

Media Release

Chiefs of Staff, News Directors

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New research finds oceans once held more gold than Fort Knox

A research team of geologists led by the University of Tasmania's ARC Centre of Excellence in Ore Deposits (CODES) has developed a new technique to estimate how much gold was in oceans billions of years ago.

The team created a "time series curve" that shows how gold concentrations in the ocean have varied through time over 3.5 billion years.

The research, published in *Earth and Planetary Science Letters* this week, found that gold was far more abundant in the oceans at certain periods in the past, whereas at other times, gold was virtually absent from the oceans.

The time series curve indicates that three billion years ago there was ten times the gold in the ancient oceans compared to the modern ocean; more than 2,000 times the Fort Knox gold reserves.

Professor Ross Large, CODES, said "this was a time when the world's greatest gold ore deposits were formed in South Africa in the Witwatersrand Basin.

"Over the next 400 million years, gold remained high in the oceans and many other important deposits formed, including the Golden Mile in Western Australia."

Professor Large said the concentration of gold in the oceans indirectly relates to gold ore generation in the shallow crust.

"This means peak times of gold in the oceans correspond to the best times in Earth history for gold ore formation."

So why was there so much gold in the oceans back then?

"Firstly, there was far more volcanic activity and gold was carried in micro-particles in the volcanic magmas and volcanic gases from deep in the Earth and erupted on the Earth's surface.

"Erosion then transported the gold along with other related elements arsenic, nickel, antimony, tellurium and mercury into the oceans. The very ancient oceans were therefore enriched in gold but highly toxic."

Following this period of gold-rich oceans, the time series curve shows that in middle Earth history, during the Proterozoic period, gold was at an all-time low in the oceans. This helps to solve a great conundrum in Earth Sciences, of why so few gold deposits are present during this billion-year period.

However, gold returned to the oceans in a third period of Earth history starting 550 million years ago. Experimental studies have shown that the solubility of gold, under ocean conditions, is strongly affected by the amount of oxygen dissolved in the seawater.

“So when oxygen increased during the explosion of life in the oceans in the Cambrian period, gold also gradually increased and ultimately reached a maximum 525 million years ago.

“During this third period many major gold deposits formed in the shallow crust, including Bendigo and Ballarat in Victoria, Beaconsfield in Tasmania and Cracow in Queensland,” Professor Large said.

“This new gold time series curve not only tells geologists the time periods to explore for deposits, but also informs the ongoing scientific debate on how oxygen has changed in the atmosphere and oceans through time.”

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