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Scientist shows Earth age difference

WASHINGTON — A Caltech geologist thinks he knows why scientists searching the world have been unable to find rocks older than about 3.8 billion years — even though the Earth is believed to be some 4.6 billion years old.

Dr. Don L. Anderson says the evidence indicates the young globe was blanketed by an ocean of molten rock and that as the liquid "froze," the resulting crystals sank to the depths of this sea of magma — like sand settling in a pond.

Thus the earliest crystallized rock on Earth probably is buried hundreds of miles beneath the surface.

Anderson, professor of geophysics and director of Caltech's seismological laboratory, outlined his theory at a meeting last week of the American Geophysical Union in Baltimore. He said his ideas were based on a decade of research.

His theory represents a sharp departure from commonly accepted ideas of Earth's early history that hold the Earth formed with only modest amounts of melting.

The key to Anderson's hypothesis lies in Earth's mantle, that semi-solid region between the thin crust of today and

the molten core. Anderson believes the upper layers of the mantle solidified at different times from the global ocean of molten material into rock of different composition.

The theory is based primarily on the fact that molten rock now coming up in crustal cracks in the middle of ocean floors is chemically quite different from that coming up at oceanic islands and in the interiors of continents.

Anderson said the first forming crystals in the magma ocean would have been more dense than the liquid rock — so they would sink. The elements concentrated in the early crust therefore formed the lower layers of the mantle.

"As the Earth cooled, further lighter crystals began to separate out of the melt and form the upper mantle," Anderson said. "These crystals, however, were depleted in those elements that formed the first layer, making the two layers complementary in their chemistry."

"Such a scenario explains the absence of an early crust on Earth and the two contrasting magmas found at ocean ridges and ocean islands."

Anderson said the inferred composition of these two layers indicates they resulted from a 20 percent melt of the

mantle. That would make the ocean of molten rock 300 miles thick if the melted material was on the surface one time. He said the surface probably remained molten from about 4.5 billion to 3.8 billion years ago.

Sound wave studies have shown there indeed is a separation in the mantle at depths of about 130 and 190 miles.

Molten rock from the upper layer of the mantle is released where continents separate and where oceanic islands form such as in the Hawaiian chain of islands. These Anderson said, contain such elements as potassium, niobium, thorium, barium and rubidium — which migrate upwards in a molten state.

Molten material from the deeper layer of the mantle emerges from the mid-ocean ridges and Anderson says these rocks contain elements that would have remained in a magma ocean.

When mixed together, Anderson said, the element concentrations of the upper and lower layers of the mantle would approximate the average composition of the Earth.

Suppliers must face situation here to survive

Japanese computers gain in U.S. sales

NEW YORK — Japanese computers, unlike their autos, are not yet a major presence in the United States, but they are slowly gaining a firm foothold.

Mirek J. Stevenson, chairman of Quantum Science Corp., which specializes in evaluation of the impact of technology on business,

told a recent seminar "Japanese companies have strong technological capabilities which will pose a threat in the new rapidly emerging computer departmental information processing and teleconferencing markets of future office systems."

"These technological capabilities are particularly strong in such areas as communications, video compression, speech recognition, non-impact printing, teleconferencing, facsimile and personal computers," Stevenson told the

meeting sponsored by the American Institute for Professional Education.

He said the merger of computer, communications and office-related technologies will give the Japanese a big advantage, unless properly faced by U.S. suppliers.

Analyzing on a company-by-company basis, he said:

—Fujitsu Ltd., focuses its research efforts on such leading edge technologies as pattern recognition, cassette bubble memories, Kanji (Japanese character)

technologies, fiber optics and 64 K-RAM (random access memory) chips. Fujitsu overtook IBM Japan Ltd. as Japan's leading computer vendor in the Japanese fiscal year 1980, ended last March, for the first time in history with \$1.5 billion volume vs. \$1.3 billion.

—Nippon Electric Co., with telecommunications revenues of \$1.5 billion and electronics data processing system revenues of \$959 million, is strong on fundamental technologies, such as optical fiber components and systems, bubble memories and solid state devices, speech recognition and robotics.

—Hitachi Ltd. registered \$982 million in computer sales, ranking third in Japan, and its goal is to export 25 percent of its computers. It now exports 7 percent.

Stevenson said he does not think the Japanese Ministry of International Trade and Industry runs the whole show in the Japanese computer industry, adding Japanese computer makers are competing fiercely among themselves.

Edward Lesnick, assistant to the president of Wang Laborator-

ies Inc., disputed Stevenson's view.

He argued the Japanese government has been picking up the research and development expenditures for Japanese electronic computer manufacturers specifically has limited its size and purchase of computers to

state-owned companies. These practices, he said, effect force individual American computer companies to compete with the Japanese government.

Frank R. Kline Jr., an analyst with Drexel Burnham Lambert Inc., the Wall Street House, recently published report, the Japanese pose a serious threat to U.S. manufacturers of computer parts, peripherals, microprocessors and small desktop computers, which he expects to realize over the next 24 months.

Kline forecast Japanese exports of computers and their components to the United States grow at an annual clip of 24 percent over the next nine years, the present \$800 million to \$1 billion by 1989.

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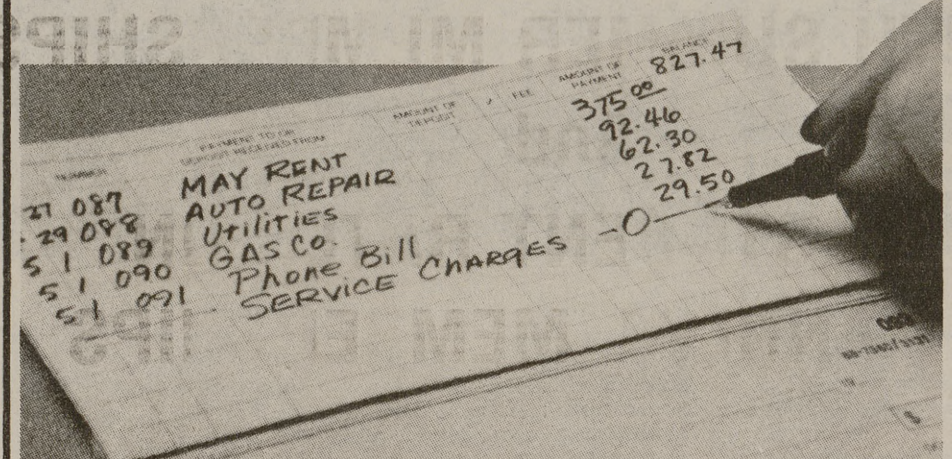
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