# Natural remanent magnetization of Tufa and the mechanism of its acquisition

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Tufa is a biologically induced calcium carbonate ($CaCO_3$) deposited in freshwater. Tufa deposition is related to the inhabitation of photosynthesizing cyano-bacteria and high evaporation from an intense water flow such as cascade (Yoshimura *et al*., 1996). Tufa sometimes shows annual bands with a set of tight and porous layers, which are deposited in summertime and wintertime, respectively. We have already detected that currently growing tufa has stable remanent magnetization recording the Earth's magnetic field direction (Fujino and Morinaga, 2007). In order to clarify the mechanism keeping the geomagnetic field direction for tufa, we investigated remanent magnetizations of both tight and porous layers. Tight layers are fairly high-fidelity recorders of the geomagnetic field, while porous layers are not so good recorders of it. Acquisition of isothermal remanent magnetization and microscopic observation show that main magnetic mineral is magnetite of several to 200 micro-meter. Difference in fidelity of the magnetic recording between tight and porous layers presents an idea of the mechanism keeping the geomagnetic field direction for tufa as follows. In summertime, $CaCO_3$ crystals formed through relatively high photosynthesis of cyano-bacteria fix the magnetic minerals trapped in tiny spaces near to tufa surface, and therefore tufa acquires the remanent magnetization recording the geomagnetic field direction correctly. On the other hand, as the formation of $CaCO_3$ crystals is relatively low in wintertime, the fixation of the magnetic minerals is not so enough to acquire stable remanent magnetization for tufa.