

What is the meaning of ophiolites?

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Ophiolites are claimed to be pieces of ocean crust and upper mantle that have been thrust up onto continental crust and are now found in mountains, mainly along continental margins.^{1,2} An ideal ophiolite suite consists from bottom to top of peridotite, gabbro, sheeted dikes, basalt with pillow lavas and sedimentary rocks. The peridotite is considered to be an upper mantle rock, while the remainder of the sequence consists of ocean crustal layers.

Starting at the bottom of ocean crust, layer 3 is gabbro; followed by layer 2B, the sheeted dikes, which are closely-spaced nearly vertical dikes of diabase (an intrusive basalt); layer 2A, which is the extrusive basalt that is supposed to flow from mid ocean ridges; and layer 1, the sediments. Ophiolites can be over 10 km thick and sometimes of large scale, such as the impressive arc-shaped Oman ophiolite that is about 150 km wide and 550 km long (figure 1).^{3,4}

Ophiolite conundrums

The origin of ophiolites has long been the subject of controversy.⁵ A favoured hypothesis is that the ocean crust was generated at mid-ocean ridges (MORs), spread out from the MORs and, after colliding with continents, forced up and over the continental crust, in some cases for possibly

hundreds of kilometres. Ophiolites sometimes possess high temperature metamorphic rocks at their bases,⁶ and the grade of metamorphism decreases downward below the base.⁷

Research on ophiolites in the 1980s and 1990s revealed that they are much more complicated than first thought. Major parts of the 'ideal' sequence are frequently missing, especially the sheeted dikes and the sedimentary rocks. The basalt can also vary from thin to absent. Although the structure is similar to that of ocean crust, supposedly generated at MORs, the geochemistry of ophiolites often does not match that environment. A revolution in thought has occurred

and most geologists now believe that ophiolites were mostly generated near 'subduction zones'.

Another problem is that there are no locations where ophiolites are currently being 'slammed' against continental crust. In other words there are no modern analogues,⁸ which is again contrary to uniformitarian ideals (although not against actualism). It also makes it difficult to develop a thorough understanding of the proposed mechanism.

In truth there does not seem to be any credible mechanism for emplacement (obduction). As Dewey writes, 'no credible mechanisms

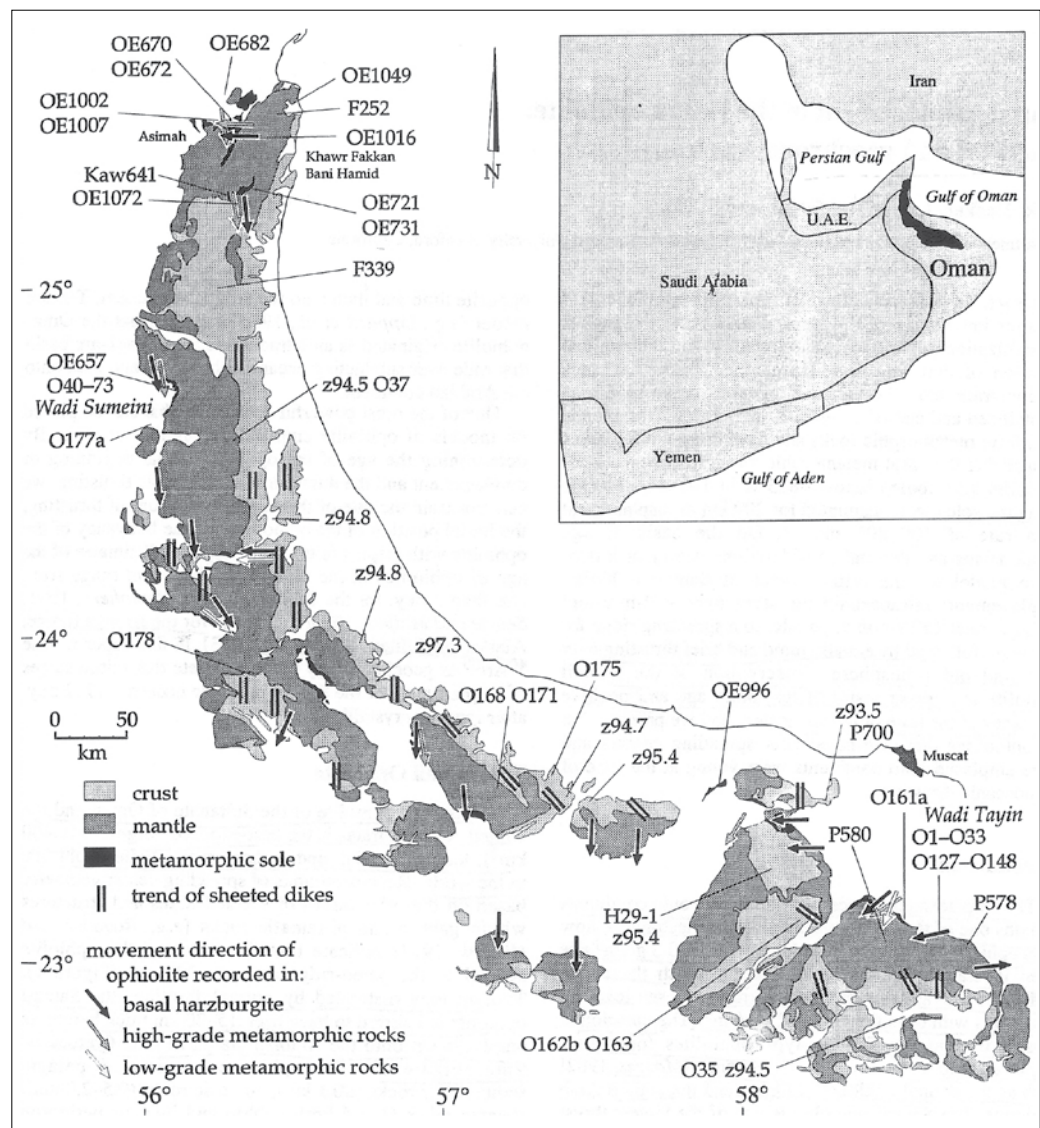


Figure 1. Oman ophiolite, also called the Samail ophiolite. (From Hacker *et al.*,³ p. 1,231).

What are creationists to make of ophiolites?

Ophiolites represent a bit of a conundrum to creationists as well. We cannot dismiss them as rare because they are widespread across the earth.¹⁷ It is difficult to relate ophiolites to the Catastrophic Plate Tectonic (CPT) model because ophiolites are not often found in plate collision zones,¹⁸ an obvious possibility for an emplacement mechanism. Furthermore, their radiometric ages are often older than the Mesozoic and Cenozoic, the time the current ocean crust is believed to have formed by CPT. Ophiolites are mostly younger than 1 billion years with the oldest believed to be about 2 billion years old within the uniformitarian timescale.¹⁹ However, there is now a claim of a 3.8 billion-year-old ophiolite in southwest Greenland.²⁰ So, ophiolites occur throughout the geological column, and according to the CPT model would mostly represent pre-CPT ocean crust.²¹ These dates assume that creationists can accept radiometric dates in a relative sense, which is possible,²² but requires more research to confirm.

Ophiolites likely represent real ocean crust and upper mantle material from some time in the recent past; some have been used with great success to estimate many properties of current ocean crust.²³ I suggest that ophiolites represent pre-Flood ocean crust. If this is the case, is it possible that the current ocean crust is really pre-Flood ocean crust and upper mantle? This would mean the current ocean crust and upper mantle were *not* formed during the Flood, according to the CPT model.

Furthermore, the catastrophe of the Flood is a much more worthy mechanism for emplacement of ophiolites than the uniformitarian model, assuming the overthrust mechanism and distances of displacement are more or less correct. Given that microdiamonds and UHP and HP minerals are now found in ophiolites, I would favour the impact origin in which pre-Flood ocean crust is

forced up and onto what are considered continental rocks. The arc shape of the Oman ophiolite (figure 1) is suggestive of a large impact. However, many other ophiolites are not arc shaped. The reason why other ophiolites in mountains, such as the Luobusa ophiolite in Tibet, are not suggestive of an impact could be because of the chaos of numerous impacts, the extreme tectonics, and huge erosion and rapid deposition during the Genesis Flood. Ophiolites dated during the Mesozoic and Cenozoic could represent mid to late Flood impacts.

I am seeking to develop a creationist model for ophiolite emplacement that is compatible with the Flood. Such deductions are obviously controversial, and I welcome differences of opinion and encourage those who disagree to express their thoughts on these mysterious ophiolites.

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