

16.04.2019

Europlanet NA1 Expert Program Report

Dear Maria Genzer,

During the week from April 8 to 12, I participated in a concurrent design study for the Cubesat for Refining Ephemerides (CURE) mission which would support the ESA's ARIEL mission by provided ephemerides with minimized uncertainty. My role in the study was System Designer and I mostly focused on the satellite subsystem assessment, system requirement and budget co-development, and mission simulation development in VTS simulation environment.

The main goal of CURE is to observe exoplanet transit targets which have high uncertainty of ephemerides, which would result in more efficient time use of ARIEL mission. During the study week, it was determined, that CURE must observe targets which other facilities can't observe or are not planning to observe, for example, Twinkle, CHEOPS and TESS.

At the end of study, we concluded that the most cost-efficient way would be to use 3U CubeSat satellite with one or two optical instruments - compact photometer which uses optical fiber as light receiver and telescope with 9 cm aperture (like PicSat satellite payload), and compact imager with sensitive sensor and telescope with 9 cm aperture. Analysis of instrument performance showed that these instruments can observe 45-60 targets from the ARIEL catalogue. Principal investigator (PI) of CURE mission described that additional study is necessary, in order to find trade-off between instrument design and observable target count. Although larger aperture (18 cm) instrument could observe up-to 320 targets, PI would like to make observations for 500 to 800 targets from ARIEL catalogue.

Next step of the study of CURE mission will take place in "[Design of small satellite missions for planetary studies](#)" summer school at the University of Tartu in July 2019, which I am planning to attend.

The mission study took place at Space Exploration Research Centre and Campus (C²ERES) concurrent design facility PROMESS. This was one of the first studies carried out with external experts. Good results of first step of study showed that it is possible to use PROMESS for rapid mission design.

Please find attached agenda, list of participants and final presentation in email with this report.

Yours sincerely,

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