What is the origin of Martian floods?

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The evidence for floods on the planet Mars is substantial,[1–3] and they are often described in detail with superlatives:

> "Outflow channels represent the largest system carved by liquid water on Mars. They are thousands of kilometers long, more than a kilometer deep (Baker, 2001) and show attributes such as grooves, terraces, teardrop islands, streamlined terraces and high width-to-depth ratios that are consistent with the erosive origin of the channels."[4]

Some scientists further claim they have found additional evidence of precipitation, lakes, and glaciation.[5]

Many of the features on Mars are similar to the features of catastrophic flow created by the Lake Missoula flood in the northwest United States.[6] However, the Martian catastrophic flow channels (figure 1) are orders of magnitude larger than those of the Lake Missoula flood. The estimated amount of water released from one location on Mars, Aram Chaos, is 93,000 km^3, while the volume of glacial Lake Missoula is estimated at 2,000 km^3. The flood volume on Mars is said to be 10 to 100 times larger than the largest catastrophic floods on Earth, not including Noah's Flood, which most scientists do not recognize.[7] Figure 2 shows a picture of the flood debris on the ground from the Mars Pathfinder.

Floods mostly from 'chaos' regions

Scientists appear to have reached a consensus as to the origin of the water for the Martian floods. They conclude that it erupted from below the ground, with most researchers believing the water originated from 'chaos regions'.[8,9] These regions are large collapse features seen by satellite. The regions have an irregular fracture pattern on a scale of tens to hundreds of kilometres, and have tilted, flat-topped blocks tens of kilometres in diameter. The blocks form depressions in the landscape hundreds of metres deep. The chaos regions also have a convoluted network of mesas, buttes, and hills, chopped through with valleys. Nothing like this exists on Earth.

Aram Chaos is hundreds of kilometers long with a large-scale collapse of about 1,500 m. The researchers suggest that long ago a large underground reservoir burst. Most of the chaos regions are found in the northern highlands, and it appears the issuing water rushed down the steep slopes of the crustal dichotomy into the northern lowland, forming the immense water-carved channels.

What caused the floods?

It is unknown what caused the 'chaos regions' to expel such a huge volume of water quickly, but there are many ideas,[10] including meteorite impacts, the rise of magma, volcanic eruptions, and tectonic activity. Judging from the size of the chaos regions and the outflow channels, the resultant floods were spectacular, so the cause must have been equally spectacular. Secular scientists are not able to reach any conclusion regarding the number and duration of the floods or the dates of the floods. Because they rely on crater counting as a relative age indicator, they spread the occurrence of floods from the chaos regions over a time period from 3.8 Ga to 2.0 Ga or younger.[11] One ingenious, but speculative, hypothesis claims that the water collected in basin sediments, sometimes deposited in impact craters, during the so-called Late Noachian (not to be confused with Noah's Flood on Earth), about 3.7 Ga but that it did not cause floods until the late Hesperian, about 2.5 Ga.[12]

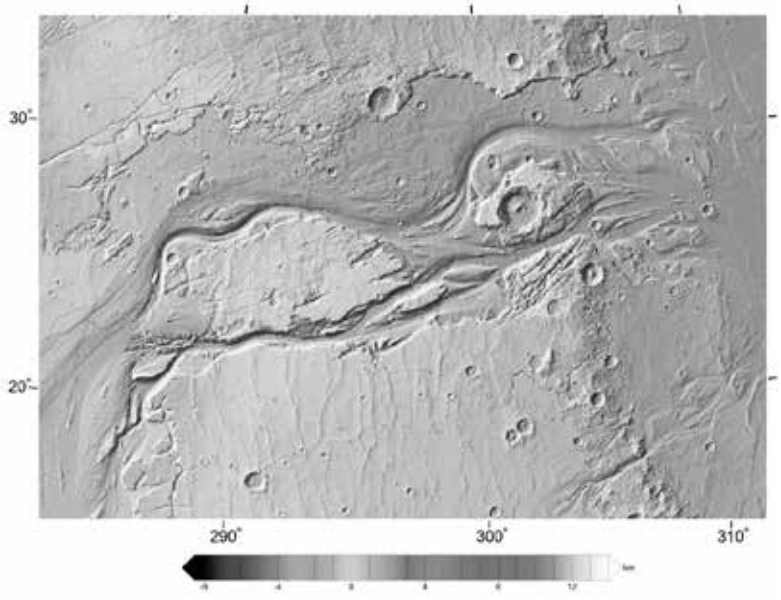

Figure 1. Kasei Valles, seen in MOLA elevation data. Flow was from bottom left to right. North is up. Image is approximately1,600 km across, showing the enormous size of this channel, which is 3,500 km long, greater than 400 km wide, and exceeds a depth of 2.5 km (Areong, NASA).

Figure 2. Mars Pathfinder photo of region where Ares Vallis borders Chryse showing flood debris (NASA/JPL)

If meteorite impacts broke open underground reservoirs,[13,14] it could have caused a massive flood. The fact that Aram Chaos is found inside an impact crater adds credibility to this hypothesis. An alternative possibility is that the heat of an impact melted ground ice. Meteorite impacts could also explain the evidence for precipitation and glaciers as produced by water vapour from impacts.

Timing of the floods

The impact idea is not popular. One reason why this uniformitarian proposal falls short is that they spread the thousands of Martian impacts over hundreds of millions or even billions of years. There are several planetary scientists who try to focus a large number into more specific time periods so they would produce more powerful floods.

Spreading the time out to billions of years means each flood would be isolated and mediocre. However, if they came all at once, at the same time as the Genesis Flood on Earth,[15,16] a huge number of impacts would fall in quick succession. The bombardment would cause a great amount of heat to rapidly pass into the subsurface. It would be the right order of magnitude to release a prodigious amount of underground water. With such a meteorite bombardment, the crater-counting dates proposed by secular scientists would become virtually meaningless, since by chance some areas would have many impacts, dated 'old', and some areas with few impacts, dated 'young'. Meteorite bombardment over a short period of time would be a much more powerful mechanism for the release of ground water and precipitation than the isolated impacts proposed by secular geologists.

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