences program;
- Utility of Earth observations for potentially substantive improvements to health and air quality challenges and decision-making activities;
• Suitability of proposed work to a team setting;
• Extent to which proposed project involves work with and support of air quality and environmental health policy and regulatory managers and end users to deliver solutions enabled by Earth observations; and,
• Potential societal (as opposed to technical) impact of the project.

In addition to the factors given in the NASA Guidebook for Proposers, the evaluation criterion "Intrinsic Merit" includes:
• Ability to develop, test, demonstrate, and achieve results in a team setting;
• Ability to apply Earth observations and related products;
• Ability to characterize decision-making activities and needs for improvement;
• Ability of teaming across appropriate sectors and areas of expertise with appropriate end user organization(s); and,
• Feasibility of the proposed approach to manage the project and achieve stated objectives

In addition to the factors given in the NASA Guidebook for Proposers, the evaluation of Cost includes:
• Appropriateness of the level of effort to manage the project and achieve stated objectives; and,
• Cost effectiveness of the proposed approach to meet identified needs.

6. Award Reporting Requirements

Each awarded project will be responsible for periodic maintenance of team activities, status updates, highlights, and milestone achievements. NASA will coordinate with each principal investigator at award to provide the necessary information for the online reporting system.

The following reports in Sections 6.1 and 6.2 will be required of awardees. In cases where teams of organizations or subcontractors exist, consolidated project reports, including financial records, must be submitted by and are the responsibility of the Principal Investigator. The proposed budget should provide for these reporting requirements.

6.1 Tiger Team Reports

A one-page tiger team "quad chart" (format provided after award) with Purpose and Objectives, Approach, a Figure, and Key Milestones will be required at the beginning and end of each tiger team. Additional charts may be requested to summarize progress. Progress is also verbally reported at Health and Air Quality Applied Sciences Team meetings.

6.2 Annual and Final Reports

Annual reports should thoroughly discuss milestones and achievements met in the past year and look forward to project plans and milestones for the coming year, including "tiger team" activities. Annuals should also address any risks to schedule and intended milestones and include information on financial status.
A Final Project Report is required prior to the conclusion of the project. The Final Report should describe how the grant activities met the solicitation requirements and demonstrated an impact on decision-making activities using Earth observations. The report should describe all the tiger team and core activities undertaken by the Principal Investigator over the course of the grant. The report should also include lessons learned and recommendations. The Program may request a presentation of the project report, results, and findings.

NASA, ESD, and the Applied Sciences Program may periodically request information to support outreach efforts, website content, etc. PIs are expected to publish results from their work in peer-reviewed/refereed, trade, and popular literature.

7. Summary of Key Information

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<tr>
<th>Description</th>
<th>Value/Details</th>
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<tr>
<td>Expected program budget for first year of new awards</td>
<td>~ $2M; ~$100-$125K per award per annum ($225-$250K for team lead award per annum)</td>
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<td>Number of new awards pending adequate proposals of merit</td>
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<td>Award duration</td>
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<td>See Tables 2 and 3 of this ROSES NRA.</td>
</tr>
<tr>
<td>Due date for Proposals</td>
<td>See Tables 2 and 3 of this ROSES NRA.</td>
</tr>
<tr>
<td>Planning date for start of investigation</td>
<td>October 1, 2020</td>
</tr>
<tr>
<td>Page limit for the central Science-Technical-Management section of proposal</td>
<td>8 pages and an additional 2 pages for &quot;Societal Impact&quot; Statement (see Section 4.4). One additional page allowed for proposals requesting consideration as team lead.</td>
</tr>
<tr>
<td>Relevance</td>
<td>This program is relevant to the Earth science strategic questions and goals in the NASA Science Plan. Proposals that are relevant to this program are, by definition, relevant to NASA.</td>
</tr>
<tr>
<td>General information and overview of this solicitation</td>
<td>See the ROSES Summary of Solicitation.</td>
</tr>
<tr>
<td>General requirements for content of proposals</td>
<td>See Section IV and Table 1 of the ROSES Summary of Solicitation and Section 3 of the NASA Guidebook for Proposers.</td>
</tr>
<tr>
<td>Detailed instructions for the submission of proposals</td>
<td>See <a href="https://nspires.nasaprs.com/tutorials/Sections">https://nspires.nasaprs.com/tutorials/Sections</a> 3.22-4.4 of the NASA Guidebook for Proposers and Section IV(b) of the ROSES Summary of Solicitation.</td>
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<tr>
<td>via NSPIRES</td>
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<td>Web site for submission of proposals via Grants.gov</td>
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<td>Funding opportunity number for downloading an application package from Grants.gov</td>
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</tbody>
</table>
| Point of contact concerning this program | John Haynes  
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