(*e.g.* CH_3OH and C_2H_6) can liquefy at very low pressures, which are easily sustainable inside the nucleus. Now that O_2 has been discovered, we can even expect melting to occur at temperatures as low as 50K if mixed with nitrogen (N_2).

Three papers involving BAA members have recently been published in *Icarus*, which present new observations of Comet 29P and, together with an analysis of data reported to the *Minor Planet Center*, show that its outbursts are seasonal and that its ~60km nucleus rotates extremely slowly: the mean solar day lasting 57.7 days or nearly two months for a single rotation. Consequently, the nucleus is very prone to subsurface melting, and the last of the three papers explains the way in which the protracted day-night cycle induces separation and concentration of chemical species via nyctogenic (night-time-created) processes brought about by diurnal oscillations in the temperature gradient beneath the surface.

These papers are:

– 'Anatomy of outbursts and quiescent activity of Comet 29P/Schwassmann–Wachmann', by R. Miles, G. A. Faillace, S. Mottola, H. Raab, P. Roche, J.–F. Soulier & A. Watkins, published in *Icarus* online on 2015 Dec 02 (29 pp.);
– 'Discrete sources of cryovolcanism on the nucleus of Comet 29P/Schwassmann–Wachmann and their origin', by R. Miles, published in *Icarus* online on 2015 Dec 02 (27 pp.);
– 'Heat of solution: a new source of thermal energy in the subsurface of cometary nuclei and the gas-exsolution mechanism driving outbursts of comet 29P/Schwassmann–Wachmann and other comets', by R. Miles, published in *Icarus* online on 2016 Jan 29 (31 pp.).

The last paper demonstrates that in Comet 29P temperatures of 65–95K [–208 to –178ºC] can create liquid rich in hydrocarbons, predominantly CH_4, in which CO gas (as well as N_2 and O_2) can dissolve in all relative proportions provided that pressures of >0.1 atmospheres are maintained. It describes the physical chemistry of the various cometary species and how heat can be generated far below the thermal skin via gas dissolution, leading to sintering (partial melting of icy particles causing them to coalesce and harden), and the formation of gas-laden cryomagma responsible for cryovolcanic activity of the nucleus, *i.e.* similar to volcanic processes on Earth except involving molten material at very low temperatures. Eruptions occur via the sudden release of dissolved gases in the same way as CO_2 gas escapes in a sudden rush from an uncorked champagne bottle: a process known as 'exsolution'.

Surprisingly, a similar process involving CO_2 gas-exsolution from cryomagma rich in CH_3OH can also operate at 150–200K in Jupiter-family comets, which might explain the remarkable outbursts of comet 17P/Holmes.

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Mercury & Venus Section

Recalling the 2003 transit of Mercury

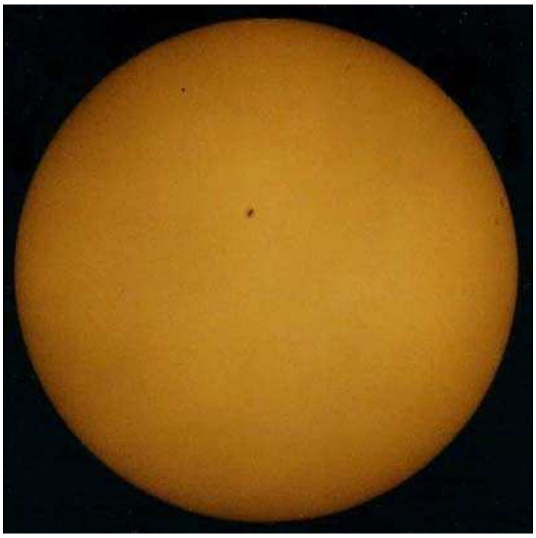

Figure 1. The transit of 2003 May 7 photographed at 08:58 UT by Alan W. Heath (Long Eaton, Notts.) with 254mm refl. and 203mm aperture Orion solar filter, 1/500s on Fuji 200 film.

As described in the previous *Journal*,[1] Mercury will cross the Sun's disk on Monday May 9. The timings for the event are from about 11:12 to 18:41 UT, or from 12:12 to 19:41 BST. Since the February *Journal* was printed, Prof David Rothery has advised me that there have been a number of Mercury videos uploaded (including one which deals with safe methods of transit observation) which have links from the *BepiColombo* Mercury mission website.[2]

In 2003 a number of members across the UK and Europe were able to get good views of the transit of May 7, and a short summary of their work was published in the *Journal* at the time.[3,4] Recently I went through the Section archive containing their results to refresh my memories of that day. Here are a few images from 2003, to act as a further reminder of the approaching event, and to encourage observers to submit their results to the Mercury & Venus Section.

I found that a complete list of the contributing observers in 2003 was not published at the time. They were: J. Cook, E. L. Ellis, R. Emery,[4] D. Fisher, M. Foulkes & P. Carter, D. Frydman, M. H. Gaiger, M. Giuntoli (Italy),[3] A. W. Heath,[3] R. J. McKim, J. C. D. Marsh, P. J. Meadows, C. E. Meredith, B. Mitchell, M. P. Mobberley,[4] D. Niechoy (Germany), G. North,[4] P. Paice,[4] M. D. Taylor, A. Vincent, W. J. Williamson.

Here we show a whole disk photo by Alan Heath (Figure 1) and a collage showing egress by Mike Foulkes & Paul Carter (Figure 2). We also give a drawing showing the progress of the event by Peter Meadows, as observed by projection (Figure 3).

I encourage observers to time the contacts and to report their results, in addition to supplying their drawings and images. It only remains for me to wish everyone good luck with the weather!

Richard McKim, *Director*

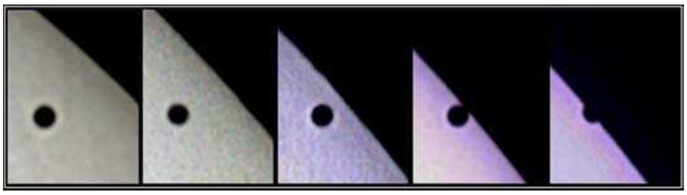

Figure 2. Egress sequence of the 2003 May 7 transit by Mike Foulkes & Paul Carter (Tewin, Herts.). These processed webcam images were taken with a 203mm SCT at f/10 through a half-aperture Mylar filter.

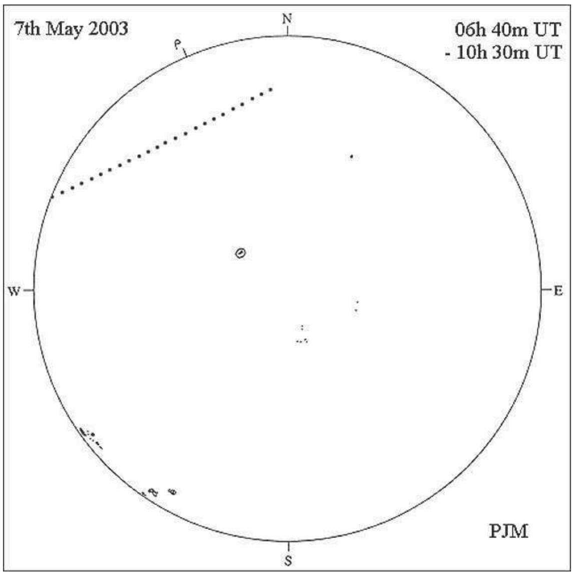

Figure 3. Drawing of the 2003 transit by Peter Meadows (Great Baddow, Essex) by projection with an 80mm OG.

References

1 R. J. McKim, *J. Brit. Astron. Assoc.*, **126**(1), 7 (2016). (In this note I inadvertently wrote UT in lieu of BST for the stated times of the 2016 event.)
2 **http://www.open.edu/openlearn/explore mercury**. The resources at this website are linked to: **http://bit.ly/1K5nJXz** and **http://www.cosmos.esa.int/web/bepicolombo**
3 P. Macdonald, *J. Brit. Astron. Assoc.*, **113**(5), 253–254 (2003)
4 Observers' Forum, *ibid.*, **113**(4), 225 (2003)