The Webcam around Mars: Supporting Science with the Mars Express Visual Monitoring Camera

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The Visual Monitoring Camera (VMC), or “the ESA Mars Webcam” on board ESA’s Mars Express (MEX) orbiter was originally designed as an engineering camera whose purpose was to monitor the separation of the Beagle-2 lander in 2003. Later, in 2007, the camera was switched on again for outreach purposes, with images regularly posted to Twitter (@esamarswebcam) and Flickr. Following the subsequent use of VMC data for Mars atmospheric science (Sánchez-Lavega et al., AAS/DPS, 48, 2016; Sánchez-Lavega et al., Icarus 299, 194-205, 2018) the VMC was designated a scientific instrument in 2016. No on-ground calibration exists for the VMC, so the VMC team have had to take initiative in order to perform in-flight calibration of the instrument. New observation planning procedures have been developed, as well as a new data processing pipeline hosted at the European Space Astronomy Centre (ESAC) in Madrid to maximise the scientific return of the instrument. The data is currently in the process of being archived in the Planetary Science Archive, for its wider use by the community.

The MEX Science Ground Segment (SGS) team at ESAC maintains close collaboration with the VMC science team located at the University of the Basque Country (UPV-EHU) in Bilbao. The scientific studies undertaken with VMC camera data include monitoring of the global dust storm over the south pole in 2018 (Hernández-Bernal et al., J. Geophys. Res. Lett., 46, 10330–10337, 2019), analysis of twilight clouds (Hernández-Bernal et al., EPSC, 12, 2018), discovery of a seasonally recurrent double cyclone in the northern latitudes of Mars (Sánchez-Lavega et al., J. Geophys. Res., 123, 3020, 2018) and studies of an extremely elongated cloud over Arsia Mons (Hernández-Bernal et al., EGU, 2020). The scientific success of this “webcam” around Mars highlights how small cameras on planetary missions can yield high science return, which has implications for potential future CubeSat missions to Mars.