Solving the mystery of the Tibetan Plateau

November 3 2005

A University of Alberta physicist who helped solve the age-old mystery of what keeps afloat the highest plateau on earth has added more pieces to the Tibetan puzzle. Dr. Martyn Unsworth has uncovered new research about the Tibetan Plateau--an immense region that for years has plagued scientists studying how the area became so elevated.

Several years ago, Unsworth and a team of scientists from China and the United States used low-frequency radio waves to detect that the mid-crust of the plateau is like "a big waterbed." The hot, molten rocks supporting the plateau are less dense than cold rocks, which means they rise up slowly, similar to the way a hot-air balloon works. The discovery provides an explanation for how the whole of Tibet could rise up over millions and millions of years.

After that finding, Unsworth returned to Tibet and has since learned that this geological makeup is typical of the whole length of the Himalaya, not just a small region. "We initially thought that this layer might be a local structure, but it's not so," says Unsworth. His results are published in the current edition of the scientific journal, "Nature."

Dubbed "the roof of the world," or the "adobe of the Gods," the plateau contains not just Mount Everest but almost all of the world's territory higher than 4000 metres. The area was formed when India rammed into Asia about 50 million years ago and is considered a showcase of plate tectonics. Although many theories have been proposed to explain the unusual thickness of the plateau--its crust doubles the average 30 to 35km thickness found the world over--little concrete evidence has been offered. Tibet was closed to foreign access until the 1980s, when French scientists first collaborated with Chinese scientists to investigate the plateau. Since then Unsworth and his international research team have made many significant findings and has recently negotiated access to data collected in India.

These newest results have allowed Unsworth and his research team to quantify how much flow, or viscosity, is taking place. "These models are important because they give observations that constrain many theories about what happens when mountains are formed," said Unsworth. "This has implications in many areas of earth science, since all continents were formed in the past by a series of continent-continent collisions."

In Canada, for example, we cannot easily study collision that occurred in the distant pass, says Unsworth, but we can look at these geological processes where they are active today. Last summer Unsworth began a similar project in Eastern Turkey, where two plates are colliding. This collision zone is at an earlier stage than Tibet and may give some clues about the temporal evolution, he says.

Source: University of Alberta