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Earth Observations to address Earth's Environment and Climate Challenges (7)

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SWARM-SENSING: A SPACE-BASED APPROACH FOR OBSERVING OCEAN ACIDIFICATION

Abstract

The severe climate changes indicate that our current actions against environmental variation are not sufficient to prevent threshold points from being reached. The researchers raised concerns over the world's oceans coming under a menace. Following the industrial revolution, more than five hundred billion metric tons of carbon dioxide were released into the atmosphere, which is then absorbed by the ocean, causing the pH of ocean water to drop significantly; this is referred to as ocean acidification. As the ocean absorbs approximately thirty percent of the carbon dioxide, marine carbonate chemistry changes, resulting in a fall in seawater pH (a drop in alkalinity and an elevation in acidity) and a concentration of carbonate ions. Many vulnerable coastal habitats, such as coral reefs, mangroves, and wetlands, are under threat from ocean acidification, which is causing biodiversity loss and affecting aquaculture. Aside from various terrestrial geoengineering methods, there are currently efforts underway to investigate new ways of incorporating space-based techniques. One such space-based approach for observing ocean acidity is discussed in this paper. Swarm Technology is a satellite constellation that is commonly used for remote sensing. This swarm makes it easier to observe ocean acidity in close proximity. The swarm consists of thirteen satellites, one of which is the primary satellite, which controls the other secondary satellites that aid in the various constellation patterns for observation. The ground station controls the primary satellite, which in turn controls the secondary satellites. In a broad sense, the satellite's thermal and microwave sensors measure the ocean's temperature and salinity, respectively. The ocean's temperature and salinity support determining its pH. The main advantage of swarm technology is the flexibility and cost-effectiveness with which these constellations of satellites may be positioned to view the whole planet. The manufacture and operation expenses of secondary satellites are reduced by the use of nano-satellites and microsatellites.