

The Behavior of Red Giant Stars

What is the science question? What is happening to the atmosphere and photosphere (the surface layer of gas that radiates light and heat) of a class of red giant stars as they pulsate?

What were your findings?

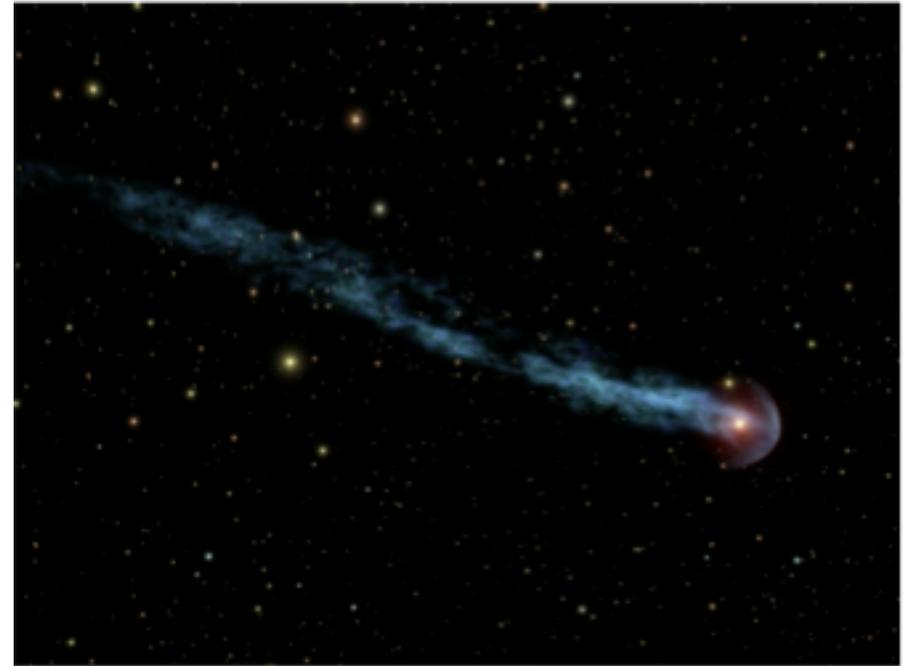
When the star R Peg — an example of this class of star — was brightest:

- The diameter of the photosphere was the smallest.
- The diameter of the water vapor in the atmosphere was the smallest.
- The diameter of carbon monoxide in the atmosphere was the largest.

What was the impact? As the star pulsates, the atmospheric shells of water vapor and carbon monoxide move in opposite directions with respect to the photosphere. This indicates that these molecules undergo different processes during the stellar cycle. It also shows that the new GRAVITY instrument on the Very Large Telescope Interferometer is well-suited to precisely measuring the size of stars over time.

Why does it matter to non-scientists?

These processes are the onset of enriching the Universe with elements that are formed in these stars. These elements are blown into the Universe to make new stars, planets, and the building blocks of life.



Artist's illustration of a red giant star shedding material that will be recycled in new stars and planets.

Markus Wittkowski, Gioia Rau (667), et al. 2018: "VLT-GRAVITY measurements of cool evolved stars I. Variable photosphere and extended atmosphere of the Mira star R Peg" *A&A Letters*, 613L, 7W