3.3.P01

The genesis of the North Caucasian mineral waters: An isotope and geochemistry study

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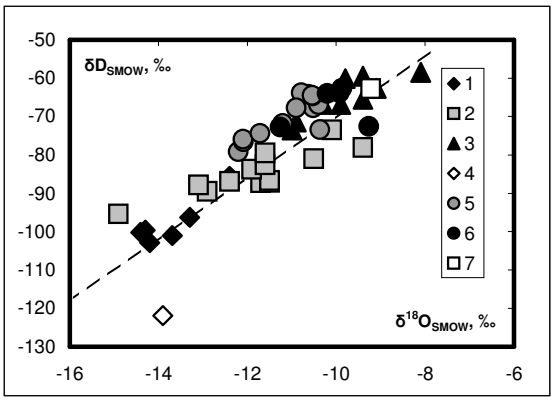
The North Caucasian mineral waters locate at the young volcanic area. Their genesis has a complex character. Their gas phase (mainly CO_2) has a deep genesis by $^3He/^4He$ and $\delta^{13}C$ composition, but the water phase showes meteoric genesis by δD and $\delta^{18}O$. The thermal activity of the Caucasian zone has an influence on the chemical (salt, REE and microelements) composition of the mineral waters, but has no influence on their isotopic characteristics. This phenomena can be explained through dissolution of the deep component by meteoric waters. The proportion of meteoric waters is about 90-98 % at the different springs.

The O and H isotope and geochemical parameters of the waters show the altitude-lateral geographic zonality: the lower is altitude at the North direction, the higher are δD, $\delta^{18}O$, mineralization and Na, Li, Cl, K, Sr, Br etc. Role of the sedimentary waters grows in this direction.

The source of "meteoric" component is a combination of precipitations with the different isotopic composition due to the complex relief and high-altitude gradient. Role of ice melting waters is higher for the Main Caucasian Ridge springs. For the Caucasian Mineral Waters region the meteoric component are mainly precipitations.

The Caucasian mineral waters show a little deficit of ^{18}O compared to the "meteoric" ones. This can be explained by the water-rock interaction at low temperatures. We can see the interaction also by REE-spectrum forms and their concentrations.



Mineral waters of 1-Main, 2-Front, 3-Monoclinal (Caucasian), 5- Precaucasian zones and 4,6,7– fresh waters.

3.3.P02

Geochemistry of pore waters as indicators for the potential gas hydrate occurrence in the South China Sea

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Although gas hydrates have found in many of the world's ocean, they are still under exploration in the Chinese offshore. In the last several years, our study in the northern part of the South China Sea areas has shown great promise for the occurrence of gas hydrates there.

Pore water geochemistry of marine sediments has become a powerful tool for the gas hydrate study in the world, in particular the downward Cl^- content and $\delta^{18}O$ variations of the pore waters in the deep drill cores that intersect the gas hydrate stability zone such as DSDP and ODP. In the South China Sea areas, we can only obtain samples of pore waters and marine sediments from shallow pistol cores (<9 mbsf). Hence, it remains a real challenge for us to use these data to explore the gas hydrate there.

Although geochemical anomalies in the shallow sediment cores may have various origins, a combination of geological, geophysical and geochemical data may still serve as useful indicators which may have related to the formation or dissociation of gas hydrates at depths. We suggest that the following geochemical criteria are important for gas hydrate search, namely, gas geochemistry (such as methane and ethane contents in headspace gas of the marine sediments), anion and trace element geochemistry such as downward and spatial profiles of Cl^-, SO_4^{2-}, Br^-, I^-, and major cations and trace elements (e.g., Ca, Mg, Ba, Sr, B, Li, Cs, Mn and NH_4) contents, and isotope geochemistry of $\delta^{18}O$, δD, $\delta^{11}B$, and $^{87}Sr/^{86}Sr$ ratios of the pore waters, and $\delta^{13}C$ of the methane and authigenic carbonates. There are also many other potential indicators for the gas hydrates, such as thermoluminescence anomaly, reflectance spectra using diffuse reflectance spectrometry, and biogeochemical evidence.

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