Paper ID: 75131
student

Topics (T)
Earth Observing Missions and Systems to Address Climate Change and Its Impacts [3] (3C)

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

MONITORING OCEANIC ACTIVITIES USING MULTISPECTRAL AND MULTI-TEMPORAL NOSTRUM CUBESATS FOR IMPROVED CLIMATE CHANGE MITIGATION

Abstract

Abstract

Climate change is a major threat to global security, the environment, and public health. To understand and mitigate the impacts of climate change, it is crucial to study its effects on various ecosystems, including the oceans. Oceans play a vital role in the dynamics of climate, influencing the distribution of rainfall, droughts, floods, and the development of storms. They also absorb 93 per cent of the heat and 25 per cent of the CO2 in the atmosphere, and marine heatwaves have increased by 50 per cent in recent decades. To monitor oceanic activities and climate change, powerful satellites and remote sensing technologies have been used to collect data over large areas. However, these conventional satellites are large, expensive to produce and launch, and have low reliability as only a single satellite carries the mission.

In this paper, we propose the Nostrum system, a 6U CubeSats system that carries instruments and sensors to measure salinity, sea level, and surface water temperature. The Nostrum system will work in a small constellation to provide risk distribution, greater data security, and increase the redundancy of the mission. The multispectral and multi-temporal Nostrum system will be positioned in the low earth orbit (LEO-polar) at an altitude of 1340 km in multiple planes to have global coverage. Nostrum's 6U CubeSats system monitors surface temperature by collecting a longwave infrared spectrum (LWIR) that provides a heat map indicating cold and warm regions. It also provides salinity by simultaneously measuring and analyzing the temperature and conductivity of seawater. In addition, it will track the ocean's acidification by using marine chemistry parameters such as partial pressure of CO2 in water, dissolved inorganic carbon, alkalinity, and pH.

The Nostrum satellite system will provide many benefits, including disaster forecasting, risk calculation, and understanding the impact of climate change through the collection of oceanic data with high accuracy. It will collaborate with available Ship Earth Stations to gather data about the bottom topography of oceans and share the findings on our website, which will be accessible to everyone. The production of Nostrum's 6U CubeSats system will cost less and take 10 times less time to develop compared to conventional satellites. Overall, Nostrum's earth observing small satellites will provide vital information to scientists and civilians to improve outcomes for society and the environment.