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OUTLOOKS IN EARTH AND PLANETARY MATERIALS

On the mineralogy of the "Anthropocene Epoch"

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ABSTRACT

The "Anthropocene Epoch" has been proposed as a new post-Holocene geological time interval—a period characterized by the pervasive impact of human activities on the geological record. Prior to the influence of human technologies, the diversity and distribution of minerals at or near Earth's surface arose through physical, chemical, and/or biological processes. Since the advent of human mining and manufacturing, particularly since the industrial revolution of the mid-eighteenth century, mineral-like compounds have experienced a punctuation event in diversity and distribution owing to the pervasive impact of human activities. We catalog 208 mineral species approved by the International Mineralogical Association that occur principally or exclusively as a consequence of human processes. At least three types of human activities have affected the diversity and distribution of minerals and mineral-like compounds in ways that might be reflected in the worldwide stratigraphic record. The most obvious influence is the widespread occurrence of synthetic mineral-like compounds, some of which are manufactured directly for applications (e.g., YAG crystals for lasers; Portland cement) and others that arise indirectly (e.g., alteration of mine tunnel walls; weathering products of mine dumps and slag). A second human influence on the distribution of Earth's near-surface minerals relates to large-scale movements of rocks and sediments—sites where large volumes of rocks and minerals have been removed. Finally, humans have become relentlessly efficient in redistributing select natural minerals, such as gemstones and fine mineral specimens, across the globe. All three influences are likely to be preserved as distinctive stratigraphic markers far into the future.

Keywords: Mineral evolution, archeology, new minerals, mining, philosophy of mineralogy, sociology of mineralogy, Anthropocene Epoch