AAPG Annual Meeting
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Annual Meeting Highlights

*Geologist Directs*

# ‘Naked Mountain’ Flick Worth a Peek

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## ‘Nanga Parbat’ Is the Monday Film Special

“Nanga Parbat (Naked Mountain)” will be shown at noon on Monday, May 12, during the AAPG Annual Meeting.

The Conventional Theater will be located in room 253 A/B of the Salt Palace Convention Center.

The Convention Theater will offer 37 geologic, scientific or travel-oriented films May 12-14.

“Nanga Parbat” will be Monday’s special “lunchtime case study” feature. Tuesday’s lunchtime feature is “Arch Druid of the Environmental Movement -- David Brower: A Conversation with Scott Simon.” Wednesday’s special feature is National Geographic’s “Forces of Nature -- Nature’s Fury!”

A complete film schedule can be found in the convention announcement.


Nanga Parbat, the “Naked Mountain” -- and movie star at this year’s Convention Theater. CLICK TO ENLARGE.

**Visit the Tobin Theater** at AAPG’s annual meeting in Salt Lake City to see a rare triple-play:

A film made by a geologist about geologists working in one of the world’s most geologically fascinating places.

Geologist and filmmaker Doug Prose created the 57-minute documentary “Nanga Parbat: Naked Mountain,” working with his wife, Diane LaMacchia.

The film tells the story of geologists trying to understand the dynamics of Nanga Parbat, a fast-growing mountain in northern Pakistan.

In fact, Nanga Parbat might be the world’s fastest-growing mountain. It stands at the end of the Himalayan chain, in Pakistan’s Kohistani region.

Its name means Naked Mountain, from the fact that snow cannot completely cover its steep sides.

Nanga Parbat rises above a valley carved by the Indus River -- which proved to be a key fact for geologic investigators.

“We really loved being there. It’s very challenging,” Prose said.

“In most of these places, you go out in Jeeps on dirt roads that are hanging off the edge of these incredible mountains, with this enormous, raging river far below you.”

## Mountain Mystery

Prose said work on the Nanga Parbat documentary began in 1996. Most of the filming took place over two years, including two trips to Pakistan during an eight to nine week period.

In addition to the remote location, Prose had to cope with dust storms and temperatures that reached 100 degrees.

He also filmed in the French Alps and at various labs and universities in the United States. The documentary couldn’t be completed until 2001, when scientists completed their study of the area.

One of those geologists was Peter Zeitler, professor of Earth and Environmental Sciences at Lehigh University in Pennsylvania.

At the time, Zeitler served as director of the university’s Nanga Parbat Continental Dynamics Project, funded by the National Science Foundation.

The project “looked at how the crust was reworked, or overprinted, during this orogeny,” Zeitler said. “Some people question that terminology, but Nanga Parbat definitely had this overprinting happen to it.”

At 26,658 feet (8,125 meters), Nanga Parbat is usually listed as the world’s ninth tallest mountain. Zeitler estimated its growth at 4-5 millimeters per year, or 4-5 kilometers per million years.

That doesn’t mean it will get taller. Zeitler put the mountain’s rate of erosion at about five millimeters per year.

“From a fixed point of reference on the surface, rock is passing through that point,” he said. “At the same time, erosion is happening.”

With rapid growth and rapid erosion, perplexing petrology and the puzzling presence of much younger rock, geologists faced a truly towering mystery.

What was going on at Nanga Parbat?

## From Rock to Film

Prose came to science documentary work from a natural but oblique direction.

He earned his degree in geology at the University of California-Santa Cruz, then spent 10 years with the U.S. Geological Survey in Menlo Park, Calif.

At the same time, Prose said, he played in bands when music videos became a popular extension of performing.

He wasn't directly involved in production, but he paid attention "and picked up a few things," he said. "It dawned on me that this was a way to tell a bigger story, to get more in."

Prose also liked communicating with a broad public audience instead of writing and presenting papers for a few dozen specialists at meetings.

He worked on a USGS film project, then branched out. One of his assignments introduced him to his future wife, who now writes the scripts for their documentaries.

Their production company, Earth Images Foundation in Oakland, Calif., has made several public television science documentaries, broadcast around the world.

Prose said he especially enjoys making nature films that will be seen by young people.

"We hope they'll get excited about what geologists do, and possibly consider that as a career," he explained.

The Nanga Parbat documentary began as a way "to show how geologists become involved in these big projects," according to Prose.

Those scientists include Qasim Jan, a Pakistani geologist who began exploring and interpreting the geology of the Nanga Parbat region more than 30 years ago.

While the geologists provide a focus for the movie, and Nanga Parbat provides the mystery, Prose said they were all upstaged in the completed work.

"The Indus River was actually the big star of the movie," he said. "It's like one big rapid all around the base of the mountain."

## Tectonic Aneurysm

Zeitler and a Lehigh faculty colleague, Anne Meltzer, conducted seismic work at Nanga Parbat to examine the root cause of the mountain's growth.

"The seismic results tend to indicate that the mountain is underlain by warmer and fairly weak rock," he said.

From seismic data and field studies, the project's team of geologists formed a working hypothesis.

Zeitler described the Nanga Parbat model as a "tectonic aneurism" in Proterozoic basement, with advection of deep crustal material into a relatively weak crustal zone.

"What we think happened is that the Indus River rapidly carved a deep valley, a couple of kilometers deep, into crust already warmed by orogenic events," Zeitler said.

"Models show that if you cut a notch of that sort, this will be a place where the crust will tend to fail."

Once the crust fails, "you get rapid rock uplift, and rapid erosion facilitated by the presence of the large river. This erosion steeps the shallow thermal gradient in the crust, further weakening it, encouraging continued crustal failure," he added

At the surface, he likened the phenomenon to blowing up a balloon. Once the balloon begins to expand, it gets easier to blow up.

Zeitler also sees the phenomenon as a positive feedback loop, in which the rapid uplift leads to continued rapid erosion, which helps produce ongoing uplift.

Today, Zeitler works on a similar project in the Himalayas' western syntaxis, in southwest Tibet.

He thinks the same kind of processes may be at work, where the Tsangpo River cuts a gorge near Namche Barwa.

"What they share is the big river," he said. "It seems like an interesting coincidence that this is happening at both ends of the chain."

Prose sees the Nanga Parbat documentary as compelling narrative, in addition to a story of the geologists who took on an unusually challenging riddle.

"It took a couple of years for them to complete the studies, to solve the mystery," he said. "Now I guess everybody is out there rewriting the textbooks."