

OBSERVATORY

Massive Floods May Have Formed Steep-Headed Canyons



Michael P. Lamb

A topographic map of Box Canyon, just off the Snake River in Idaho, which may have formed because of a flood.

By HENRY FOUNTAIN
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With some canyons, it's obvious how they formed: the river that is now at their base carved them over time. But the origin of others is less clear, particularly the kind that dead-end in steep headwalls, known as amphitheater-headed canyons.

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The evidence for this comes in several forms.

The researchers calculated that the seepage flow would not be enough to transport eroded material downstream. They found scouring at the top of the headwalls, signs that

One interpretation is that this kind of canyon forms by gradual erosion through seepage of groundwater through the headwalls. But while this idea has been shown to work in sandy conditions, there are no obvious examples of it in much harder rock.

Box Canyon, just off the Snake River in Idaho, is a short canyon created out of basalt that at first glance might seem to have been formed by seepage. For one thing, the canyon is home to a larger spring, with water seeping through the headwalls at a rate of about 10 cubic meters per second.

But Michael P. Lamb and colleagues at the University of California, Berkeley, report in *Science* that upon closer inspection, Box Canyon was not formed by seepage over time. Instead, they say, a massive flood about 45,000 years ago carved it violently and much more quickly.

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surface water once flowed into the canyon. And they interpreted concentric rings of boulders at the base of the canyon as plunge pools, formed by waterfalls. They say a megaflood (220 cubic meters per second of water) carved the canyon.

The researchers note that Mars has similar amphitheater-headed canyons. So if they evolved in the same way, through flooding rather than erosion, that could help in understanding the Martian water cycle — what happens to water on the planet over time.

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