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Tsunami and seasonal variation records in Senday Bay sediments revealed by rock magnetic and geochemical analyses

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Coastal marine sediments along island arcs have records of the past disaster events like tsunamis and seasonal floods. In order to reconstruct those events from the coastal marine sediments, we need to distinguish between tsunami effects and seasonal variations. Tsunami was occurred in 11 March, 2011, off the Pacific coast of Tohoku by the Earthquake (M 9.0). The earthquake source was located off Sendai city and near the axis of the Japan trench. This study is aimed to sort both past events based on rock magnetic properties and geochemical analysis from the sediments taken in Sendai bay. The sediment samples were collected at five stations in Sendai bay at every season during 2002-2011. The sediment particle size is larger at the offshore stations. It suggests that fine sediment particles are transported by the bottom current. For measurements of carbon, nitrogen and sulfur amounts in the sediments, CHNS analyses were conducted. Results indicated that the amounts of those elements decrease toward offshore stations, and the changes of the values depend on the season in the inner bay. Rock magnetic properties (natural, anhysteretic, and isothermal remanent magnetization, magnetic susceptibility, remanent corecivity, and corecivity) of the sediments were measured. The values also show seasonal variations at the stations in the inner bay. For discriminations between tsunami effects and seasonal variations, we focused on the samples taken in June 2007, 2008, and 2011. The amounts of carbon and sulfur are large in the 2011 samples after the tsunami. Thermo-magnetometric results indicate the presence of magnetite and iron sulfide in all samples. Especially, the 2011 samples at the offshore stations under the bottom current are found to contain iron sulfide as a dominant magnetic mineral. It may be implied that iron combines sulfur after deposition and that are prevented from the transportation of the bottom current.

Keywords: Tsunami deposit, rock magnetism, C/N