Discovery of a huge new deposit of rare-earth elements in the Pacific Ocean

Abstract

Rare-earth elements are crucial for novel electronic equipment and green-energy technologies and world demand is rapidly increasing. Associate Professor Yasuhiro Kato and his team at the Department of Systems Innovation of the University of Tokyo's Graduate School of Engineering have discovered a new type of mineral resource, named REY (rare-earth elements and yttrium)-rich mud, distributed in vast quantities throughout a large part of the Pacific Ocean. REY-rich mud containing up to approximately 0.2 percent by weight total REY occurs across the central north and southeastern Pacific Ocean in average thicknesses of approximately 24 m and 8 m, respectively. Our data show that REY stored in these Pacific mud deposits amounts to a possible resource 10^2 to 10^3 times greater than the world's current land reserves of 110×10^6 tonnes of REY oxides, depending on local stratigraphic continuity and thickness of the REY-rich mud. Uptake by materials such as hydrothermal Fe-oxyhydroxides and phillipsite seems to be responsible for the high REY content, and consequently REY are readily recovered by simple acid leaching and are a suitable resource for development. The newly discovered REY-rich mud may constitute a highly promising source of rare earth elements.

Paper information

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Title:

"Deep-sea mud in the Pacific Ocean as a potential resource for rare-earth elements"

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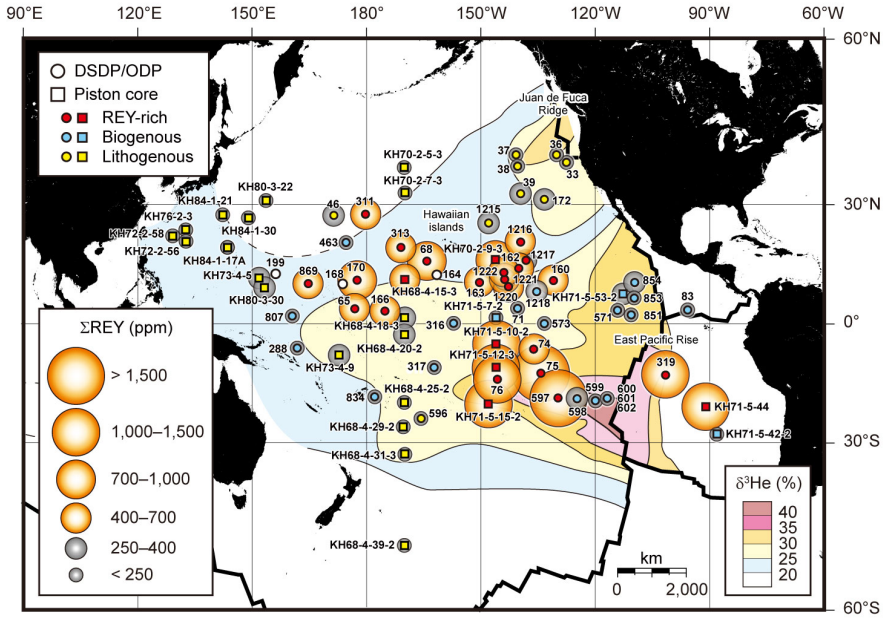

Figure 1. Distribution of average ΣREY contents for surface sediments (<2 m in depth) in the Pacific Ocean. Circles represent DSDP/ODP sites and squares represent University of Tokyo piston core sites, with colors corresponding to the dominant origin of surface sediments. Open symbols are sites lacking samples from the sediment surface. Contours represent helium-3 anomalies (δ^3He) of mid-depth seawater. REY-rich mud with average ΣREY >400 ppm is designated as a potential resource in this study (Kato et al., 2011 *Nature Geoscience*).

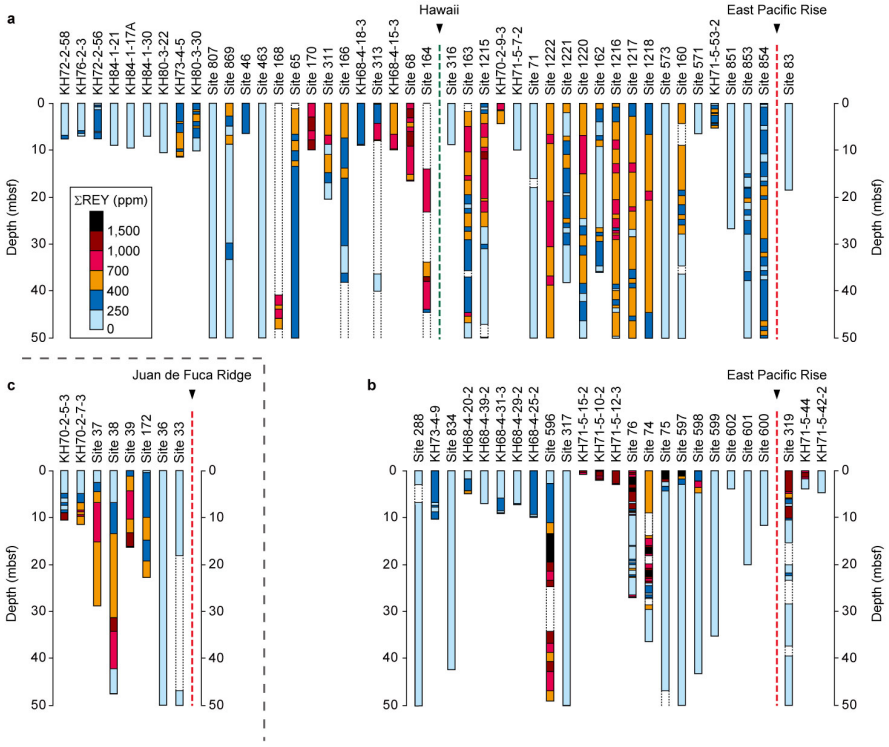

Figure 2. Color-coded depth profiles of ΣREY contents in cores. a, The northern tropical Pacific Ocean between 0° and 30°N. **b**, South of the equator. **c**, North of 30°N. These are simplified profiles limited to shallower than 50 mbsf (Kato et al., 2011 *Nature Geoscience*).

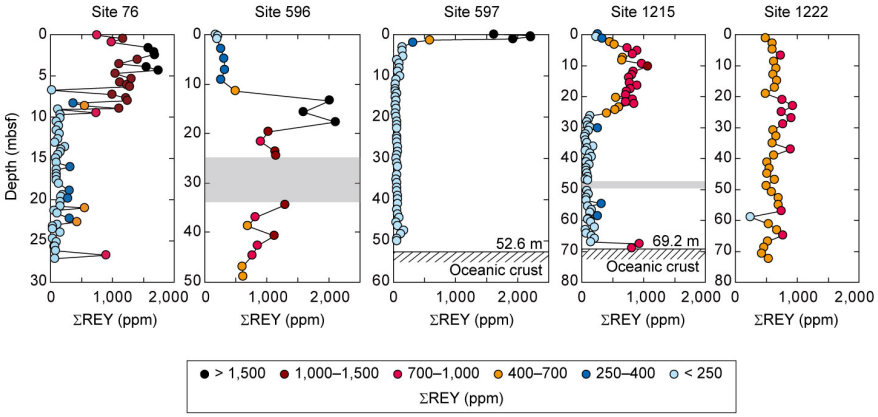

Figure 3. Detailed depth profiles of ΣREY contents in representative cores. The pale grey intervals represent no core recovery (Kato et al., 2011 *Nature Geoscience*).