

Stratigraphic variation of $\delta^{34}\text{S}$ compositions in the Meguma Group: implications for paleoenvironment and mineralization

A.L. Sangster and R.A. Bretlaff

Geological Survey of Canada, 601 Booth Street, Ottawa, Ontario K1A 0E8

M.C. Graves

Cuesta Research, 154 Victoria Road, Dartmouth, Nova Scotia B3A 1V8

and

M. Zentilli

Department of Geology, Dalhousie University, Halifax, Nova Scotia B3H 3J5

The Cambro-Ordovician Meguma Group is composed of a basal sandy flysch (Goldenville Formation - 6000 m) and upper carbonaceous, pyrrhotitic, shaley flysch (Halifax Formation - 5000 m) separated by a Mn-rich, calcareous argillite transition zone. Anomalously heavy $\delta^{34}\text{S}$ values (Po \pm Py) in the Goldenville Formation vary from a low of +9% near the exposed base to a maximum of +34% at the top of the unit. Most values are between +15% - +25%. At the transition zone, $\delta^{34}\text{S}$ (Po) drops sharply to -5% in the Mn-rich calc-argillite, rises again to +20% in the basal part of the Halifax Formation and then decreases stratigraphically upwards to values in the range -9% to +2%, typical of the lower 700 m of the Halifax Formation. $\delta^{34}\text{S}$ values of sulphide in slate in sandy flysch, and siltstone in shaley flysch are similar to values in the dominant lithology.

The data are interpreted to indicate deposition of rocks of the Goldenville Formation, and the basal Halifax Formation, in a reservoir closed with respect to seawater sulphate, and deposition of the Mn-argillite and most of the Halifax Formation in a ventilated sea open to seawater sulphate.

The occurrence of stratiform Zn-Pb and districts containing bedding-parallel Au veins [$\delta^{34}\text{S}$ (Apy, Po)=+9to+25%] in host rocks with anomalous $\delta^{34}\text{S}$ indicate an association between seawater composition and mineral occurrence, and a marine sulphate source for S in associated sulphides. Reinterpretation of C/O isotopic data from the literature suggests that the vein components may have been mobilized by fluids generated during prograde greenschist facies metamorphism.