



Earth and Life

Tibet: evidence for and against the Raymo- Ruddiman Hypothesis

Voice Over

A two-stage model was beginning to emerge. First, Ruddiman and Kutzbach suggested that an uplift of Tibet changed the movement of air masses and rainfall patterns, strengthening the Indian monsoon. The effects of that can be devastating as people living south of the Himalayan mountain belt know only too well. Second, Raymo and others argued that the powerful monsoon falling on the Himalayas led to intense chemical weathering, stripping carbon dioxide from the air. Low CO₂ meant a cooler climate but there's nothing to suggest that there's a limit to this process, a fundamental problem with the Raymo/Ruddiman hypothesis, as expressed by Berner.

Bob Berner

You'd run away until the whole world froze. The original paperback that Raymo and co-workers in 1988 specified that if we had uplift of the Himalayas that the carbon dioxide we had consumed by weathering and CO₂ would go down. Well you can't just do this simply because you have to watch out, you run out of CO₂ very quickly.

Voice Over

The Raymo/Ruddiman hypothesis took no account of the negative feedback mechanism which keeps the Earth's climate from running out of control, and Berner's objection remains unanswered.

Don Depaolo

If you listen to Maureen she will tell you a story that you have a hard time arguing with, and if you go to another person, for example Bob Berner, he will tell you a story that's almost completely at odds with Maureen, with what Maureen will tell you, and give you good reasons why that has to be the case. And there is a real scientific problem.

Voice Over

Is there really a link between uplift of Tibet and climate change? Studies of microfossils from the Indian Ocean have traced the changing intensity of the monsoon. It was greatly strengthened between seven and nine million years ago. What was Tibet doing at that time? Fossil leaves have characteristics which are indicative of the environment in which they lived. A few isolated specimens have been found by Chinese geologists on the Tibetan Plateau.

Chinese Man

He says this be it a widow stamp or a reet - they should be the plants on the river bank of a temporary and very humid region and that seemed to be...

Man

Temperate

Maureen Raymo

Temperate. So you wouldn't find this today in Cailash?

Chinese Man

(In Chinese)

Man

What did he say there?

Translator

He said that that's actually impossible to find this type of plants in the modern elevation or the attitude of Cailash and they are...

Voice Over

The difficulty is that a wide range of fossil leaves is required to define the temperature zone of their habitat, and then to relate that temperature to altitude is problematic too. Another way of looking at the elevation history is to look for geological faults. Here, for example, the foreground terrain has slipped downwards, leaving what was once a cliff face now eroded into minor peaks.

Peter Molnar

There are hundreds of normal faults like this in Tibet today and this fault is active, and there is likely to be an Earthquake on this fault any time. So if we can date when these faults become active that will tell us when this change took place, when the change from building a plateau to destroying a plateau took place.

Voice Over

These faults relate to the time when the Tibetan Plateau had reached its critical altitude and then began to collapse. The time at which the fault was active turns out to be some time between five and eleven million years ago. This is the same time that the monsoon strengthened. Scientists like Peter Molnar are now trying to establish a causal link between the two events.

Peter Molnar

The forefront of science is a very fuzzy area and one needs a balance of all kinds of approaches, there have to be ideas drifting around, they have to be formulated and worked up well, and usually when they are there still aren't enough facts. And then there are the rest of us who go out and try to find facts and test them.

Voice Over

The next fault to be dated came in at 14 million years, which is older than the change in the monsoon. Contradictions remain.

