Large rare earth deposits found in Pacific

Manuel Quinones, Environment & Energy Publishing, 7-5-11

Japanese scientists have announced the discovery of significant quantities of rare earth elements in the Pacific Ocean.

Yasuhiro Kato, a geoscientist at the University of Tokyo, and his research team are reporting rare earths in swaths of deep-sea mud in the south and central-north Pacific Ocean, including areas east and west of the Hawaiian Islands.

"We estimate that an area of just one square kilometre, surrounding one of the sampling sites, could provide one-fifth of the current annual world consumption of these elements," the scientists wrote in an article published this weekend in the journal *Nature Geoscience*.

Kato and eight other researchers say their findings are based on more than 2,000 sediment samples from 78 sites around the Pacific. They say the deep-sea mud is particularly abundant with heavy rare earths, considered the most coveted.

The scientists said the elements "are readily discovered from the mud by simple acid leaching, and suggest that deep-sea mud constitutes a highly promising huge resource for these elements."

China is by far the world's top producer and exporter of rare earth elements but recently decided to restrict exports in the name of environmental protection and to promote local economic uses.

A ruling by the World Trade Organization against Chinese export limits of raw materials like bauxite and magnesium could help bolster global complaints against rare earth export limits.

Japan, with its high-tech economy dependent on rare earths, has been hit particularly hard by recent Chinese actions to restrict exports. Japanese government officials and scientists have actively pursued alternatives.

But many rare earth experts are skeptical about the feasibility of extracting the elements from deep-sea mud in the near future.

Massachusetts Institute of Technology professor Robert Jaffe, who helped author a widely circulated report on critical materials, said the rush to find rare earths is making large discoveries more likely. He does not think the Pacific Ocean find will have significant short-term effects.

"It is interesting but unlikely to reshape the situation in the short or medium term," Jaffe said in an email. "It's just the kind of thing you would expect as an entrepreneurial research community responds to a sudden shortage in an important element."

The seabed is a source of important metals, including the oft-discussed manganese nodules, but they have never been commercially mined, Jaffe said, adding that the presence of heavy rare earths in the Pacific may make the find more "interesting."

Jack Lifton, founding principal of Technology Metals Research LLC, was more direct in his dismissal of the deep ocean discovery.

"The announcement of the preliminary findings of a purely scientific study of some deep ocean sediments is of interest only to scholars of geology and the oceans," he said in a statement. "No technology exists for the recovery and processing of the quantities of bottom sediments that would be required to produce significant commercial amounts of any metallic minerals."

Lifton's colleague at Technology Metals Research, Gareth Hatch, published an online post skeptical of claims by the Japanese scientists that some of the deep sea mud has higher rare earth concentrations than Chinese clays.

"It is because they are readily accessible and processable that the Chinese ion-absorption deposits are exploited, despite their very low concentrations of [rare earth elements]," Hatch wrote. "I can't see these deposits ever being commercially exploited, but the empirical work done by the Japanese researchers which is presented in the paper, is impressive."

Skeptics have also brought up environmental concerns and the implications of disturbing large portions of the ocean floor.

Kato himself acknowledged such concerns. He told *Nature News*, "I'm a geoscientist, not an economist."

Kato and his team say one site near Hawaii could hold 25,000 tons of rare earths. They say rare earth resources on the seafloor could be greater than those on land.

Meanwhile, land exploration is ongoing for new rare earth deposits and more information about current ones. There are several advanced rare earth projects around the world, including Molycorp Inc.'s Mountain Pass mine in California. Company spokesman Andy Davis said the mine has the potential for supplying about 26 percent of the global rare earths demand by 2013.