

Rockies formed by suction? Theory may stick

The formation of these mountains has long presented a puzzle to geologists



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The Rocky Mountains may have been formed when a giant suction created a counter force that thrust the mountains upward. The proposal also could potentially explain the surprising bands of gold, silver other minerals that streak at a near right angle across the Rockies in Colorado.

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The craggy Rocky Mountains may have been formed when a giant suction created a counter force that thrust the mountains upward, according to a new theory.

The Rocky Mountains, rising from the center of the North American continent, have long presented a puzzle to geologists.

Mountains generally form where continental plates crash into each other: the Himalayas rise where India smashes into Asia, for example. But the nearest plate boundary to the Rockies runs along the west coast of North America, forming the coastal mountain ranges.

"The Rocky Mountains have always been a problem because they look like a collisional mountain range. They look like the Himalayas but we can't find the India," said Basil Tikoff of the University of Wisconsin, Madison.

"It's just a weird situation in the Rocky Mountains that despite the fact that they have extraordinarily good geology and geophysics that we don't get the basic geology of how they formed."

Since the 1980s, the dominant theory has been that the Farallon plate to the west skidded underneath the North American plate above it at a shallow angle, creating ripples far out in front, like trying to pry a sticky pancake off a griddle. The further you stick the spatula underneath, the more it sticks to the spatula and ripples the pancake ahead of the spatula edge.

Yet a number of geologists note that several types of evidence are inconsistent with this idea. Types of rocks found in California indicate that this shallow scraping isn't possible because it should have sheared away the bottom layer of the plates, and ancient rocks representative of the bottom have been found where they shouldn't be.

"There's a fundamental assumption of what's going on that does not stand up to further scrutiny," said Tikoff.

Now researchers provide evidence in support of a new idea that they say may explain not only the Rockies' rising but also the gold, silver and other mineral deposits that thread through the mountains in Colorado.

The new hypothesis revolves around the idea that underneath Wyoming is an area where the North American plate is extra thick, protruding like a hull into the more fluid part of the upper mantle below. As the Farallon plate slid underneath, the fluid layer beneath flowed around the hull shape and into the cavity where the plates meet and as it tried to flow out again, it created a downward suction force.

Seemingly paradoxically, the suction, combined with the plate pressing in from the side, created the forces that pushed up the Rockies, Jones said.

Evidence supports the new idea, he noted, including the presence of a two-mile-thick layer of marine shale in Wyoming where the downward suction would have created an undersea basin starting about 75 million years ago.

Another aspect of the proposal is that it could potentially explain the surprising bands of gold, silver other minerals that streak at a near right angle across the Rockies in Colorado. The unusual fluid flow created by the keel formation could have drawn magma up from below, creating the metal deposits that drove prospectors to the Colorado Rockies in the late 1800s.

"I suspect for people who are thinking hard about this problem, this is likely to become a leading candidate if not the leading candidate" said Tikoff of the proposed mechanism. "It makes predictions you can test."

Testing the predictions made by the hypothesis will be the next step, Jones agreed