**NASA DEVELOP National Program**

Langley Research Center

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**CALIPSO Health and Air Quality**

Creating tool to help identify Smoke Plumes Observed with CALIPSO and LANDSAT to Improve Future Research and Decision-making

**Project Team:**

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**Advisors & Mentors:**

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**Partner Organizations**

NASA CALIPSO Science Team, Partner POC: Dr. Charles Trepte and Amber Soja

**Applied Sciences National Applications Addressed:**

Health and Air Quality

**Study Area:** Global

**Study Period:** May 2006 - Current

**Earth Observations & Parameters**

CALIPSO, CALIOP - Vertical Profile of Aerosols

Terra, MISR - Thermal Anomalies

S-NPP, VIIRS - Fire Detections

**Objectives Overview**

This project is focused on the development of a tool based off an existing IDL code that will allow researchers working with Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations (CALIPSO) and LANDSAT data to analyze smoke plumes, clouds, and other aerosols, overlaid on a map. The tool will allow researchers to identify, outline, and categorize a suspected object. The tool will also give the ability to catalogue the object by location, time, vertical features, classification, and other features and store them into a database for better organization and future analysis by the CALIPSO Science Team and numerous other research groups.

**Abstract**

Lidar data, such as that produced by the CALIPSO Earth Observing System (EOS), is relatively new and many researchers are unfamiliar with its formatting and appearance. Because of this, CALIPSO data is often unused despite its application in various research projects The proposed solution was the creation of a web-application that will increase the ease-of-access to the CALIPSO data sets. Towards this goal DEVELOP will develop a tool that will allow a researchers to identify, select, and categorize aerosol objects, and a database to store and organize these objects. Once this database is in place, a web application can be built around the database, giving users an easy to use system for browsing the available data.

**Community Concerns**

* Having a tool and corresponding database will help understand the impact of smoke on air quality downstream of the source fires

**Current Management Practices & Policies**

Currently the CALIPSO science team is usingIDL to read and view CALIPSO lidar data. This system was not designed for the purpose of selecting and creating individual aerosol objects. There is currently no centralized method of storing and collaborating findings other than manual sharing.

**Decision Support Tools**

* Lidar Data viewing tool that will allow for the selection of aerosol smoke objects

**Benefit to End-User:**

* Simplify the data acquisition
* Provide a means of organizing data in a logical manner

**Ancillary Datasets Utilized**

* GEOS-5 - Atmospheric data
* NASA MERRA - Atmospheric data
* NOAA Hazard Mapping System (HMS) Fire and Smoke Product - Smoke Plume detection

**Software Utilized**

IDL - existing tool to use as reference

Python - visualization of CALIPSO data

ArcGIS - Raster Manipulation/Analysis, Image Enhancement & Map Creation of Landsat ETM+, NPP VIIRS, Aqua/Terra MODIS