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## Mineralization of Miyazaki Ore Deposits, Miyagi Prefecture, Japan -Especially about Bonten Gypsum Deposit-

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Several gypsum, manganese, zinc-lead deposits are distributed in the Miyazaki mining area, northwest of Miyagi Prefecture. The Bonten gypsum deposit is a sedimentary type and is embedded in the rhyolitic tuff of early Miocene age. The rhyolitic tuff in the vicinity of the deposit dips 7-10 degrees south and is covered with tuffs containing rounded andesitic pebbles (Anzai, 1955). The center of the deposit is affected by remarkable clay alteration and contains satin spar gypsum up to 15cm. The Bonten gypsum deposit, Bonten manganese deposit of early Miocene and Yunokura Pb-Zn deposit are focused in this study.

In this study we collected ore and rock samples from each deposits and outcrops and analyzed by XRD, microthermometry of fluid inclusions, and EPMA to elucidate the mineralization of this area.

The clay ore of the Bonten gypsum deposit contains quartz, pyrite, sphalerite, and sericite, halloysite. Although pyrite, analcime, mordenite, smectite is detected in tuffaceous host rocks around the deposit, they are not detected in rocks far from the ore deposits. Fluid inclusions of gypsum indicate 50-60 degrees homogeneous temperature and 4.9-3.2 wt.% NaCl equivalent. Judging from the surrounding geological setting, pressure revision to the temperature is very low, and it is thought that this area has affected by the thermal spring activity of about 70 degrees or less. This fact is in accordance with that no anhydrite is detected in this area (Kinoshita, 1924). Calcium may be originated from rocks in the vicinity during the process of smectite alteration. On the other hand, about the origin of S, we have two ideas; 1, if this deposit has occurred during shallow marine sedimentation, S originates in seawater, 2, if this deposit occurred at secondary alteration after sedimentation, it is suggested that S originates in thermal spring water. (leaching of pyrite in the lower formation)

The Yutorinuma Formation which overlies the Bonten gypsum deposit contains the Bonten manganese deposit. Pyrolusite and hematite which are known to be indicators of oxic environment are detected from this ore deposit. The Yunokura sulfide deposit embedded in the Nagashida Formation which overlies the manganese deposit. This deposit produces sphalerite, galena, chalcopyrite, pyrite, and barite. The  $T_H$  of fluid inclusion from these samples is 120-200 degrees. Hydrothermal alteration zones are sporadically occurred in this area. These facts suggest that the Miyazaki mining area have widely received multiple and different thermal (spring) activities.