

Jury Summary

CASE Constellation for Aerosol Surveillance around the Equator

Group 16

The accelerating density of aerosol concentrations over recent decades is believed to influence human health, ecosystems, and climate change. Every year more people die as a result of the growing air pollution in our urbanizing world. Forest fires in Africa and the Amazon rainforest threaten the local communities and wildlife, as well as the ecosystems these forests provide. If the left unchecked, a point of no-return will soon be achieved; remedies and other efforts to decrease aerosol concentrations will be futile. For this reason, accurate aerosol measurements are essential to identify where aerosols originate, how they spread through the atmosphere and what their environmental effects are.

The Constellation for Aerosol Surveillance around the Equator (CASE) will use newly-developed polarimeter sensors to detect aerosol concentrations and locations with unrivalled resolution. This data can be used to improve climate models, providing an impetus for better climate policy and legislation. CASE will focus on measuring three distinct areas from its unique vantage point at a 500km altitude. Firstly, the Amazon rainforest will be measured to assess the effect of deforestation and the relation between aerosols and cloud formation. Additionally, Singapore, Nairobi & Kampala will be monitored with a high spatial resolution to determine their exact sources of aerosol pollution. CASE's high temporal resolution and large swath width make reconstructions of aerosol data easier and more accurate than ever before. This is made possible by using state-of-the-art Optical Metasurfaces Based Spectro-Polarimeter that are currently being developed by TNO. This is the first time an instrument of this accuracy and performance will be launched in a CubeSat!

The current status of developments of the design have resulted in a 3-satellite constellation in an equatorial orbit. Each subsystem has been investigated in detail, culminating in detailed component-level designs. During the design process, sustainable considerations were among the CASE's top priority. At the time of writing, the CASE team is busy finalizing the design concept. In the remaining weeks of the DSE, the design will converge to its final form. The implications of the design will also be refined, including its reliability, operability, and profitability.

During the Final Review, the CASE team will be excited to share all of the progress of the project. Explanations and justifications of the design choices will be given, along with the decisions and trade-offs leading to this final design. The CASE team is happy to welcome you to its Final Review and Symposium presentation to answer all of your further questions regarding the promising CASE mission. We hope to see you there!

Let's make sure a future of face masks will not be the CASE!