A 9-day disruption on Venus's lower clouds from AKATSUKI/IR2

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The lower clouds of Venus, located at ~50 km above the surface, can be observed on the night side at observing windows at 1.74 and 2.30 μm that sense the clouds' opacity to the deep thermal emission. Observations from ESA's Venus Express allowed to determine the overall dynamics at this cloud level. In contrast to the dynamics at the upper clouds, motions at this layer are less variable and do not have a clear mean meridional component. However those observations were severely constrained to mid-to-high latitudes because of the polar orbit of Venus Express. The arrival of AKATSUKI at Venus in December 2015 has allowed continuing the study of the lower clouds at wavelengths 1.74, 2.26 and 2.32 μm. Here we report the discovery of an equatorial disruption or bow between 30ºN-30ºS which appears on the nightside lower clouds of Venus every 9 terrestrial days during more than 8 months of observations. This bow introduces a dramatic and abrupt increase of the cloud opacity, reducing the thermal radiance in about a half. The bow is preceded by a narrow dark equatorial area surrounded by brighter clouds at higher latitudes and a border with frequent wave-shape and rich of shear-like features and vortices of very slow development. After the passage of the bow, lower clouds emerge as more opaque and homogeneous during days. A shallow-water model succesfully applied for the case of Jupiter and Saturn is adapted for the case of Venus to constrain the nature of this bow and explaining its evolution.

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