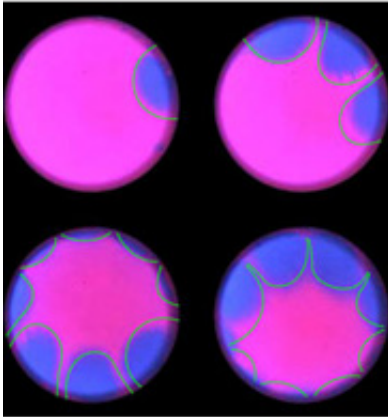


# Stirring the ore pot with Chaos theory

April 16 2010

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Experimental results (pink and blue colours) showing the development of stirring of the leaching solution in a laboratory model of an in-situ leaching operation. Green lines show what theory predicts, which matches well with the results. (CSIRO)

(PhysOrg.com) -- Chaos theory could hold the key to making the in-situ leaching process a more effective ore extraction technique, according to a team of CSIRO Minerals Down Under Flagship scientists.

In a paper published in the latest edition of *Philosophical Transactions of the Royal Society*, researchers working on the Flagship's Towards the Invisible Mine project say that a major drawback to employing the in-situ leaching process (injecting leaching solution into [ore deposits](#) and then extracting the resulting ore-rich liquid) is that the solution does not always penetrate fully into the ore deposit.

"This can be due to 'short-circuiting' where the solution takes a path of least resistance," says the paper's lead author, Dr Guy Metcalfe. "In addition, the mineral can dissolve into the leaching solution too slowly.

"What is needed is a way to 'stir' the solution while it is underground and that's where [chaos theory](#) comes into the equation."

The method involves a carefully orchestrated switching on and off of the leaching solution flow between various inlet and outlet wells.

"While the method is simple, the best solution is different for every orebody so CSIRO has developed [computational methods](#) to optimise the solution for different orebody configurations," Dr Metcalfe says.

"These solutions have been demonstrated to work in laboratory settings."

He says that, in some cases, the laboratory demonstrations of the chaotic stirring methods have doubled mineral extraction rates.

"It is very exciting for us to move from relatively abstract theory to practical solutions."

"A dramatic rise in efficiency of in-situ leaching means that large numbers of Australian marginal deposits may now become economic. That would be a very satisfying result."

A number of Minerals Down Under papers were published in this issue of *Philosophical Transactions*, which is the oldest scientific journal in the world. Notable authors have included Isaac Newton, Michael Faraday and Charles Darwin.

Provided by CSIRO

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