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CONSTELLATION DESIGN FOR REMOTE SENSING OF TRACE GASES USING NANO-SATELLITE ATMOSPHERIC CHEMISTRY HYPERSPECTRAL OBSERVATION SYSTEM (NACHOS)

Abstract

Nano-satellite Atmospheric Chemistry Hyperspectral Observation System (NACHOS) is a CubeSat-based hyperspectral observation system that is an ultra-compact, high-resolution imager. The high special resolution allows us to see trace gases such as sulfur dioxide, nitrogen oxide, etc. at a neighborhood scale even individual power plants. However, some large earth observation and remote sensing satellites can monitor these gases on a regional scale, none have the special resolution to see crucial finer details at the local scale. A CubeSat of such kind has already been launched in February 2022 on the Cygnus CRS-17 mission. This paper is focused on the long-term development of a Multi-satellite constellation in low earth orbit to produce global trace-gas hyperspectral imaging and detailed 3D mapping of pollutant gases. The formation flying is designed considering onboard data processing and downlink capabilities that require inter-satellite communication. This will help researchers to monitor climate change and improve air quality predictions.