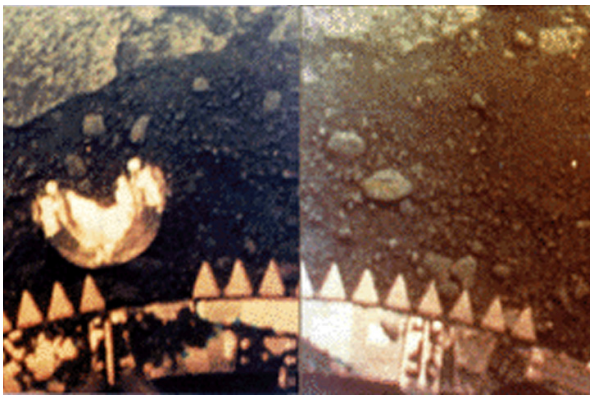
Investigating Landforms on Venus

Imagine traveling in a spaceship toward the surface of the planet Venus. At first, everything is hidden by thick clouds, but as you get closer, you can see the rocky surface below. As you fly over the surface, you notice strange landforms scattered around. They are raised domes with cracks reaching outward in all directions. These are called novae (NO-vay).

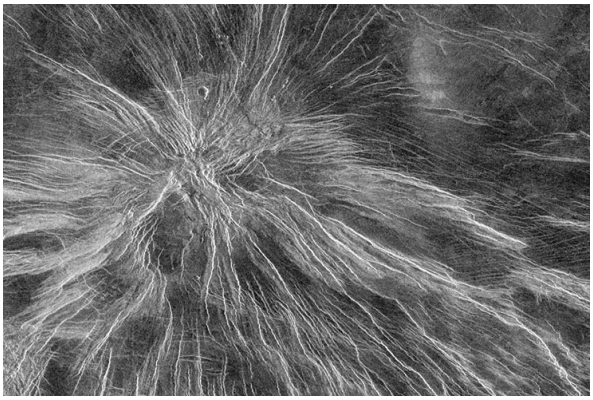
Why do we see novae on Venus but not on Earth? Planetary geologist Taras Gerya (TAR-as GARE-ya) wondered whether two important differences between the two planets might help answer that question. First, Venus's atmosphere is much thicker than Earth's. Its thick atmosphere traps heat from the sun, making Venus much hotter than Earth. The average surface temperature of Earth is a comfortable 14°C (57°F), while the average surface temperature of Venus is a scorching 462°C (864°F)! Second, Gerya thought that possible differences between the geospheres of Earth and Venus might affect how novae are formed. He didn't know for sure, but he thought that the top rock layer on Venus might be thinner than the top layer of Earth's crust. A thinner crust might allow melted rock called magma to move toward the surface more easily, pushing the surface upward to form the novae.

Gerya wanted to test his ideas about how novae form on Venus. But how? Venus is millions of kilometers from Earth, and the novae there were formed millions of years ago. To test his ideas, Gerya made a computer model of Venus.

Models can help scientists like Gerya get evidence about things that are difficult or



This photo, taken by a spacecraft called *Venera*, shows the rocky surface of Venus. The triangles in the photo are part of the spacecraft.



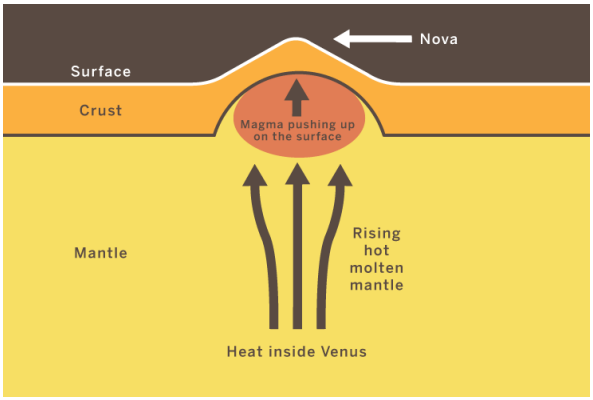
Novae are dome-shaped landforms on Venus. They are easy to see from above because they have cracks reaching out from their centers in all directions. The word novae is the plural form of the word *nova*.

Geologist Taras Gerya built a computer model to test whether the high temperature of Venus's surface and the planet's thin crust make it possible for novae to form there.

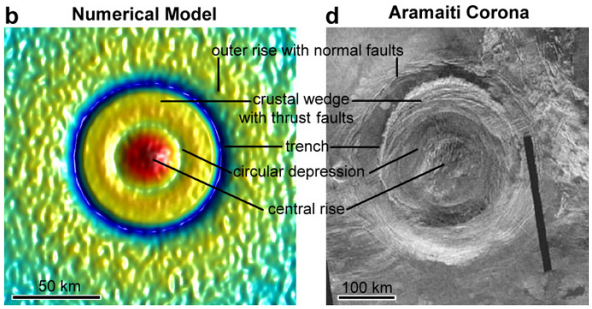
impossible to observe, like the creation of landforms on Venus. Some models are made of physical materials and others run on computers, like Gerya's Venus model. When Gerya made his computer model, he made it represent Venus in ways that would let him test his ideas. For example, he made the surface temperature of the Venus model much hotter than the surface temperature of Earth. He also made the top rock layer in his model much thinner than the top layer of Earth's crust. Gerya programmed his model to show what would happen on Venus over time with this combination of a high surface temperature and a thin rock layer. If features like novae formed in his model, he would have evidence that he was right about how novae on Venus were formed.

When Gerya ran the model, it showed melted rock rising up from underground, pushing the surface upward and creating raised domes with cracks reaching out in all directions.

When he compared the domes that formed in the computer model with the domes on the surface of Venus, he found that the domes in the computer model were the same size and shape as the novae that have been observed on the surface of Venus. Because the model results matched the real features on Venus, Gerya was more confident that the ideas represented in his model were accurate.



When Gerya ran his model, it showed melted rock rising up from the mantle, pushing the surface up and creating raised domes with cracks spreading in all directions.



The domes formed in Gerya's computer model (left) were the same size and shape as the novae found on the real planet Venus (right)