

The 9 May 2016 transit of Mercury – a great outreach opportunity in Europe

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Abstract

People across most of the globe will have a chance to witness Mercury's next solar transit, 11:12-18:42 UT, Monday 9 May 2016. Occurring a year after the end of the MESSENGER mission and a few months before the launch of BepiColombo, this transit (the first since 2006) will be an ideal occasion to draw the public's attention to the science goals of those missions, to showcase what we have recently learned about Mercury, and to draw attention to the conundrums that make Mercury such a fascinating object to study.

1. Introduction

Although Mercury passes between the Earth and the Sun at least three times a year, exact alignment is rare and can happen only in May or November, when the Earth is close to one of the two points in its orbit where the two planets' orbital planes intersect. When the alignment is sufficiently exact, Mercury transits across the face of the Sun. Because Mercury's angular size is only about 12" in May (about 1/150th of the Sun's diameter) and 10" in November a magnified image is required to reveal it.

Solar transits of Mercury are more common than those of Venus. The first observation was in 1631 by Pierre Gassendi, thanks to a successful prediction by Johannes Kepler. There is no observational record of a transit of Venus until 1639, even though those can be seen by the naked eye.

Precise observation of planetary transits played a key role in determining the scale of the Solar System, and observing the 3 June 1769 transit of Venus from Tahiti was a primary scientific goal of Captain Cook's first voyage of circumnavigation on HMS Endeavour. Less well known is that the expedition's

astronomer Charles Green, along with Cook himself, also observed a transit of Mercury on 9 November 1769, from the shores of Mercury Bay in New Zealand.

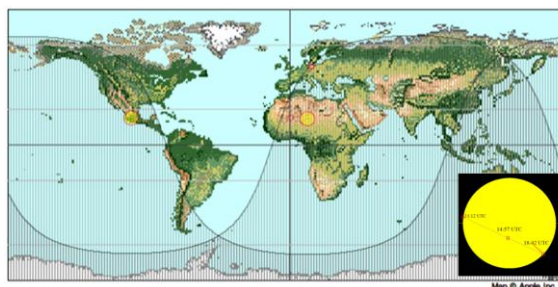


Figure 1: Visibility of Mercury's solar transit, 9 May 2016. The shaded areas limit the hemispheres from which the Sun will be visible at first contact (11:12 UT) and last contact (18:42 UT). Cloud permitting, the whole transit will be visible from most of the Americas and western Europe. Only from a north-south belt from Manchuria to Australia will the whole duration be invisible. (map from <http://www.venus-transit.de/Mercury2016/>) Inset: the path of Mercury across the Sun, as seen from the northern hemisphere.

2. The 2016 opportunity

The 2004 and 2012 transits of Venus were accompanied by major outreach events, and stimulated day-long media interest. The 2016 Mercury transit offers a similar opportunity, which the Mercury science community should seize upon. It is especially timely for showcasing the science achieved by MESSENGER and planned for BepiColombo. As a bonus, outreach infrastructure and momentum will still be fresh enough to re-use for the next transit, on 11 Nov 2019. Inexpensive

solar projectors adequate to show the transit are readily available, and a recent upsurge of amateurs posting H-alpha and Ca-K solar images via social media shows that the amateur astronomy community is well-equipped to observe the Sun.

2.1 2016 transit outreach plans

Aspirations emerging from the BepiColombo community include:

Encouragement and coordination of schools and local astronomy groups to hold public events during the transit, and to list them on a shared site so that the public can find a nearby event.

Stimulation of national broadcast media to cover the transit, similar to BBC Stargazing's day-long event for the 20 March 2015 solar eclipse and the 2012 and 2004 transits of Venus.

Specific plans include:

Beforehand

Stimulation of awareness and interest via social media, using #MERCURYTRANSIT

Liaison with local and national amateur astronomical societies

Provision of a webportal where groups can advertise events, and that will be searchable by the public

Provision of web-based Mercury and transit outreach materials, to be added to in the months leading up to the transit

Internet advice on safe viewing of the transit

On the day

Webstreaming of images from Proba2, SOHO and SDO spacecraft, and also H α images every 30 seconds from 9 cm Coronado solar telescopes in Spain and Chile, belonging to the CESAR project (Cooperation through Education in Science and Astronomy Research).

Video-feed, perhaps from ESA-TV, containing pre-recorded features about Mercury and BepiColombo,

live or pre-recorded interviews with scientists and engineers

A photo-sharing site where people can post their images of the transit, including a separate area for 'transit selfies'

Experts on Mercury and transits available to talk to the media

What we have already

A humorous animation explaining the relationship between Mercury's day-length and its year <http://www.open.edu/openlearn/mercuryday>

Transit countdown clock and basic information at <http://www.cosmos.esa.int/web/bepicolombo/mercury-transit> including a list of public transit events

A facebook 'community' page <https://www.facebook.com/mercurytransit2016>

3. Summary and Conclusions

We call upon member of the European planetary science and astronomy community to provide transit viewing opportunities for the public in their local area. Please list your event via our website:

<http://www.cosmos.esa.int/web/bepicolombo/mercury-transit>