



Geology and Mineralization in the Oshima Belt of Eastern Iwate, Japan: the Ohkawame Mo Deposit and the Noda-Tamagawa Mn Deposit

Brian Muteta, Carmela Tupaz, Manuel Nopeia, Renaldi Suhendra,
Keeditse M., Mukuka S., Patthana B., Satori S., Suzuki T.,

Graduate School of International Resource Sciences,

Akita University, Japan

Several types of metallic deposits are present in northern Japan including epithermal deposits, volcanic massive sulfide Kuroko-type, base-metal skarn deposits, and metamorphosed manganese deposits, among others. The two-day field excursion focused on the geology and ore deposits of the metamorphic Oshima Belt rocks of eastern Iwate Prefecture.

Firstly, the team visited outcrops of accretionary prism units represented by the Seki Fm., which is a *mélange* of Jurassic age consisting mainly of alternating layers of shale and sandstone with intercalation of chert, basic tuff, and limestone (Fig. 1a). At the nearby Ohkawama Mo skarn deposit, the stratigraphic column consists of Seki Formation, Mesozoic Akka, and Upper Cretaceous Tamagawa Formation of the Kuji Group (Okami et al., 1992). At Ohkawama, **molybdenite was observed in hornfels within the Akka Fm.** (Fig. 1b). This formation is composed of chert, basic tuff, and recrystallized limestone.

On the following day, the underground mine of Noda-Tamagawa manganese deposit was visited (Fig. 1c). This mine was opened in 1905 and at that time, the total reserves were estimated to be ~800,000 tonnes with an average grade of 30% Mn. The manganese ores are always bedded with rhythmic or massive chert, and the deposits consist of metamorphosed and recrystallized primary manganese mineralization. These deposits formed within pelagic sediments, initially as manganese oxyhydroxide precipitates analogous to modern ferromanganese nodules in the deep ocean. After mining ceased in 1985, rhodonite has been extracted for gemstones (Rhazi and Hayashi, 2003). Rhodonite usually occurs in granular massive and semi-crystalline form (Figure 1d).



Figure 1. (a) Outcrop of massive limestone with banded chert of Seki Fm, (b) occurrence of molybdenite in hornfels of the Akka Formation, (c) Noda-Tamagawa underground mine portal, and (d) massive rhodonite on wall rocks.

References

El Rhazi, M., & Hayashi, K. I. (2003). Origin and formational environment of Noda-Tamagawa manganese ore, northeast Japan: constraints from isotopic studies. *Chemie der Erde-Geochemistry*, 63(2), 149-162.

Okami, K., Koshiya, S., & Honma, K. I. (1992). On the occurrences of molybdenite and stress field of the Okawame mine, Northern Kitakami Massif Northeast Japan. *Shigen-Chishitsu*, 42(236), 391-400.

Watanabe, T. (1970). Metamorphosed bedded manganese deposits of the Noda-Tamagawa mine. *Volcanism and Ore Genesis.*, 448.