



## Mercury & Venus Section

### Ground-based support for the Venus Express mission

In 2006 February I was in touch with Jason Hatton, who is Biology Science Co-ordinator at the European Space Agency. He invites BAA members to participate in a 'Venus Express Ground Based Observing Project'. He has personally contributed high quality Venus images to the Section during 2004.

Jason writes as follows: '...[this] is an opportunity to contribute scientifically useful images and data to complement the Venus Express (VEX) spacecraft observations of Venus. The project will focus on utilising the capabilities of advanced amateurs to obtain images of the atmosphere of Venus, specifically filtered monochrome images obtained with CCD-based cameras in the 350nm to 1000nm (near ultraviolet, visible and near infrared) range.

'The VEX spacecraft will observe Venus using seven instruments for at least two Venusian years (1000 days) beginning in 2006 May. The instrument package includes the Venus Imaging Camera (VMC) which will image the planet in the near-UV, visible and near-IR range. Although VMC will provide much higher resolution images of the planet than visible from Earth, continuous monitoring of the planet will not be possible... there may be periods when parts of the planet are visible from Earth that are not visible from the spacecraft (due to the spacecraft position in orbit). Additionally it is important to compare Earth-based observations with simultaneous spacecraft observations.

'The objectives... will be to obtain high quality images of Venus before, after and during VEX operations. 'Images can be acquired using either a high-quality monochrome CCD camera or a monochrome digital video camera (e.g., based on webcam technology). Colour CCD cameras/video are not suitable for this project since these limit the possibility of obtaining meaningful filtered images, particularly in the near-UV regions. Some examples of cameras successfully employed for Venus imaging include:

- Atik Instruments ATK-1HS or ATK-2HS
- Lumenera LU075M
- modified Philips ToUcam camera with a monochrome CCD chip

To perform worthwhile imaging of Venus a core set of three filters is required:

- a U-Band filter (e.g., Johnson-Cousins photometric U-Band or Schott U-360, 300-400nm bandpass)
- V-Band filter (e.g., Johnson-Cousins photometric V-Band)
- I-Band filter (e.g., Johnson-Cousins photometric U-Band or an infrared cut-on filter. In the case of non standard infrared filters

the cut-on wavelength and/or bandpass should be noted.

Filters should ideally be photometric quality... In any case the specifications... should be noted with all observations. The following filters are also useful to expand imaging possibilities:

- a photometric B-Band filter
- a Wratten 47 or violet filter in combination with IR-blocking
- a photometric R-Band filter
- an 850LP filter (850nm cut-on)
- an 1000LP filter (1000nm cut-on).

The effective focal length of the instrument should be adjusted so that the image scale per pixel is approximately twice the resolution limit of the instrument (e.g., if the resolution of the telescope is 0.5", then the image scale per pixel should be approximately 0.25")... The image exposure should be adjusted to ensure a good dynamic range, without saturating the image...'

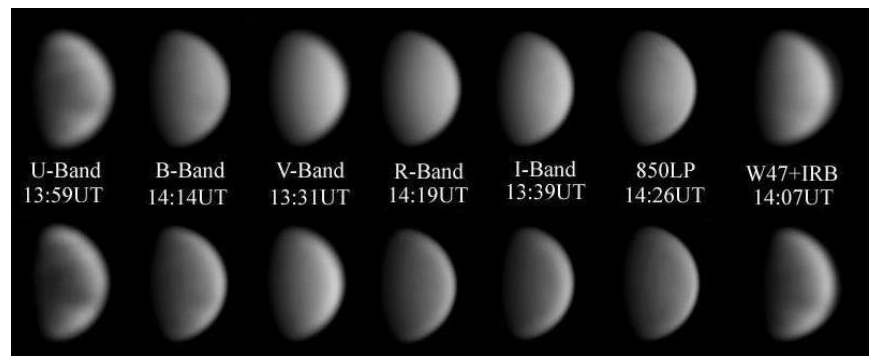
It is anticipated that BAA members will send their images to the Section, but Jason has also requested that we (as one of the very few amateur organisations collecting Venus observations) also act as a clearing centre for observations from around the world. I have agreed with Jason that this is reasonable. The idea will be to make a copy of our Venus Ex-

press archive available to ESA, though of course we shall also be making use of the work for our own purposes. I have explained to Jason the file naming format I prefer (or at least the format I use for archiving): please simply put the year-month-day-UT-observer's initials in that order. For example a fictitious image by myself might be labelled 2006-06-29-1108UT-RJM. All details of observer, telescope, imaging system, etc., should be written upon the image itself and not sent in the text of an email.

'Routine observations of Venus are needed throughout the period that VEX is observing the planet, as well as after completion of the mission... Co-ordinated observing campaigns in conjunction with spacecraft observations will be organised periodically. Information on observing campaigns will be posted on this website: <http://sci.esa.int/science-e/www/object/index.cfm?fobjectid=38833>.'

I have reproduced above a sample of Jason's own work showing typical images in the infrared and ultraviolet. I hope BAA members will welcome the opportunity to contribute scientific data to ESA, and would remind the visual observer that their work is wanted too. Good observing!

**Richard McKim, Director**



Filter images of Venus during western elongation on 2004 October 13 by J. P. Hatton, Mill Valley, California, USA. 230mm Schmidt-Cass., x3 Barlow, ATK-1HS camera, Schuler U, B,V, R and I-band photometric filters, showing the appearance of Venus at different wavelengths. 850LP= 850nm cut-on filter; IRB= IR blocking filter; ca. 400-1200 frames stacked per image. Top row: mild image processing; bottom row: strong processing. South is uppermost. Average seeing and transparency. U-band (ultraviolet) and W47+infrared blocking (violet) images show cloud structure, most apparent in the ultraviolet. This agreement between the UV and violet images demonstrates that BAA observers who use the W47 violet filter visually really have been recording the classic UV features. Venus was largely featureless in the visible and near-infrared.