Module B. Colour from the Cosmos

Lesson 15: Beryl Geology and Geography

Why is Beryl Rare?

Beryl is relatively rare because there is very little of the element beryllium in the upper continental crust and it concentrates only in specific rock types, such as granites and pegmatites. Furthermore, beryllium is not usually concentrated enough to facilitate the growth of larger crystals suitable for the gemstone industry.

Aquamarines are comparably more widespread than emeralds because the chromophore in those gemstones, iron, is found in most geological environments. For emerald, Cr and V are also required although they are marginally more abundant than Be in the upper continental crust. However, they are concentrated in totally different rock types, such as black shales, peridotites, and basalts of the oceanic crust and upper mantle, requiring unusual geologic and geochemical conditions for the Be and Cr/V reservoirs to meet.

In the "classic emerald model", Be-bearing pegmatites interact with Cr-bearing ultramafic or mafic rocks. However in the Colombian emerald deposits there is no evidence of magmatic activity and it has been demonstrated that circulation processes within the host black shales were sufficient to extract Be, transport it, and form emerald. The more unusual gem beryl varieties, such as red beryl or dark blue beryl, require even more specific geological and geochemical environments and thus are much rarer in nature.