

## Geochemical precursors to the activation of Mutnovsky volcano, Kamchatka, in 2000-2003

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Mutnovsky volcano is one of the most active volcanoes in Kamchatka. The last explosive eruption of the volcano occurred in 1960. After that time the volcano is in a stage of a strong gas activity. A short phreatic eruption occurred in March 2000. During a few hours of the eruption a 2500 m-high steam column was observed. Airborne observations showed that the eruption took place from the northern part of the southwest crater. The March 2000 eruption was preceded by an increase in the  $\text{SO}_4/\text{Cl}$  and  $\text{SO}_4/\text{F}$  ratios in waters of the Vulkannaya river, which drains active craters of the Mutnovsky. These changes appeared one year before the eruption. An acid lake was formed after the eruption of 2000 in the southwest crater. The water in the lake initially had salinity 16.8g/L, pH=1.3 and temperature of 35°C. In summer 2001 the lake water was significantly diluted and temperature dropped to +3,5°C. In winter 2003-2004 the lake was frozen. However, in the summer of 2002 an increase in  $\text{SO}_4/\text{Cl}$ ,  $\text{SO}_4/\text{F}$  in waters of the Vulkannaya river were observed again. In the beginning of May 2003 the ice on the lake has melted within 3 days. The water temperature quickly rose to 35°C, pH=1.4 and the salinity increased up to 9.0g/kg. The color of the lake turned into green-blue and gas bubbles released everywhere from the lake bottom.

It can be suggested that Mutnovsky volcano now is in a stage of activation. A magmatic eruption during nearest years is quite probable