Microdiamonds found in Japanese forearc

Michael J. Oard

The origin and formation of diamonds is not completely understood, but it is believed that they form at depths of between 150 and 300 km and even possibly 450 km in the earth's upper mantle.[1] The discovery of microdiamonds in a wide variety of geological contexts on and near the earth's surface has therefore stirred much interest and controversy among uniformitarian geologists.

Uniformitarian shock over microdiamonds and other ultrahigh-pressure minerals

Microdiamonds have commonly been found with other ultra high-pressure and high-pressure minerals at many locations.[2] These include central China, Antarctica, Brazil, Europe, Mali, East Greenland, central Asia, the Himalayas, Indonesia, Norway, northeast Canada, and French Guiana.[3–5] The microdiamonds and ultra high-pressure minerals are commonly located in structurally high mountainous areas.[6] They also come from what uniformitarian scientists consider as continental rocks. So, uniformitarian scientists must postulate that continental rocks were somehow forced down by "continental collisions" or "subduction" to depths of a few hundred kilometres and then, somehow, forced back up to the surface again.

Microdiamonds have recently been found in a Himalayan ophiolite, believed to be pieces of ocean lithosphere (upper mantle and crust) thrust up onto the continental crust.[7,8] Ophiolites are found in mountain ranges mainly along continental margins. This discovery has caused a mild shock among uniformitarian scientists because ophiolites have always been considered shallow crustal rocks.

Moreover, the up and down motion of continental rocks must be relatively rapid.[9] The problem with the suggested mechanisms is that it is well known continental rocks are lighter than the ocean crust and upper mantle, and do not normally "subduct". Then there is the problem that once subducted well below 100 km, why would the rocks "pop" back up to the surface? Although uniformitarian scientists can come up with some subduction hypothesis for some occurrences, it is difficult to even imagine such a history for ophiolites.

Although uniformitarian scientists write about rapid vertical motions for crustal rocks containing microdiamonds and ultra high-pressure minerals, the velocity is sometimes stated as only a few centimetres per year. This velocity is likely tempered by radiometric dating and uniformitarianism, which ends up slowing all processes considerably. So instead of millimetres per year, they postulate several centimetres per year and call it "rapid". One method to determine the velocity of uplift is to see how fast these microdiamonds and ultra high-pressure minerals undergo reverse metamorphism to lower pressure equivalents. This may be determined in the lab, although there could be a problem of scale. It is possible that lab tests may indicate that much faster rates are needed.

Microdiamonds now found in a forearc setting

To make matters worse, microdiamonds have recently been discovered in a xenolith from a dyke in a Japanese forearc (figure 1).[10] Xenoliths are foreign rocks likely incorporated from the wall of the dyke and brought to the surface in the flowing magma. A forearc (figure 2) is presumed to be the accretion area in a subduction zone in which soft sediments on an ocean plate, combined with terrigenous trench sediments, are plastered against the slope of an island arc or continent as one plate converges within another. Early concepts in plate tectonics assumed that a great mass of this material accreted to the island arc or continent, since the

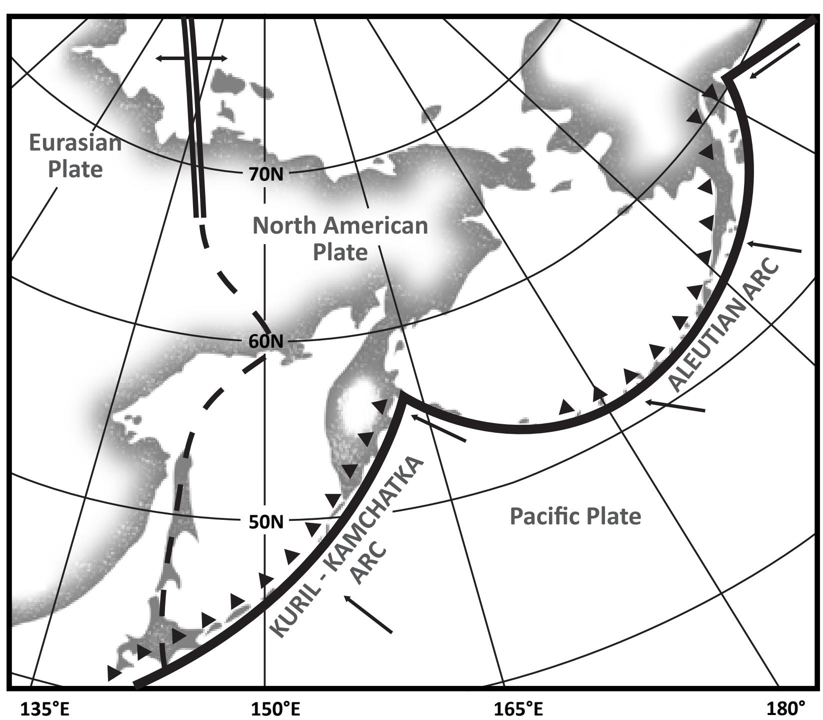

Figure 1. Inferred plate junctions in the north Pacific adjacent to Japan. Single solid line = thrust boundary; double solid line = rift boundary; dashed line = inferred locations of rift boundary; filled triangles = active island arc; arrows show relative motion. (After Cormier, ref. 18).

material was lighter than ocean crust and should be scrapped off during subduction. However, observations of forearcs showed that this simple plate tectonic model was not based in reality, since many forearcs have little or no accretionary sediments, and the sediments that are found are almost totally of terrestrial origin. Furthermore, extensional features are more common than thought for a "convergent" margin.[11] A forearc environment should be one of the least likely spots to find microdiamonds. But they have been found:

> "Convergent margins are not generally considered to be suitable places for the formation of diamond and its transport to Earth's surface. Microdiamonds found in xenoliths within a lamprophyre dike in southwest Japan show that this assumption is incorrect and, furthermore, that diamond occurs in a wider range of geological settings than previously realized."[12]

Mizukami *et al*. assumed that the microdiamonds rose from depths of around 160 km and were cooled from temperatures of about 1,500°C, according to the standard beliefs on the origin of diamonds at depth. The microdiamond locality is actually only 35 to 40 km above the subducting Philippine Sea plate. The subducting plate is believed to be relatively cool and a barrier to magma rising vertically from great depths through the subduction zone. Furthermore, the plate is assumed to have been subducting since the Mesozoic, so it is unlikely the microdiamonds formed and arose before subduction. Another problem is that the mantle below the island arc is assumed to become more oxidized in the subduction process, which is unsuitable for diamond formation. But forearc magmatism is rare.[13]

In a quandary, the researchers suggest that the microdiamonds must have risen far away from the subduction zone toward the west, possibly associated with the backarc basin of the Japan Sea. Then the microdiamonds were incorporated into the mantle above the subduction zone where magmatism brought them to the surface. In this *ad hoc* scenario, the microdiamonds would need to travel over 100 km *horizontally* toward the east *underneath* the island arc. It seems that the uniformitarian plate tectonic paradigm has an endless number of variables and possibilities that can explain every anomaly.

What do forearc microdiamonds mean to creationists?

This is a good question, and I am not sure. But I have ideas. Forearcs are assumed to be surficial off-scrapings from the ocean plate. Just finding igneous intrusions in the area is somewhat anomalous. To say that the igneous intrusions in forearcs originated from depths of around 160 km is especially anomalous. The catastrophic plate tectonics (CPT) model probably offers more possibilities than the uniformitarian model, but it seems to me that it will be difficult for the CPT model to explain the forearc microdiamonds. Regardless, microdiamonds and other ultrahigh-pressure minerals anywhere on the surface of the earth present provocative possibilities—and challenges—for any Flood model.

There is another creationist possibility for explaining forearc microdiamonds, as well as micro-diamonds and ultra high-pressure minerals elsewhere. It is well known that impacts not only create microdiamonds, but also cause a variety of ultrahigh pressure minerals. For instance, microdiamonds found in Nunavut, Canada, could have been caused by an impact, but the authors favoured some type of subduction 1.8 billion years ago.[4]

If the microdiamonds in the Japanese forearc were caused by impacts, it may even be possible that the island arc and trench, in which the forearc is part, was caused by an impact. Despite attempts to explain island arcs, the curvature of the arc and associated trench have been difficult to explain.[14] But, impacts cause circular features and the island arcs could just be remnants of impacts. Could it be that island arcs are impact features and not related to plate tectonics or catastrophic plate tectonics? Forearc microdiamonds would point toward this possibility. Ron Samec recently suggested an impact origin for the Aleutian Island Arc.[15,16]

The Aleutian Island Arc has a high radius of curvature, which would indicate a huge impact, but this is quite possible during the Flood. Based on scaling from the moon, I have recently calculated that, during the Flood, the

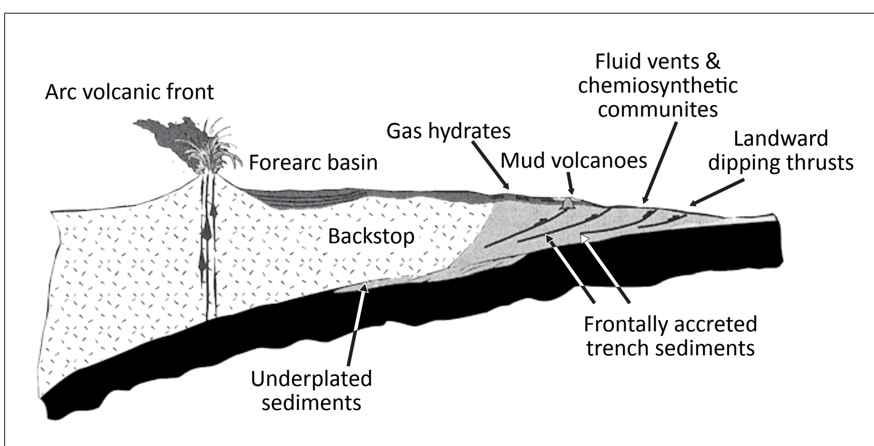

Figure 2. Typical accretionary volcanic arc at an active convergent margin (after Clift and Vannucchi, ref. 19).

earth should have received 36,000 impact craters greater than 30 km in diameter, with about 100 over 1,000 km and a few with diameters of 4,000 to 5,000 km.[17] Such a great bombardment would pulverize a larger portion of the earth's surface and may have started the Flood. The implications of such bombardment are tremendous and I don't think creationist have yet dealt with this issue. The reason that we do not see direct evidence of such bombardment is very likely because vertical tectonics, erosion and re-deposition would have greatly modified the original craters during the Flood. All these microdiamonds and ultra high-pressure minerals, plus island arcs, could be remnants of a huge asteroid bombardment at the time of the Flood.

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Eolian erosion exposé

Emil Silvestru

Wind (eolian) erosion is usually mentioned in the scientific literature as wind picking up sand particles (deflation) and "sandblasting" the bedrock (corrasion).[1,2] The most visible results are sand deposits (dunes and associated forms) and strange "mushroom" rocks.

Little is however said or taught about the possibility of wind excavating large hollows in massive rocks. The most obvious features that come to mind are *tafoni* (singular *tafone*) which is defined as

> "A hollow, produced by localized weathering on a steep face. Rock breakdown typically takes place by granular disintegration or by flaking, and the hollow shows a tendency to grow upwards and backwards."[3]

Although most authors seem to emphasize localized weathering, mineral constituents inside the host rocks and local fracture concentration as cause for their formation, some have at least considered the role of wind in the overall excavation process.[4]

Wind "eats" rock

I believe that wind plays a more significant role in the formation of tafoni. During microclimate research in a salt mine near the city of Turda, Transylvania, Romania, I witnessed the formation of many "megascallops"—large (up do a meter long and 30 cm diameter at the wider end) scallop or spoon-like excavations—in rocksalt resulting from the opening new air shafts. The cause was the sudden increase in fresh air flow from the surface through the shaft. The fresh humid air being unsaturated in salt aerosols, unlike the normal, near-stagnant mine atmosphere would be able to dissolve the rocksalt in areas where turbulence ensured a longer air-rocksalt contact. These were generally in the upper corners of the mining