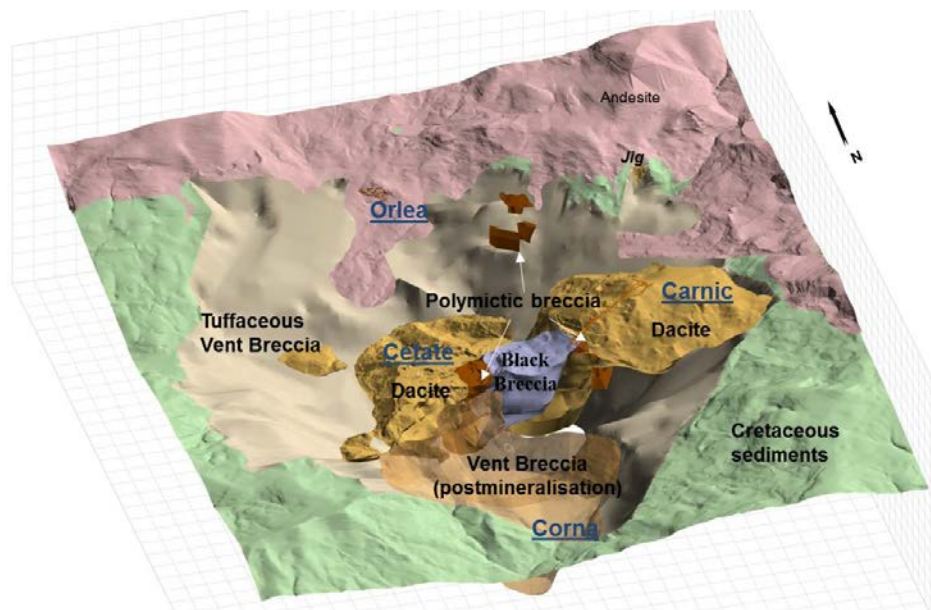


Geological background

Rosia Montana gold and silver deposit is part of the *Golden Quadrilateral*, a precious metal mining district located in the Southern Apuseni Mountains (Romania). Beyond the precious metals, some base metals deposits, with Cu, Pb and Zn, are also present. The mineral deposits are related to three approximately parallel belts of Neogene volcanics. The geological structure of the area includes a Precambrian and Paleozoic basement, covered by marine and non-marine sedimentary rocks, Mesozoic in age. Neogene volcanic and sub-volcanic bodies have intruded the basement along certain lineaments. Three magmatic stages have been recognized. The mineralized bodies from Rosia Montana belong to the second cycle, late Badenian to early Pannonian in age, mainly consisting of different types of andesite and dacite.

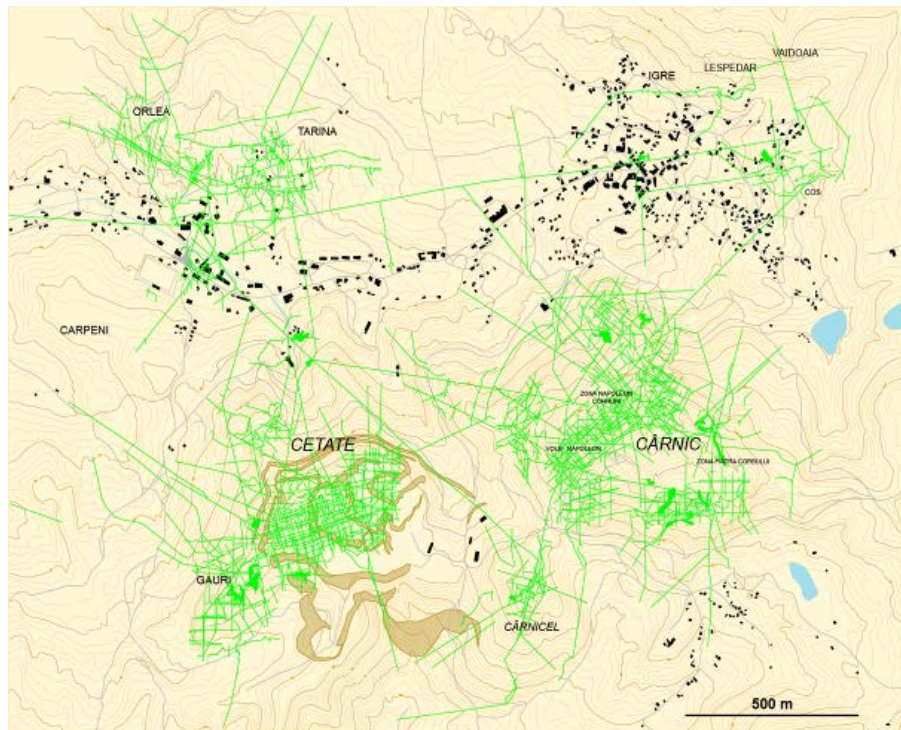
The volcano-sedimentary edifice from Rosia Montana is interpreted as a *maar-diatreme* complex, intersecting the Cretaceous sedimentary formations. Different types of breccias and volcanoclastics, emplaced during successive phases of the volcanic activity occur. Phreatomagmatic breccias, generated as a result of the interaction between magma and groundwater, are very common. The main mineralized bodies correspond to two dacite intrusions, informally named the Cetate Dacite and Carnic Dacite. The two dacitic intrusions are separated by a sub-vertical breccia body with a fine black matrix of Cretaceous shale, named the *Black Breccia*.



Tridimensional model of the gold and silver deposit in Rosia Montana (RMGC, 2006).

Mining

The gold mining history in Rosia Montana started about two millennia before, probably before the Roman period, when the local populations (Dacians) have made the first attempts to extract gold. The first written evidence of the existence of a Roman settlement called Alburnus Maior dates back to the 2nd century A.D (year 131). This locality was built with the specific purpose of mining the rich gold deposits in the area, and coincides with the current Rosia Montana village. An extensive network of underground works was developed by the Romans by using relatively advanced techniques. Hammers and chisels were used to dig trapezoidal galleries with an almost perfect shape. Rock heating by fire, followed by spraying it with water, was another method of disintegrating the stronger rocks. It is assumed that significant amounts of gold were extracted during the relatively short period of Roman administration, the land of Dacians (corresponding in part to modern Romania) thus becoming an important supplier of gold of the Roman Empire. The mining activity has seen fluctuations after the Roman period, with another maximum in the 19th century, during the Austro-Hungarian Empire, and at the beginning of the 20th century.



The network of underground mining works in Rosia Montana (in green).

After the Second World War, the mining activity was completely undertaken by the state. The underground works continued until 1985, while the first open pit was developed since 1970 in Cetate area. A total of about 140 km of galleries are currently known. The mine was closed in 2006, due to the low efficiency determined by the economic context, the low grade of the deposit, and the old technology. A new mining project is currently proposed by Rosia Montana Gold Corporation (RMGC).

Consequently to extensive exploration works, commercial reserves of approximately 300 tons of gold and 1,500 tons of silver have been documented.



Roman gallery from Catalina-Monulesti mine (left). Roman statue dedicated to God Iannus (right).



Cetate open pit. Carnic Masif with Carnic open pit in the background.

State of the environment

The soil cover of Rosia Montana area mainly consists of predominantly acidic soils, commonly found in the mountain regions, on acid rocks. The general level of contamination of soils with heavy metals is

low, excepting the proximity of the mining works. In most of the cases, the metal contents in soils do not exceed the thresholds imposed by the Romanian regulations. Strong contamination of the sediments can be observed along the streams that cross the mining areas.

Downstream the mining works, the quality of the surface water is generally poor, due to drainage from mining works, and waste rock and tailings piles. In many cases the contents of heavy metals (Cd, Cu, Zn, Ni, Pb, and Cr) are elevated, frequently exceeding the imperative values. The contamination may propagate downstream along the rivers on tens of km. The acid mine drainage significantly lowers the pH of surface waters, especially at galleries outlets and downstream the waste rock dumps. A gradual improvement of the river water quality may be observed at greater distances from the mine, due to inputs from relatively clean tributaries, and increase of pH, that promote the precipitation of metals.



Confluence between Aries River (main stream) and the mining-impacted Abrud River.