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Mercury observations in 2016 and 2019, during Transits and Total Eclipse

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Abstract

Transits are rare astronomical events of profound historical importance (measuring the distances in the solar system). Although its scientific use has diminished since humanity roams our solar system with robotic spacecrafts, transits remain a spectacular astronomical event, with an enormous potential to engage nowadays students and general public into Planetary Sciences and Space, and also performing some unique science experiments.

In the case of Mercury, transits occur only about 13-14 times per century. It was first observed in 1631 by Pierre Gassendi, and from 2000 to 2100, 14 occasions are predicted. In this decade, only 2016 and 2019 had a transit. After that, people on Earth will have to wait until Nov 2032 to observe the event.

The educational project CESAR (Cooperation through Education in Science and Astronomy Research), in collaboration with ESA's space projects (Bepi – Colombo, Venus Express, Solar Orbiter, Proba-2) has been covering since 2012 such events (Venus transit 2012, May 2016 Mercury Transit, Total Eclipse 2017). The team is currently preparing the Nov 2019 Mercury Transit and Jul 2019 Total Eclipse.

For the Mercury Transit in May 2016, a dual observation was made from two separate locations: a twin portable telescope set-up at the IAC (Instituto de Astrofísica de Canarias) Izaña, Tenerife, Spain, and in Cerro Paranal, Chile, achieving a ground baseline parallax of around 10.000km.

For the Mercury Transit in Nov 2019, as the geometry is quite similar to 2016, a comparable set up is being organized: dual teams at Canary Islands and Chile.

For the Total Eclipse in Jul 2019, a team will travel to the European Southern Observatory (ESO) at La Silla, Chile, to record and transmit live the occultation, and record unique observations of the Mercury exosphere, while in totality.

In this paper we will report on the results from the Mercury Transit 2016, and explain the campaign and expected results from 2019.