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COMPETITION ON INNOVATIONS DEVELOPED AFTER THE NASA SPACE APPS COVID-19 CHALLENGE

APPLICATION FORM

Rules:

- To qualify, teams must have evidence of having submitted an entry to the NASA Space Apps COVID-19 Virtual Hackathon.
- Entry to the **"Competition on Innovations Developed After the NASA Space Apps COVID-19 Challenge"** must be the enhancement or improvement of the entry to the NASA Space Apps COVID-19 Challenge.
- All the 11 questions provided in the Application Form must be answered.
- Submit the application form in pdf format to christina_cayamanda@dlsu.edu.ph with the subject: **Application to Competition On Innovations Developed After NASA Space Apps COVID-19 Challenge (Team Name).**
- Submission deadline is 11:30 AM, Tuesday, June 2, 2020.

Team Name : **Phi-6**

Name of the Innovation : **Project AD (Area Denial)**

Choose 1 category. Mark (X) the one that applies to your innovation.

	1. *Quiet Planet*
	2. *Light the Path*
X	3. *Where There's a Link, There's a Way*
	4. *A New Perspective*
	5. *The Art of It All*
	6. *SDGs and COVID-19*
	7. *Food for Thought*
	8. *Purify the Air Supply*
	9. *Human Factors*
	10. *The Isolation Solution*
	11. *A World Away*
	12. *An Integrated Assessment*

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The twelve challenges are the following:

1. *Quiet Planet*
   The COVID-19 outbreak and the resulting social distancing recommendations and related restrictions have led to numerous short-term changes in economic and social activity around the world, all of which may have impacts on our environment. Your challenge is to use space-based data to document the local to global environmental changes caused by COVID-19 and the associated societal responses.

2. *Light the Path*
   The COVID-19 pandemic initiated changes in human population movements and activities around the world. Your challenge is to use Earth observations to explore how human activity and regional land-based human movement patterns may have shifted in response to COVID-19.

3. *Where There's a Link, There's a Way*
   Since the COVID-19 pandemic began, there has been a proliferation of websites and portals developed to share resources about the topic. Your challenge is to find innovative ways to present and analyze integrated, real-time information about the environmental factors affecting the spread of COVID-19.

4. *A New Perspective*
   Due to the COVID-19 pandemic, protected areas and other forms of wilderness areas (e.g., arboretums, beaches, parks, marine monuments) have been closed worldwide. Your challenge is to lead the effort to examine any potential impacts of reduced human traffic in such local protected natural environments

5. *The Art of It All*
   What have you learned about yourself or the world as a result of living through the COVID-19 pandemic? Your challenge is to express your experience of living through this historic time through a work of art.

6. *SDGs and COVID-19*
   This challenge invites you to analyze the impact of COVID-19 on the United Nations (UN) Sustainable Development Goals (SDGs) by looking at the current and ongoing change in the monitoring indicators of the UN SDGs using Earth observation/remote sensing and global Earth system model-derived analysis products.

7. *Food for Thought*
   Your challenge is to consider the journey of food to your plate, determine how disruptions from the COVID-19 pandemic are affecting the food supply locally and globally, and propose solutions to address these issues.

8. *Purify the Air Supply*
   Has your time spent indoors increased during the COVID-19 pandemic as a result of stay-at-home and shelter-in-place policies worldwide? Your challenge is to use the International Space Station (ISS) as inspiration and develop a system to monitor and/or purify indoor air. It is entirely up to you whether the system you design is able to be used on Earth (for example in homes, businesses, transportation, etc.) and/or in space.

9. *Human Factors*

The emergence and spread of infectious diseases, like COVID-19, are on the rise. Can you identify patterns between population density and COVID-19 cases and identify factors that could help predict hotspots of disease spread?

10. *The Isolation Solution*
    Social distancing policies enacted the world over during the COVID-19 pandemic have left many people socially isolated. Your challenge is to develop innovative solutions to combat social isolation.

11. *A World Away*
    Your challenge is to identify pandemic social problems that may have collateral effects in remote locations (such as space). How will you prepare for the collateral effects in remote locations, and/or evaluate on-Earth support and remote location risks, including psychological and technical risks?

12. *An Integrated Assessment*
    Your challenge is to integrate various Earth Observation-derived features with available socio-economic data in order to discover or enhance our understanding of COVID-19 impacts.

1. What problem are you solving with your solution? Why is it important? (Maximum of 200 words)

It may take years for the development of a cure, let alone a vaccine against COVID-19. For now, the only way to "flatten out the curve" and eventually contain the disease is by modifying the movement of individuals and populations. One of the ways to do this is to develop a computational model for the spread of COVID-19 as influenced by weather conditions and pollution levels. This model can then be used to guide human movement within the city.

Imagine if you want to go to a certain city but you are uncertain if that place is safe to visit. Our project aims to develop a COVID-19 hotspot prediction system using environmental variables such as air quality, meteorological variables, and human population. Based on our research, the air quality and the weather had a correlation with spread of the virus. Our sample data would cover the cities inside the Nation Capital Region of the Philippines. With this, a user will be able to track which city is safe during the pandemic.

2. Who are the target customers/users? (Maximum of 200 words)

Project AD answers the question, **"Is it safe to go to this area?"**. By using our proposed website, citizens will be guided on what cities will be considered "safe" on a given day, especially for employees who commute daily into and out of Metro Manila cities. More importantly, by predicting COVID-19 incidence, local government officials can then make evidence-based decisions before restricting or allowing access to a city.

Furthermore, the national government and policymakers are then able to predict which cities to deliver more healthcare resources. At the same time, the policy makers can limit or ban the number of people to said "hotspots."

3. How does your innovation work? What is the improvement of this innovation over the existing practice? (Maximum of 200 words)

Instead of testing people if they have the virus, we are proposing another way of knowing where the virus would spread next. Currently, we are just hoping that the we will "flatten the curve" but the problem is that the virus is unusually contagious. By using our proposed website, citizens will be guided on what cities will be considered "safe" on a given day, especially for employees who commute daily into and out of Metro Manila cities. More importantly, by predicting COVID-19 incidence, local government officials can then make evidence-based decisions before restricting or allowing access to a city.

COVID-19 data from DOH suggests only what happened in the past months, what city is has the highest cases, etc. Our project aims to develop a "prediction" what city will be in danger next due to this virus.

4. In what way is the innovation customer friendly? (Maximum of 200 words)

Our team made the website user-friendly as possible, with a few clicks an output will already be projected. No logins, examples values are given, and a big drop-down box will open so that you can choose what city you want to examine.

The problem is we cannot **yet** scrape real time data from NASA satellites that is why in the early phase, the user must put first the environmental variables.

In our future, the front-page would just give out the mappings of how contagious an area is given the environmental variables without having to input anything. Just locate or drag your cursor on a map without knowing how it works.

5. What is the social, economic or environmental impact of the innovation? (Maximum of 200 words)

COVID-19 is not just a health issue since the illness renders a person unable to work, and consequently cannot provide support to his/her family or contribute to society. Furthermore, being sick imposes a tremendous drain on one's resources especially if it requires hospitalization. Companies know that having sick employees can lead to losses in earnings. Just the fear of succumbing to the virus can halt important economic activity when the government orders a lockdown. We hope to address these issues by developing a website that predicts the number of individuals getting sick. Having this foresight can guide a resident of that city if it is safe to go outside the house.

Tourists will have knowledge on what places to avoid for the moment. Companies can determine if it would be safe for employees to work. By using such predictions politicians and policymakers can then decide if a strict lockdown is justified or if a more relaxed quarantine is enough, and which cities require more aid in terms of healthcare resources. Lastly, by considering the amount of nitrogen dioxide and particulate matter, people will realize that air pollution is an important factor in acquiring the illness.

6. How you could make this innovation financially sustainable? (Maximum of 200 words)

The technology and data used in the making of the prototype is open source and are cloud based. The open source data we used in this project are from NASA's and JAXA's satellites, unlike other companies which makes you pay for their data. Also, for our web application is deployed on Azure's cloud service which we believe is cheaper than other deployment methods.

We can make the innovation financially sustainable by offering it to local government units, NGOs, and other private firms. Since our innovation can detect COVID-19 hotspots, we can adapt it to other diseases like dengue, flu, and other diseases. The algorithm used can be easily modified to fit the desired disease to track. It can be offered as a service to LGUs to help them in planning and implementation of their local legislation when it comes to health.

7. That is the insight and creators' reflection that led to the innovation? (Maximum of 200 words)

To think what has the pandemic did for the economic and social status of the global countries has always been crossing our minds. But instead of waiting for things to happen, as citizens, we would also like to extend our hand and help the best way we can to get rid of this misfortune. Instead of making another problem, we would rather make solutions for the betterment of the future.

8. What challenges did you experience leading to the innovation? What is your "AHA!" moment? (Maximum of 200 words)

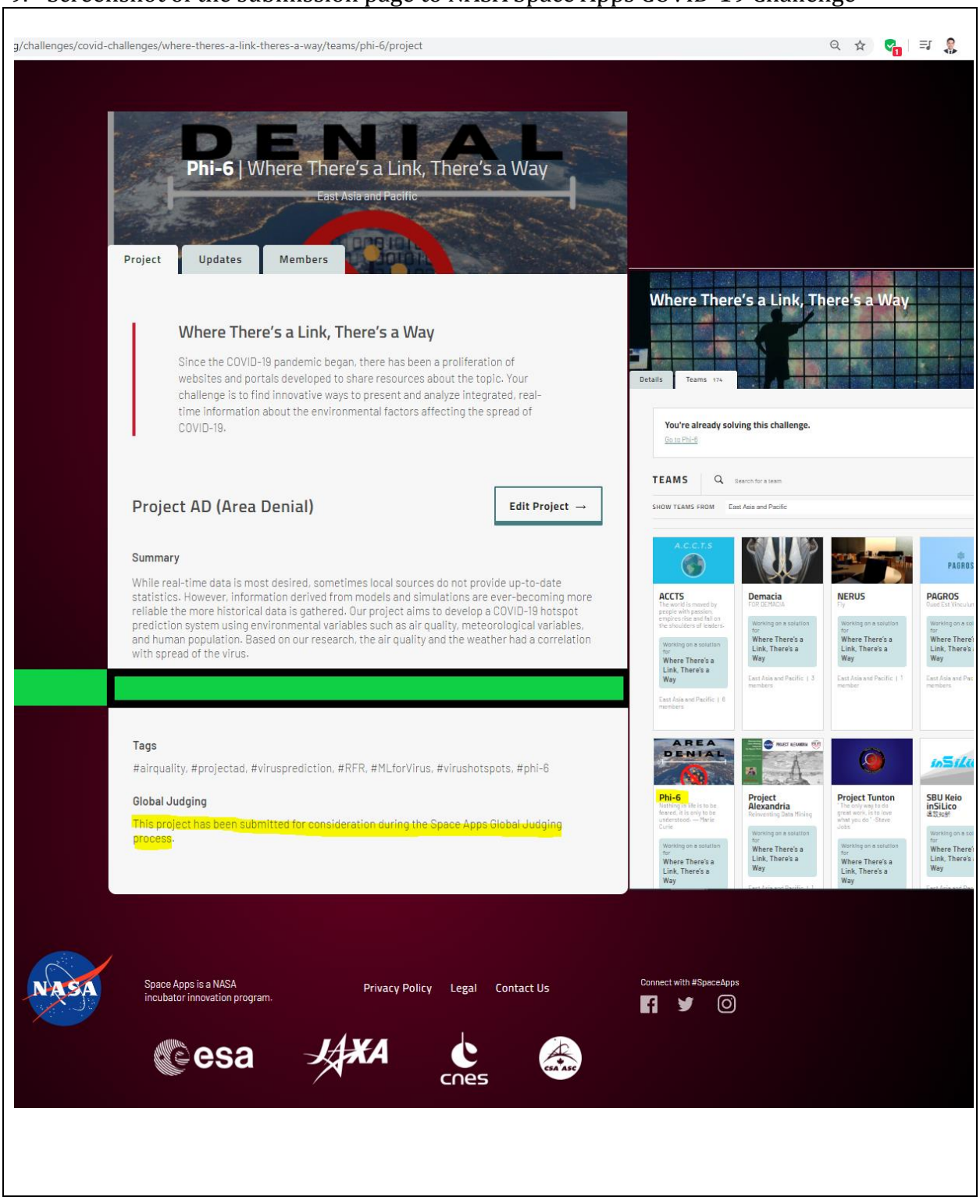
Challenges:

Our expertise is around research and data analysis, but due to some time and monetary constraints our project has a weak point in UX, web design, web-scrapping real time data and the architecture of the website. As you will see in our website, a user will notice that we have to input the environmental factors since we don't have the ability and the resources to web scrape real time data and plug it at the same time in our model. Also, we would like to map out the calculations on a satellite map, but we need more time and knowledge.

AHA! Moments:

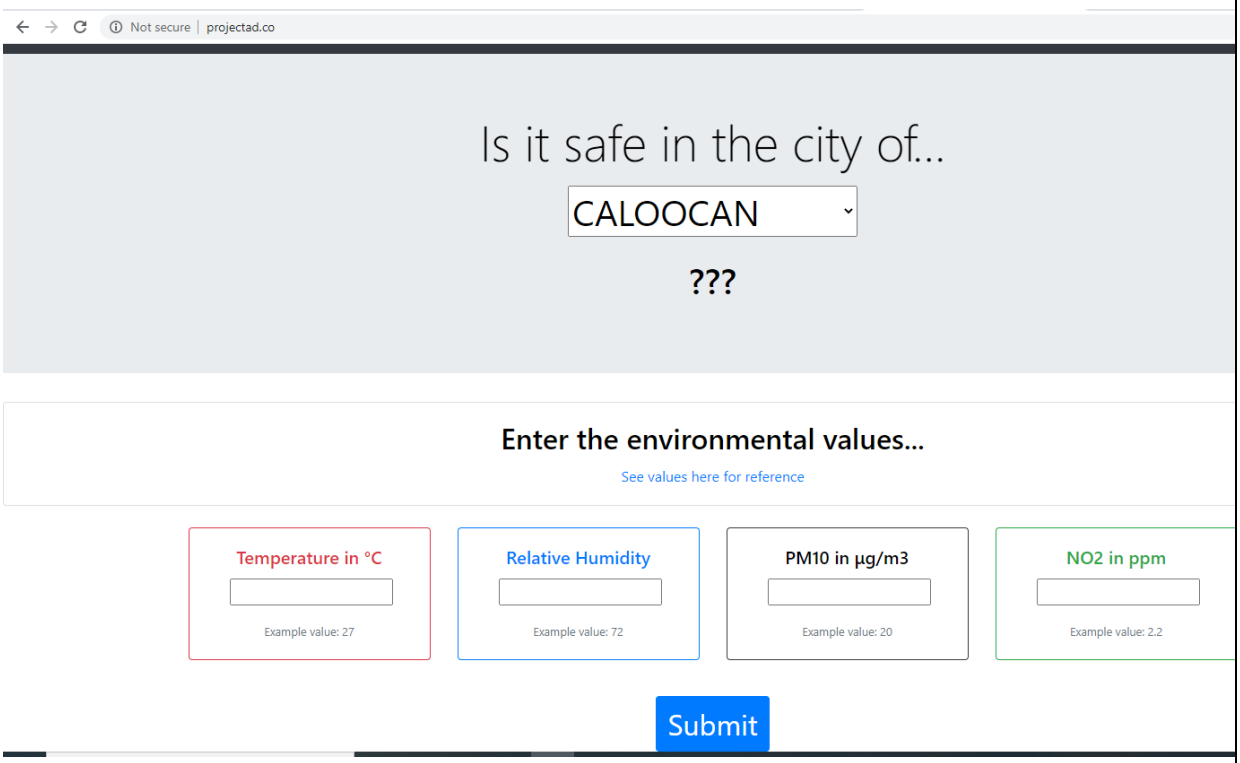
A report in a local news here in the Philippines mentioned that the government is having a hard time containing the virus. But instead of doing nothing, we thought of ways to predict where the virus spread next without testing the virus itself. We looked outside the box and formulated this project to help the country. First, we thought of a hotspot that is a barangay level, but we had a problem due to lack of data. It's easier to group the hotspots to cities given found data on the country.

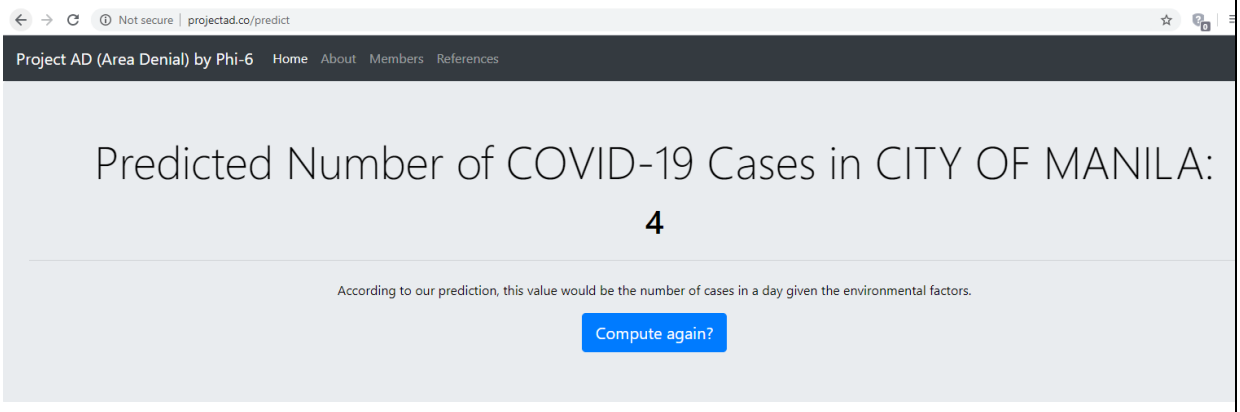
9. Screenshot of the submission page to NASA Space Apps COVID-19 Challenge



10. Drawing/sketch/photo of prototype or interface.

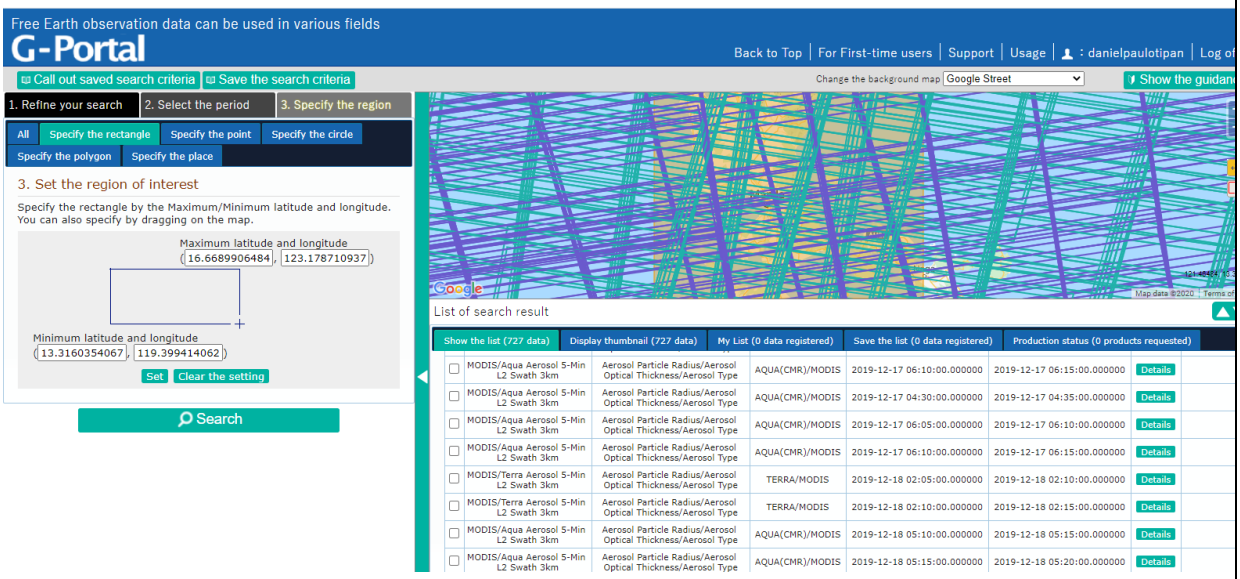
a.) Visit our website, projectad.co for the prototype.



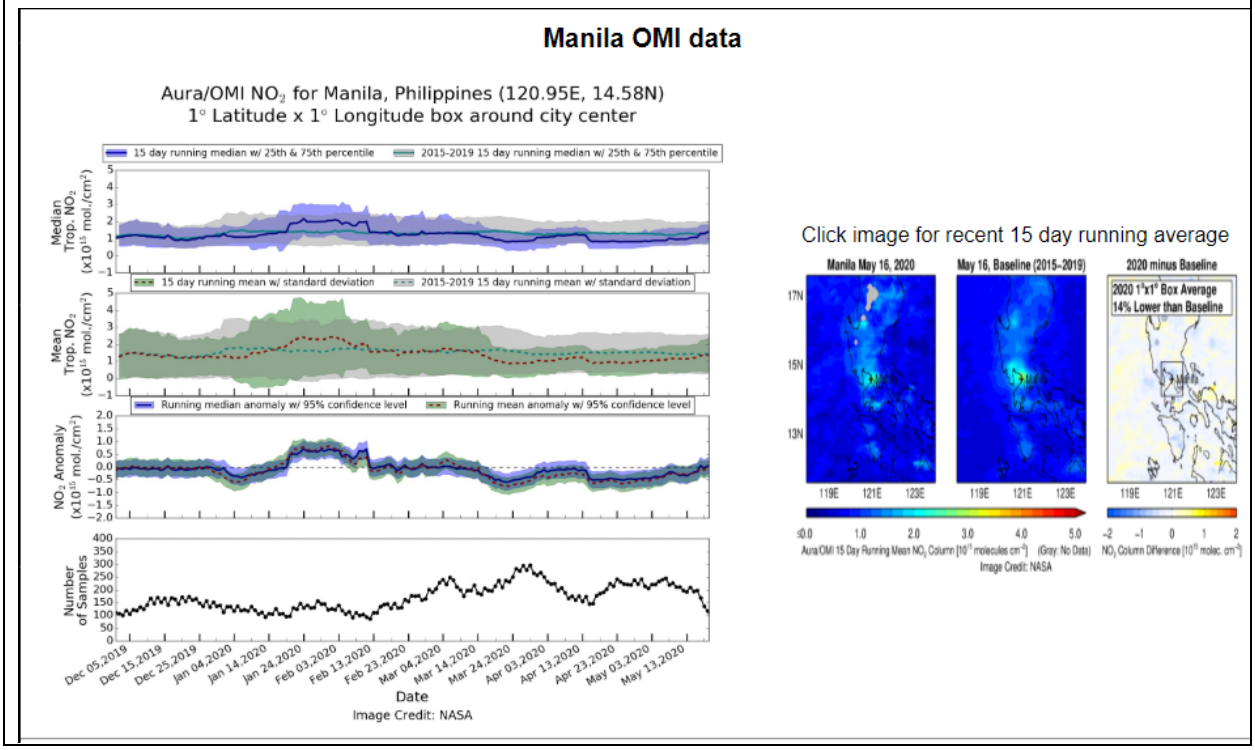


11. Space data and other resources used to develop the prototype.

JAXA's MODIS / Terra & Aqua Satellites for Aerosol Optical Thickness



NO_2 Levels in Manila, Philippines



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