Geochemical conditions of the groundwater for developing bursting pingos in Jingxian valley, Tibetan Plateau

DI ZHENG[1], ZHONGHAI WU[2], PEISHENG YE[2] AND MINGZHONG TIAN[1]

[1]Geoscience and Resource School, China University of Geoscience, P.R. China (zhengdi1887@163.com)
[2]Institue of Geomechanic, Chinese Academy of Geological Sciences, P.R. China

In order to classifying the grade of geological hazards in the permafrost field□Tibetan Plateau, we have investigated 46 field points and collected data of 168 points. Bursting pingos in Jingxian valley, bettwen active fault F6 and F7, is one relative large pingos among bursting pingos group trending in SW50°, which is 60m west away from Qinghai-Tibet Highway, with geographic location of LONG. 94°02′57″ anf Lat. 35°40′09″. In the early of 1980[th], six hydrogeologic drillings had finished along WWS direction in the Jingxian valley. The Kurllov's Formula of water samples is [1],

$$M_{3.0\text{-}1.5}\,\frac{HCO^{3}{}_{64-13}\,Cl_{85-31}}{Na_{89-96}}\,T_{0.1}$$

HCO_3^- is obviously decreasing from northeast to westsouth, and the content is from 64 to 46 to 52 to 32 to 14(meq) in turn.

The groundwater took place deoxygenation and reduction action to produce some gas as CO_2 etc. Salt-alkali lacustrine facies aquifer with humus has weak permeability. More and more aqueous gas gathered in part space and pressure increased, which may induce perdu sub-fault activity and cause press up from depth. During melting period of frozen soil, burst took place when pressure undertook by pingos was far less than inside swelling force.

The investigation and study indicates that the subpermafrost enriched in carbon and oxygen was crucial factor for the forming of bursting pingo at Jingxian valley, and the high salt-alkalinity of water-bearing strata was essential condition for gathering aqueous gas mixture pressure of pingos, and secondary deep fractures of active faults were the important sources of compensation pressure.

This research was financially supported by A Type International Science and Technology Collaborative Project of the Ministry of Science and Technology of the People's Republic of China.

[1] Shang *et al*. (1982) *Qinghai-Tibet geological corpus* (5) 113-118.

Impact of redox gradient on fault gouge formation related to fracture activities along the Ushikubi fault zone in Central Japan

G.D. ZHENG[1,2], B.H. FU[3], Y. TAKAHASHI[2] AND J. ZHAO[1]

[1]Key Laboratory of Gas Geochemistry, Institue of Geology and Geophysics, CAS, 382 West Donggang Road, Lanzhou 730000, P.R. China
[2]Department of Earth and Planetary Systems, Hiroshima University, Higashi-Hiroshima 739-8526, Japan
[3]State Key Laboraotry of Lithospheric Evolution, Institue of Geology and Geophysics, CAS, 19 Beitucheng Xilu, Beijing 100029, P.R. China

The fault gouge samples, collected from two sites along the ENE-WSW trending Ushikubi fault zone in central Japan, have distinguishable variations in their physical properties such as surface colors and structure. These features are also reflected by the mineralogical and chemical compositions, particularly iron and sulfur speciation, which were determined using X-ray diffraction, X-ray fluorescence spectrometer, X-ray near edge structure, and ^{57}Fe Mössbauer spectroscopy, respectively. Chemical species of iron and sulfur, and mineral compositions indicate redox change within the fault fractures in relation to the gouge formation of fault gouge and fault features, especially the active state of the fault. Newly formed minerals, including calcite, dolomite, siderite, iron sulfide and pyrite, have close relation to the colors of fault gouge and respective to the geochemical environment within fault zone. In addition, such mineralogical and chemical variations may have significance to evaluate the activity of faults. These fault gouge samples in yellowish color occurred in site one, and no clear difference in chemical and mineral compositions among the three samples from a relatively older rupture zone indicating a long history of the fracture and also a stable state and being suitable to fault gouge formation.. However, there is clear enrichment of reducing species of iron and sulfur as well as chlorite in the site two, a relatively younger fracture, indicating favorable connection pathway with deep position and the fault zone is active. These results from mineralogical and chemical analyses have a good agreement with evidence indicated by ^{14}C dating from this fault zone.