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Small Earth Observation Missions (4)

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WÜRZBURG AGRICULTURE SPACE PROJECT-WASP – A SMALL SATELLITE CONSTELLATION
FOR SMART AGRICULTURE**Abstract**

Bavaria comprises approximately $70,500\text{km}^2$, making it the largest state in the German Federation. The German state is well known in Europe for having more than 100,000 agricultural businesses covering around 45% of Bavaria's surface area and contributing to one fifth of the total German agricultural turnover. With a volume of 121 billion euros, the Bavarian Ministry of Economic Affairs stated Bavaria as one of the most important business locations for agriculture in the heart of Europe. Agriculture is very important for the stability of the German economy and with the application of space technology platforms such as small satellites, best known as CubeSats, the address of agricultural monitoring and environmental security can be directly and swiftly carried out, solving key issues in the governmental agenda due to the new regulations on the EU Farming Policy.

In this context, students from The University of Würzburg, formulated the WASP project. The student team designed a constellation of small LEO satellites, optimized for multispectral observations of the Bavarian land area in order to provide a toolbox for state authorities, nature conservation groups and the general public to monitor the implementation of new laws remotely. This ensures compliance verification with organic agriculture standards in Bavaria stating that 30% of all agriculturally-used fields must be organic by 2030.

The satellites are designed around the main payload, a multispectral camera. The cameras enable capturing of reflectance data in the NIR and RED spectra's. Since the main crops produced in Bavaria are potatoes, wheat and corn, the system shall classify these chosen cultivation methods automatically as organic or non-organic. This allows monitoring of new environmental protection and law Implementation, with high temporal resolution to mitigate data gaps due to cloud occultations while employing experience from previous work, available infrastructure and technology from the project partners.

This paper will propose a mission design for a future in orbit realisation of the project. It will focus on technical aspects, such as orbit design, telecommunication methods, type of payload and ADCS. It additionally will also examine the feasibility and benefits of certain technological developments for the WASP project.