

The ESA Open Space Innovation Platform campaign for Cognitive Cloud Computing in Space called for project proposals for the use of edge and cloud computing technologies in space. D-Orbit created a consortium including UniBap and Trillium to respond to this opportunity with a proposal to engage the cloud computing community to identify and fly applications on the ION SCV-004 mission.

The major aspects of this work began with the definition of the scope of the applications expected. This aimed to identify those apps best aligned with the goals of the 3CS programme and the capabilities of the existing hardware: D-Orbit's SCV-004 ION Satellite Carrier spacecraft with a UniBap iX5-100 SpaceCloud® and a cubic inch hyperspectral sensor developed by VTT. In addition to the VTT sensor, data available to users included Sentinel-2 images already on-board, images tasked from the D-Sense optical sensor, and user-supplied datasets.

A public call-for-ideas was published to solicit responses from the cloud app development community, the methodology and results of which are included in this report. A subset of the responses was selected for support and flight on the SCV-004 mission. In parallel, Trillium have adapted an existing application called RaVAEn specifically for deployment to the SCV-004 mission. This provides a change detection machine learning algorithm that can take advantage of the data generated on-orbit by the VTT hyperspectral sensor also flying on-board SCV-004. In the case of RaVAEn and the short-listed applications, an on-boarding process was defined to facilitate this stage of the work is also described in this report. Finally, the status of the app development and preliminary results from those applications that have been deployed to SCV-004 are also included.

This work establishes a baseline approach to providing cloud computing services on-orbit on a recurrent, commercial basis. It is intended that the application of this work supports an on-going and wider programme of flight demonstrations, experiments and ultimately applications as commercial services utilising the UniBap and D-Orbit solutions.