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Author: Mr. Abdelmalek Saadi Drissi
Space Generation Advisory Council (SGAC), Morocco, as5121@msstate.edu

CYCLONEWATCH: EXPLORING THE POTENTIAL OF CUBESATS FOR HURRICANE DETECTION AND DISASTER FORECASTING IN THE ERA OF CLIMATE CHANGE

Abstract

Climate change is a major threat to global security, the environment, and public health. As the planet warms, the occurrence and intensity of natural disasters, such as hurricanes, is expected to increase. These storms can have devastating impacts on communities and infrastructure, making accurate forecasting and early warning systems essential for preparedness and mitigation , Conventional methods of disaster monitoring, such as ground-based sensors and satellite imagery, have their limitations. For example, ground-based sensors may be damaged by the disasters they are meant to monitor, while satellite imagery can be limited by the size of the satellite and its resolution .

One potential solution to these challenges is the use of CubeSats, small satellites that are relatively cheap and quick to produce, and which can be launched in large numbers to form a constellation. CubeSats have been used for various applications, including earth observation and communication, and have the potential to revolutionize disaster monitoring as well.

Our proposed system, named CycloneWatch, would consist of a constellation of CubeSats in low Earth orbit, equipped with sensors to measure temperature, humidity, and wind speed. These sensors would provide real-time data on the development and movement of cyclones, allowing for more accurate forecasting and early warning systems. In addition, the CubeSats could be equipped with imaging capabilities to provide visual data on the size and strength of the storm.

The use of CubeSats for cyclone monitoring and forecasting has several advantages over traditional satellite systems. They are smaller and cheaper to produce and launch providing the advantage of a shorter development time of the CubeSats allowing more frequent updates and improvements to the system.

In addition to their potential for disaster monitoring, the use of CubeSats for cyclonic storm detection and forecasting can also provide valuable insights into the impacts of climate change on these phenomena. By collecting high-resolution data over a long period of time, we can better understand the relationship between climate change and cyclonic storm behavior, and develop more effective strategies for adaptation and mitigation.

Overall, the use of CubeSats for cyclone monitoring and forecasting represents a promising approach with a potential to greatly improve preparedness and mitigation efforts, particularly in regions that are particularly vulnerable to the impacts of these storms. By providing real-time data and early warning systems, improving our ability to prepare for and respond to natural disasters in the era of climate change.