

Estimate of the magnetic paleofields during the formation of our solar system-preliminary report.

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Introduction: Meteorites have enchanted researchers who are trying to discover the origins of the solar system and its subsequent history. Tiny melt droplets in meteorites called chondrules may be the key to unlocking the mystery of the formation and evolution of our solar system. Ordinary chondrite (OC), Bjurböle meteorite has been rigorously studied by many researchers because of its primitive and relatively unaltered characteristics leading to the possible source of information about planetesimals and nebular processes. It is classified as L/LL4 in the latest Catalogue of Meteorites (Grady, 2000). The chondrules consist of mostly Olivine, and contain magnetically stable FeNi compounds e. g., tetrataenite and taenite. The Bjurböle is classified as LL4 for its chemical composition and petrology, however there are some significant inconsistencies in the ages determined by U, Th-He, Ni-He-based and Ne-based cosmic ray ages.

Preliminary result and discussion: Our recent study of Bjurböle meteorites shows the heterogeneity of paleointensity of magnetization determined using empirical paleofield scale established by (Kletetschka et al., 2004) within individual chondrules and matrices. In addition, localized direction of the natural remanence magnetization (NRM) of some chondrules suggests the formation history of each of these chondrules is independent and prior to the accretion of the parent body. Our result suggests that along with other taxonomic parameters, characterization by paleointensity and orientation is an important proxy. The OC chondrites have been known to have variations in their ages. It is reasonable to suspect (1) a unique accretional environment; and (2) a complex history of after accretion of meteorite (parent body). Our research can tackle some of the above problems. Our orientation-preserving chondrule sampling, paleofield and magnetization measurements is a viable method. Our preliminary results are encouraging and suggest that paleointensity and the orientation information could be an additional taxonomic parameter for not only primitive meteorites, but also magnetically pristine extraterrestrial materials. Also such information would enable us to understand the formation of solar system, and proto-solar nebular processes.