

IDENTIFICATION OF METAL-POLLUTION SOURCES USING LEAD ISOTOPES

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The use of lead isotopic compositions of stream sediments to trace the sources of heavy metal pollution was successfully tested in two contrasting metallogenic regions in southeastern Brazil. In a previous study, in the Ribeira Valley Pb-Zn province, the contaminated sediments yielded isotopic values ($1.06206\text{Pb}/207\text{Pb}1.11$) distinctly lower than those of sediments located upstream the mining areas ($206\text{Pb}/207\text{Pb}=1.16$) and within the range of a deposit type ($1.07206\text{Pb}/207\text{Pb}1.10$ in galena) that had contributed with the highest ore production in the region. No significant contribution of alternative sources (ores from different deposit types or imported ores processed at the Plumbum refinery) was recorded. In the present study, in the Iron Quadrangle Au province (Nova Lima district), where the lead content in the ores is very low, the sediments (11 samples) yielded isotopic values ($1.14206\text{Pb}/207\text{Pb}1.25$) which plot linearly with those of the Neoarchean Fe-sulfide ores (5 samples). This linearity was interpreted as a mixing-line along which the lead from the ores underwent dilution through mixture with weathered Proterozoic country rocks. This method is being applied to other localities within the gold province to test how the Pb-isotopes contents in sediments could be widely used to discriminate heavy metal-pollution sources including mining districts where the Pb-content in the ores is very low.