Satellite Visualization using VIIRS Imagery over Alaska

Andrew Gonzalez | Elizabeth Ferreira | Elius Etienne | Paul K. Alabi

NOAA CREST | City College of New York | New York City College of Technology | The Brooklyn Latin School
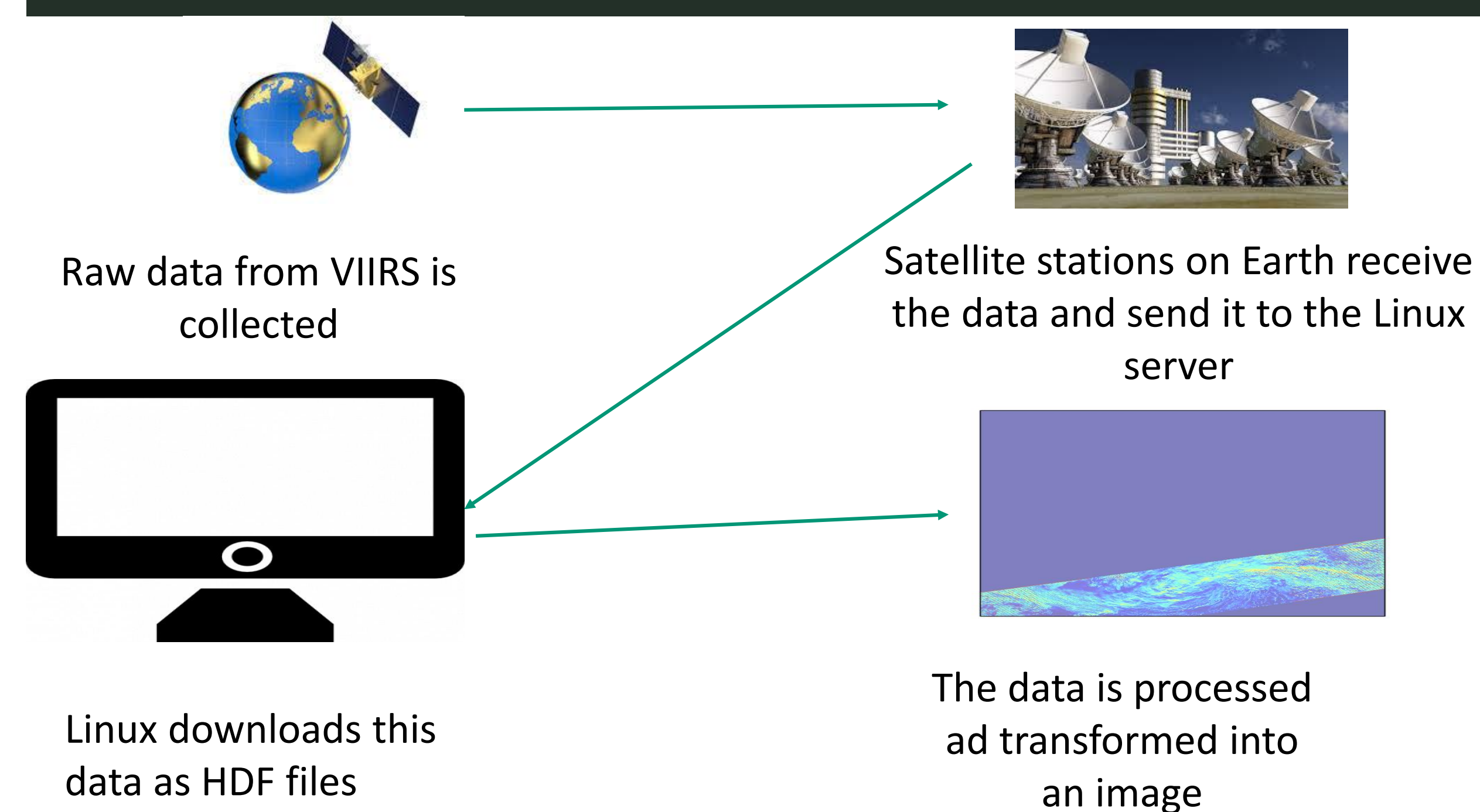
ABSTRACT

Satellites are artificial objects that placed in a planets orbit to collect data about the planet or communicate. These objects can have different purposes, from collecting data about the environment, to providing communications or for defense and security. Environmental satellites are designed primarily to collect data about the planet's environment. Satellites observing the earth help us better understand atmospheric and ocean interaction. It is also used to provide weather forecasting, and warnings about severe weather. The environmental satellite used in this project is the SUOMI National Polar-orbiting Partnership operated by the National Oceanic and Atmospheric Administration (NOAA). VIIRS is an imaging radiometer on Suomi NPP that monitors and observes the earth and its properties. The imagery data help monitor different types of events such as forest fires, hurricanes, and tropical storms. It also helps us monitor sea surface temperatures and land surface temperatures.

My project focuses on satellite data processing and visualization. Data will be taken from the VIIRS sensor will be processed using a collection of specialized tools and programs such as CSPP community package, python programming language and Linux operating system. Alaska is unique geographically. It is located at higher latitudes and is extremely important for transportation and other economy factors. Imagery from VIIRS helps monitor river ice, snow and flooding which occur frequently in Alaska.

PROCEDURE

Raw data from VIIRS is collected

Satellite stations on Earth receive the data and send it to the Linux server

Linux downloads this data as HDF files

The data is processed ad transformed into an image

OBJECTIVES

The main objective of this research project is to provide a hi-res image of the landscape of Alaska using the VIIRS sensor aboard the SUOMI satellite, in order to make observations on the seasonal changes and atmospheric appearance of Alaska.

METHODS

System Applications
SUOMI, VIIRS data, Linux OS

Software Applications
HDF view, Python, HDF4, CSPP

Procedure:

- Data is collected from the satellite going around the Earth surface

- Its is then sent to the satellite dishes and into the server Linux.

- The server then downloads the data as HDF files, and processes them to create an image of Alaska.

- **Method:**

- The satellite SUOMI NPP orbits the Earth vertically by the poles, collecting data of the levels of red, blue and green in each area as well as its thermal signatures.

- The antennae down on Earth collect this data and save it as raw L0 files

- The raw data files are then processed into L1 files

- These files are then stored in HF format

- Using python coding, the files are then retrieved from the HDF view sever and processed on Linux (Latitude, Longitude, Radiance)

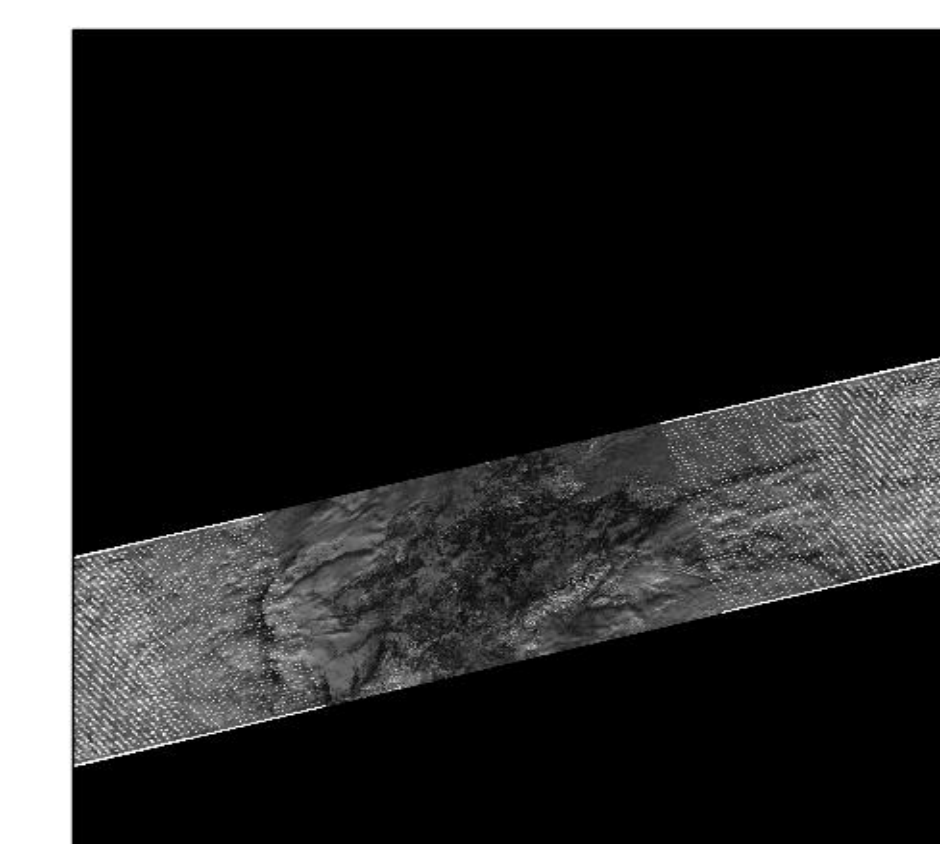- These data sets are processed and organized to produce an image in the cylindrical equidistance projection.

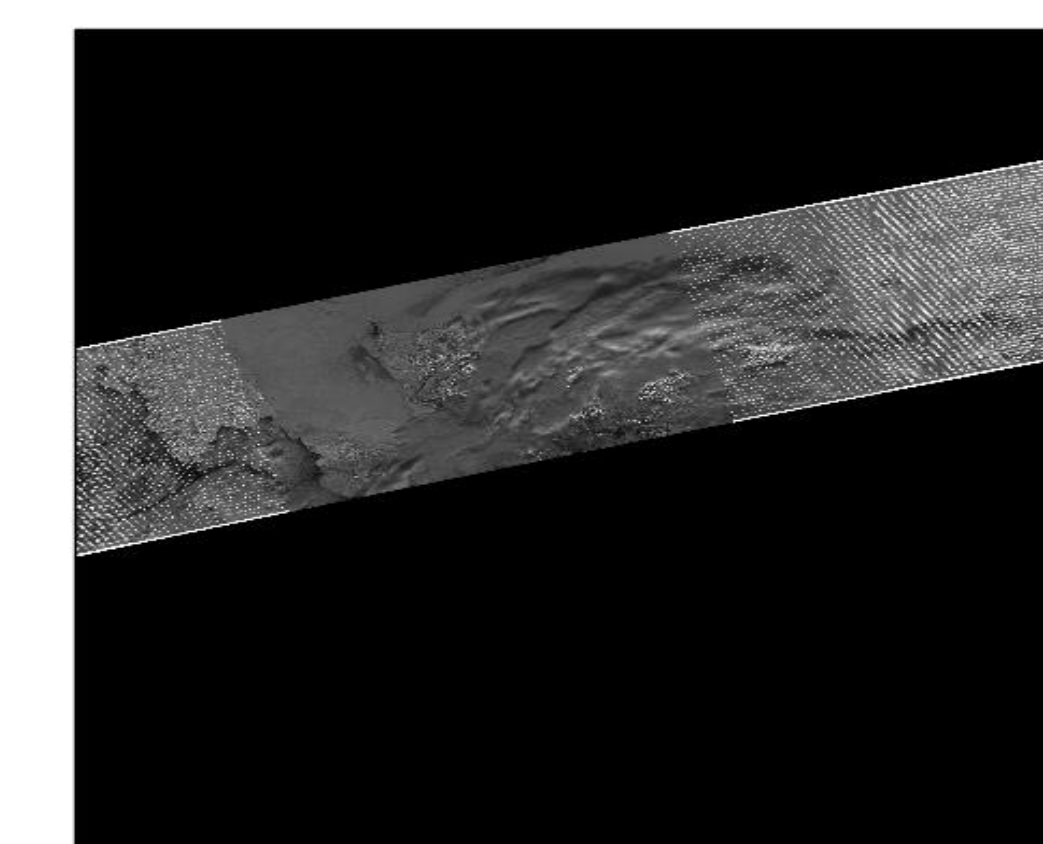### VIIRS (SUOMI NPP)

RESULTS

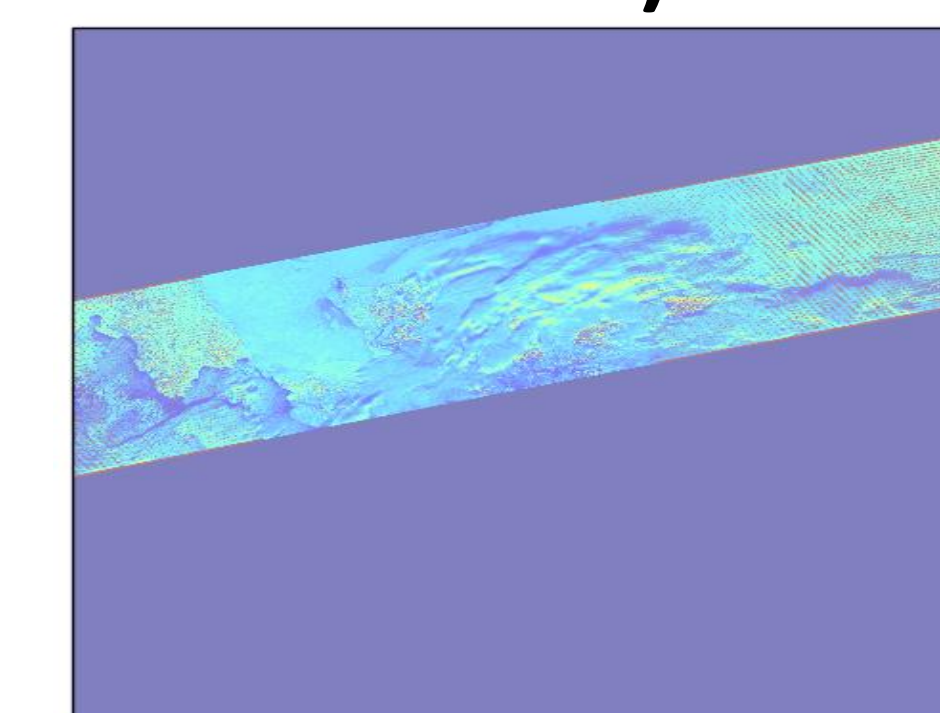**Alaska landscape through the use of VIIRS (Contain Bowtie effect)**

Greyscale

Feb 14, 2015
22:0 UTC

Greyscale

Feb 14, 2015
22:0 UTC

Hyperspectral (contains Bowtie effect)

Feb 14, 2015
22:0 UTC

Hi-Res Image of Alaska landscape through the use of VIIRS.

Feb 14, 2015
22:0 UTC

CONCLUSIONS

These images reveal the way Alaska looks from afar, allowing scientists to examine and interpret different conditions happening in the area. Since Alaska is an integral part of the United States economically, knowing which trade routes are accessible depending on the weather is important to know which is one of the main functions of VIIRS. Through this experiment, it is observable that VIIRS can also determine the different weather patterns that happen which helps transportation for the people living there tremendously.

ACKNOWLEDGMENTS