### **NASA Research Announcement**

E.7 Support for Open Source Tools, Frameworks, and Libraries, Solicitation: NNH20ZDA001N-OSTFL, <u>https://nspires.nasaprs.com/external/solicitations/summary.do?solId=%7B958CF134-D655-E512-B5AD-84501D14A0C1%7D&path=&method=init</u>

### **Due Dates**

NOI Due: Nov 19, 2020 at 11:59:59 PM Eastern Standard Time

Proposals Due: Jan 19, 2021

# A Full Title of the anticipated proposal (which should not exceed 254 characters and is of a nature that is understandable by a scientifically trained person – at 108 characters):

Sustainable Software for Processing Airborne Data to Support the Workflow of Atmospheric Science Researchers

#### Linked to Organization

University of North Dakota, UND, DUNS 102280781, Cage Code 4B858

### **Business Point of Contact**

John Mihelich and Michael Sadler

# Summary: A brief description of the primary research area(s) and objective(s) of the anticipated work: (4000 characters Max – at 3,281)

Observations are essential to advancement in atmospheric science and related fields. Scientists use atmospheric observations collected from a variety of complex instruments to develop and test hypotheses. However, these observations need to be efficiently processed to extract precise and accurate information, especially for measurement conducted on research aircraft. Additionally, the processing needs to be automated to support conducting quality control and post-flight reviews during field projects. Hence, autonomous software systems are required to support aircraft field projects and follow on data processing and quality assurance. However, software tools and supporting frameworks lack robustness and ease of use which limits the use of atmospheric observations made during field projects and affects the larger Earth Science community. Hence, it is crucial to further develop and update these software based systems to provide a workflow that supports handling large observational data sets routinely collected during field projects.

The project's objective is to enhance the Airborne Data Processing and Analysis (ADPAA://sourceforge.net/projects/adpaa/) software framework to enable continued data processing support of NASA field projects conducted by the University of North Dakota and other research groups. ADPAA is open source software released in 2007 that has supported NASA's MC3E, GCPEx, IPHEX, OLYMPEX, ORACLES, and IMPACTS field projects. ADPAA is the processing package in the airborne instrumentation software framework; however, the framework additionally includes overview documentation on Web and Wiki pages, a testing and demonstration software package (https://sourceforge.net/projects/adtae/), and an installation software package (https://github.com/daviddelene/CoPAS). All components are openly available and have been developed continuously over the past 20 years as part of conducted research projects. The method to enhance the framework will move the majority of the code from IDL to the python programming language and provide additional tools to simplify the workflow for processing and analysis of field project data. Using python will improve the sustainability of the code by using a very popular language and enables contributions from developers who may not have an IDL license. Additionally, the code will be refactored to improve understanding of the software and additional documentation developed to fully describe the complete data processing workflow.

Developing such a sustainable software workflow that has an efficient system for the submission, evaluation and archival of material that enables scientifically useful data collections will result in high impact data analysis and publications from NASA funded research projects. The project is directly aligned with the solicitations' objectives by providing a developed and sustainable software framework of high usage in the NASA community since airborne observations are critical to interpreting satellite data and understanding atmospheric processes. Therefore, enhancement of the software framework will motivate scientists to conduct advanced research projects which strengthen NASA's ability to accomplish its missions and thus promote science and technology of tomorrow.

#### **Proposed Start/End Date:**

May 16, 2021 / May 15, 2024

### A Short Title of the anticipated proposal (50 characters or less – at 50 characters)

Sustainable Software for Processing Airborne Data

### Possible Reviewers (Up to 5 reviewers), Experts must not be from the institutions of the PI or Co-Is

Joe Finlon (jfinlon@ue.edu), Gerald M. Heymsfield (gerald.m.heymsfield@nasa.gov), Greg McFarquhar (mcfarq@ou.edu)

# Team Members: The names of any Co-Is and/or Collaborators as known at the time the NOI is submitted:

PI: Dr. David Delene, Department of Atmospheric Sciences, UND, <u>delene@aero.und.edu</u>

Co-I: Dr. Marwa Majdi, Department of Atmospheric Sciences, UND, <u>marwa.majdi@und.edu</u>