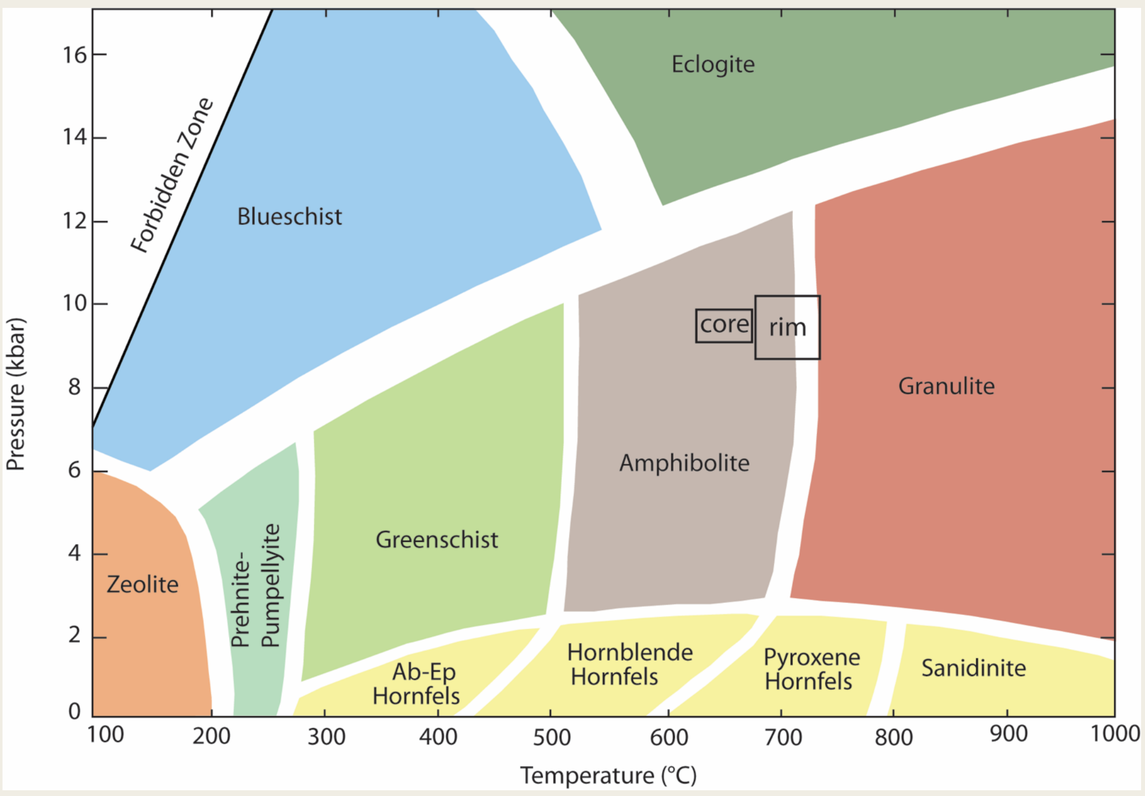
The roots of a Himalayan-sized mountain range in southwestern Sweden

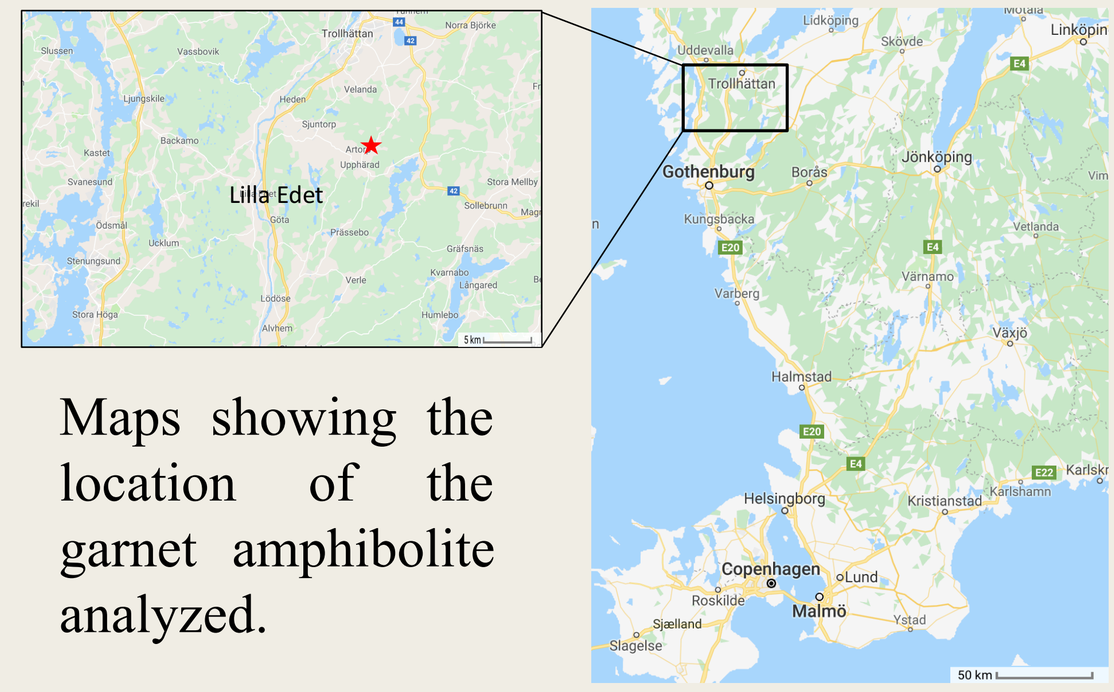
Searching for the story of how a garnet amphibolite formed around 1 billion years ago

If humankind existed one thousand million years ago, they would have experienced a world very different from the one we know today. All the continents were gathered together as one big mass, and in western Sweden, they would have witnessed a large mountain chain the size of the Himalayas. These mountains were formed as continents collided with tremendous force. Deep underneath the ground, the roots of these mountains were being changed and deformed by the high temperatures and pressures that are caused by this type of collision.

An amphibolite located near Lilla Edet in southwestern Sweden contains several larger crystals of the mineral garnet. One such crystal was analyzed to find out under what pressures and temperatures the rock formed under. Both the edge of the crystal, or the *rim*, and the center, or the *core*, were analyzed and these results are presented in the diagram below. When classifying rocks and the degree of metamorphism they have been affected by, geologists often use *facies*. Facies help to determine in what type of environment a rock has formed in and each facies field corresponds to certain temperatures and pressures. Examples of facies are green schist, amphibolite and granulite facies.



The diagram above shows that the core of the garnet amphibolite was formed under slightly lower temperatures than the rim, which means that the crystal grew as the temperature increased. Both the core and the rim are placed in upper part of the amphibolite facies field. The pressure can also be converted into depth, and the garnet amphibolite formed at a depth of around 31.5 to 37 km.



Maps showing the location of the garnet amphibolite analyzed.

The locality near Lilla Edet can be seen in the photo above. The darker garnet amphibolite is cutting through the surrounding bedrock and has lighter colored regions going through it, which indicates that it has been partially melted. This rock, which can now be observed at the surface, formed over 30 km down and under temperatures of between 600 and 750°C. This means that this part of Sweden was once buried deeply underneath a massive mountain range.

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