Fluctuations of Re-Os isotopic systematics in loess-paleosol sequences from Yili Basin, NW China

M. HONDA[1], S. YABUKI[2], K. SUZUKI[3], W. YE[4] AND Y. TATSUMI[5]

[1, 3, 5]Institute for Frontier Research on Earth Evolution (IFREE), Japan Marine Science Technology Center (JAMSTEC), Japan ([1]hondamasa@jamstec.go.jp, [3]katz@jamstec.go.jp, [5]tatsumi@jamstec.go.jp)

[2]Institute of Physical and Chemical Research (RIKEN), Japan (syabuki@riken.go.jp)

[4]Zhejiang Normal University, China (yewei82@sina.com)

Introduction

Many studies have been conducted for loess-paleosol sequences from the monsoon regions in China, such as the Loess Plateau. However, loess-paleosol studies in the westerly wind region such as NW China and Central Asia have rarely been conducted. In addition, due to extremely low Os concentrations, Re-Os isotopic studies of sialic crustal material including loess and paleosol are very scarce. In this study, we present the Re-Os isotopic data for loess-paleosol sequences from Yili Basin, NW China and discuss the paleoclimate of westerly wind region.

Samples

The Zeketai and Kuerdenengbulake sequences were composed of Holocene soils (topmost portion), Malan Loess (upper portion) accumulated during Late Pleistocene times and Lishi Loess accumulated during Middle Pleistocene times. Loesses and paleosols were sampled from these sequences every 20-100cm.

Results and Discussion

The depth profiles of the Re-Os isotopic data fluctuate with a distinct periodicity. In the Malan Loess, depth profiles of $^{187}Os/^{188}Os$ ratios (0.904–1.449) are complem-entary to those of Os abundances (28–61 pg/g). These data also form a positive linear array between end-members of biotite, with a relatively low Os content and radiogenic $^{187}Os/^{188}Os$, and of a less radiogenic component. This suggests that the variation in the ratio of biotite to the presumed less radiogenic component contributes significa-ntly to the Os isotopic composition of the Malan Loess, and is most likely caused by wind deposition or erosion. The Re-Os isotopic systematics of the Malan Loess, there-fore record fluctuations in the intensity of the regional paleo-winds at the Yili Basin. By contrast, for the Lishi Loess, Os abundance fluctuations (25–50 pg/g) are accom-panied by little variation in $^{187}Os/^{188}Os$ ratio (0.746– 1.400), and were more likely caused by Os enrich-ment in pedogenically formed magnetic minerals during paleosol development in wet periods. The Re-Os isotopic signature of loess-paleosols may therefore, provide a valuable new index for paleo-climate fluctuations under both dry and wet conditions.

Silicate dust crystallization around low-mass young stars

M. HONDA[1,2], H. KATAZA[3], Y. K. OKAMOTO[4], T. MIYATA[5], T. YAMASHITA[2,1], S. SAKO[1,2], T. FUJIYOSHI[2], AND T. ONAKA[1]

[1] Department of Astronomy, School of Science, University of Tokyo, Tokyo, Japan

[2] Subaru Telescope, National Astronomical Observatory of Japan, Hawaii, U.S.A. (hondamt@subaru.naoj.org)

[3] Institute of Space and Astronautical Science, Kangawa, Japan

[4] Institute of Physics, Center for Natural Science, Kitasato University, Kanagawa, Japan

[5] Kiso Observatory, Institute of Astronomy, School of Science, University of Tokyo, Nagano, Japan

Mid-infrared spectroscopy provide us physical and compositional. information on dust in the various environment. To study the dust analogous to that in the early solar system, we carried out mid-infrared (8-13micron, R=250) spectroscopic survey of evolved (5-10 Myr old) low-mass young stars (mostly classical T Tauri stars) using the COMICS (Cooled Mid-Infrared Camera and Spectrometer) mounted on the 8.2m Subaru Telescope.

For the first time, we detected crystalline silicates features in some of them (e.g. Honda et al. 2003, ApJ, 585, L59; Figure 1). Our detection of crystalline silicates in the old T Tauri stars indicates that the crystalization process occurs even in a protoplanetary disk of low-mass YSOs in T Tauri phase. Such crystallization processes may be analogous to those occurred in the early epoch of the solar system, and may be related to origin of crystalline silicates observed in the cometary dust.

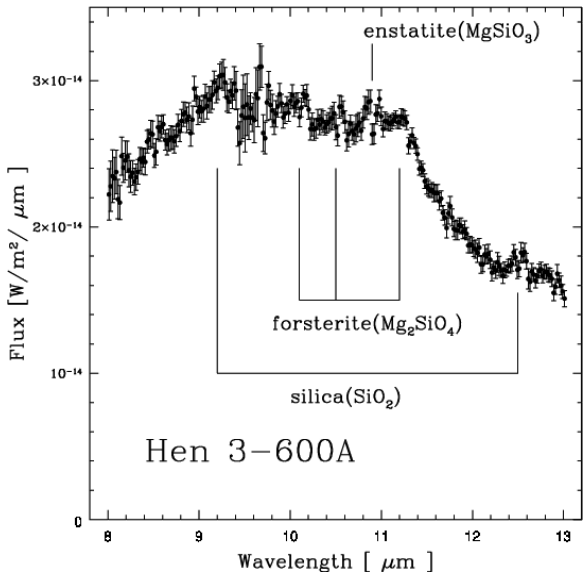

Figure 1: 8-13 micorn spectra of the T Tauri star Hen 3-600.

Reference

M. Honda, et al. 2003, Astrophysical Journal, 585, L59