

A Neptunist's View in a World of Magmatists

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Since the time of Agricola (16th century), there have been diverse opinions and theories on the origins of the fluids and metals that create ore deposits. In recent times, the last 100 years, there has been a cyclic pattern to the fashionable theories. From the 1920s to 1960s most ore deposits were considered to result from magmatic intrusion and replacement processes. From the sixties to the nineties volcanic process and seawater convection-exhalation became the dominant theory, and over the last fifteen years we have seen a return to magmatic theories and the involvement of very deep, even mantle fluids and metals.

A quick review of publications in our journal, *Economic Geology*, over the last 25 years reveals that the number of papers proposing a magmatic origin for ore fluids and ore deposits has increased from about 24% to 55%, whereas the number of papers proposing a sedimentary origin, involving seawater or connate fluids has decreased from about 20% to less than 5%. Why have magmatic fluids and “deep” fluids become so popular?

By far, the majority of the fluids in the crust (over 95%) are of ultimate surface origin (recycled seawater, meteoric water, and connate waters) where permeabilities vary from 10^{-13} to 10^{-18} m²; in contrast, very little fluid comes from the deep crust and mantle where permeabilities are less than 10^{-18} m².

I will focus my discussion on gold-arsenic deposits of the sedimentary basin, orogenic and Carlin type. I will argue that the gold and arsenic in these deposits comes from surface processes, ultimately from seawater, involving several concentration steps. Magmatic and deep mantle processes play a role in establishing the regional crustal architecture, but are not the direct cause/source of the fluids and metals.