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The Southern Strimon Lineament (Bulgaria/Greece): A Fluid Geochemistry Study

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The seismically active Strimon Lineament can be referred to a fault belt system which cuts several Alpine tectonic structures and extends for about 800 km in a NNW-SSE direction through Yugoslavia, Bulgaria and Greece. Pre-Cambrian metamorphics, Paleozoic volcano-sedimentary and sedimentary formations and granitoids and Mesozoic formations are cut and displaced by this fault system zone. The Strimon lineament strongly developed since Late Eocene when an extension regime dominated with collapse during the collisional regime (Alpine development) and rifting in the neotectonic stage (Zagorchev, 1992 and references within). After the Late Eocene the Strimon Valley developed in fragmented (marine and lacustrine) basins due to the activation or rejuvenation of both the first order fault and SSW-ENE systems. Alpine magmatism can be found in both the northern part of Strimon Valley in the Bulgarian territory and at the Bulgaria-Greece border where the latest magmatic event occurred (the Kozhukh trachyandesite subvolcanic stock, NE of the town of Petric, Harkovska et al., 1989) and dated at 15.5 Ma.

The present study presents a N-S fluid geochemical investigation of the main thermal, mineral spring and well discharges and associated free- and stripped-gases from the towns of Kyustendil and Pernik (central-western Bulgaria) to the Aegean Sea (Elefhtere thermal spa). Major, minor and trace components in the aqueous and gas (light hydrocarbons included) phases have been performed for 59 and 29 samples, respectively. Selected water and gas samples have been analysed for oxygen and hydrogen and carbon in CO_2 and helium isotopic ratios, respectively.

By a classificative point of view, the water discharges show a relatively wide variability. They are Na(K)-SO_4 (related to the oxidation of a H_2S-rich phase deriving from the Paleozoic basement; Petrov et al., 1963) in the northern-central part of the considered sector of the Strimon Lineament whereas they turn to be Na(K)-HCO_3 (possibly due to the reaction of an uprising CO_2 gas phase with the thermal waters) in the area close to the Kozhukh volcano and in the Sidirokastro and Nigrita areas. Na(K)-Cl waters are represented by the water discharges of the Elefhtere springs to the south. Similarly to waters, the gas chemical compositions indicate a strong variability according to the geographical and geological emergences. From Kyustendil to the Greek border (Aghistro) with the exception of Kozhukh, all the gases are dominated by a N_2-rich component (up to 95% by vol.). Going down to the south there is a dramatic change in composition and gases turn to be characterised by a CO_2-rich (up to 99.5% by vol.) gas phase.

Isotopically all the waters analysed have a clear meteoric signature while carbon isotopes in CO_2 suggest thermo-metamorphic reactions related to the presence of Mesozoic carbonate layers, especially in the Greek area. This agrees well when considering the He isotopes that have a clear crustal signature ranging from 0.07 to 0.7 (as R/Ra) in both the northern and southern part of the Strimon Lineament. The only exception is related to the thermal manifestations that emerge close to the Kozhukh volcano. The R/Ra value is indeed particularly high (>5) but it has to be confirmed by further analyses presently in progress.

Harkovska A, Yanev Y & Marchev P, *Geol. Balc*, **19**, 37-72, (1989).
Petrov P, Pentcheva E & Pavlova V, *Bull. Bulg. Acad. Inst. Geol*, **12**, 245-256, (1963).
Zagorchev IS, *Geol. Mag*, **129**, 197-222, (1992).