



First Evidence of Epithermal Gold Occurrences in the SE Afar Rift, Republic of Djibouti

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The Republic of Djibouti, located at the SE part of the Afar volcanic Triangle, is characterized by intense tectonic and bimodal volcanic activity, and is emplaced over an earlier magmatic rift system, as old as 25-30 Ma. Each magmatic event is accompanied by hydrothermal activity. Few works have been so far published on hydrothermal mineralization in the Afar area. Mineralization generally occur as veins and are mainly associated with acidic volcanic intrusions along the fractures at the edges of grabens established during the last 4 Ma. Eighty samples from hydrothermal quartz ± carbonate veins and breccias were studied on 9 different sites representative of 4 main volcanic events ranging in age from early Miocene up to Present. Gold was found in excess of 200 ppb in 30% of the samples. Mineralogical analyses based on optical reflected light microscopy, X-Ray diffractometry, X-Ray fluorescence, inductively coupled plasma mass spectroscopy and electron microprobe, led us to identify two types of gold mineralization (i) native gold, electrum, hessite and sulfides (chalcopyrite, pyrite, bornite, ± sphalerite, and galena) in massive quartz breccias and banded chalcedony, (ii) gold, electrum, hematite, magnetite, trace minerals (argentite) and adularia in banded chalcedony. Another group without gold is characterized by quartz, pyrite ± goethite. Secondary minerals are characterized by goethite, native silver and native copper. Arsenic is enriched in pyrite in samples with a high gold content. The bimodal volcanism, the occurrence of adularia, the native gold and electrum in banded silica veins, are classically observed in neutral epithermal systems. The discovery of this type of mineralization in a recent-active continental rift system supplies new insights about hydrothermal processes associated with volcanic activity in a spreading context.

Keywords: Republic of Djibouti, Afar Triangle, Hydrothermal, Epithermal system, Gold