VLT captures image of Betelgeuse's surface

The supergiant red star Betelgeuse has been rapidly dimming since last year. In order to find out the reason for this dimming, astronomers have been looking at it closely. Recently, the European Southern Observatory's Very Large Telescope (VLT) at Cerro Paranal, Chile, was able to take an image of Betelgeuse. *What does this image really tell us?*

Fainting Betelgeuse

Betelgeuse is a red supergiant in the Orion constellation. It is about 700 times bigger than the Sun, and is considered to be one of the brightest stars in the night sky. However, it recently lost this status due to the star's brightness decreasing to about 36% of its usual brightness since late last year. This has piqued the curiosity of astronomers and amateurs alike. The star is nearing the end of its life cycle, leading to mainstream media speculating about an imminent death of the star: a supernova.

Since Betelgeuse is a red supergiant, its death is triggered by the gravitational collapse of its core, which results in a violent explosion in which the star ejects its outer layers and causes a bright burst, known as a supernova. The leftovers of such an explosion are known as supernova remnants. One of the first supernovae to be recorded is the SN 1054, whose leftover is the widely known Crab Nebula. This explosion happened in the 11th century, and evidence of people observing the appearance of a transient bright star for a short period of time was found in Chinese and Arab texts.

The supernova remnant Crab Nebula (Messier catalog object number 1). Credit NASA/ESA.

What would we see if Betelgeuse actually exploded? Andrew Howell, astronomer at Las Cumbres Observatory Global Telescope Network and adjunct faculty at University of California Santa Barbara, states that if such an explosion were to happen, “you could see it in the daytime, it would cast shadows at night, everyone in the world who could see Orion would be able to see it”.

However, is this just a speculation or is there some foundation behind it? Turns out, there has been no recorded relationship between the dimming of a star and its imminent death. Scientists believe that Betelgeuse’s supernova death could happen in the next 100 000 years, but that the dimming is not an indicator of it happening any minute now. So what is this dimming actually indicating?

VLT’s New Image

The new image of Betelgeuse released by the European Southern Observatory (ESO) seeks to answer that question. Using ESO’s SPHERE instrument at the VLT, astronomers at KU Leuven have taken images of Betelgeuse and compared them to previous images of the star. The image below shows the comparison.

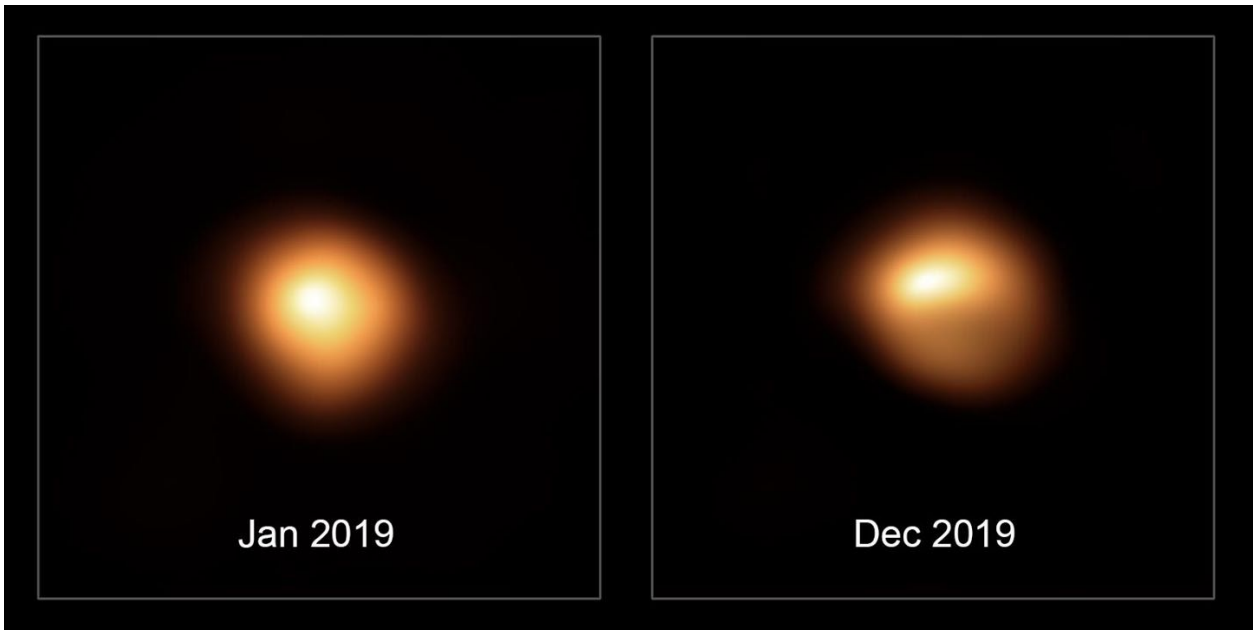

Image of Betelgeuse taken by VLT in January 2019 on the left juxtaposed to an image taken in December 2019 on the right. These were released by ESO last week. Image credit: ESO/M. Montargès et al.

As can be seen in the image, aside from the dimming on the star's surface, there is also an apparent change of shape. Astronomers do not think that this is the prelude to the star's collapse; they have other suggestions. Astronomer Miguel Montargès, who is leading this observation of Betelgeuse, says that the change in appearance of the star could either be due to "cooling of the surface due to exceptional stellar activity, or dust ejection towards us".

We hope that additional observations of Betelgeuse give more material for the astronomers to work on and await new exciting results! This could provide further insight into the evolutionary stages of red supergiants and into their properties.

Sonali Mayani, Space@yourService Scientific Writer