Bulk Chemical Compositions of Meteorites in the NIPR Collection. M. Kimura[1,2], N. Imae[2], A. Yamaguchi[2], H. Haramura[2], and H. Kojima[2], [1]Facutly of Science, Ibaraki University, Mito, Japan, [2]National Institute of Polar Research, Tokyo, Japan.

Introduction:

Meteorites were traditionally analyzed by wet chemical analysis method. Although at present such method is not commonly used, the wet chemical bulk data are still significant, especially to classify chondrites into several main groups on the Urey-Craig diagram. On the basis of such data, Haramura et al. [1] and Nobuyoshi et al. [2] discussed the classification and weathering effects on 64 and 401 chondrites in the NIPR meteorite collection, respectively.

Now the total number of the wet chemical data of the NIPR collection is 1197. In this study, we mainly focus on the effects of brecciation, as well as weathering effect, to the bulk data of 985 ordinary chondrites.

Results and Discussion:

Haramura et al. [1] suggested that selected Antarctic chondrite samples are clearly classified on the Urey-Craig diagram. However, our plot, including all current data, shows that chondrite data are distributed in wide range of composition (e.g., Fig. 1 for H chondrites), compared with the average data by Jarosewich [3]. Nevertheless, their olivine and pyroxene compositions, except in Type 3, are within the range of those expected for equilibrated ordinary chondrites. Nobuyoshi et al. [2] noticed that the terrestrial weathering is highly effective to the bulk data of many chondrites. Therefore, we added "Fe_2O_3" data to "Fe in metal and sulfide", because most of Fe_2O_3 are weathering products [1], and Fe_2O_3-bearing primary phases are hardly encountered in ordinary chondrites. However, only terrestrial weathering can not explain the wide range of the bulk data (Fig. 1).

Thus, we observed thin sections of these chondrites with "unusual data" under optical microscope. We noticed that most of these samples are some kinds of breccia: monomict, polymict, melt breccia, and melt rock. Some breccias contain large igneous clasts without opaque minerals. Melt breccias and melt rocks are often depleted in opaque minerals. Some breccias contain amorously large or long veins or nodules of opaque minerals. These features should clearly affect the distribution of the data on the Urey-Craig diagram. We noticed that breccias are abundantly encountered in the NIPR collection, which is consistent with our systematic study for brecciated chondrites [4].

On the other hand, some chondrites do not show any brecciated and/or weathered features under microscopic observation, although their bulk data are plotted in unusual positions. Heterogeneous occurrences of brecciated and weathered areas may explain such compositions.

In conclusion, the wet chemical data are still significant for the classification. However, the petrographic observation is indispensable to discuss the bulk chemistry and classification.

References: [1] Haramura H. et al. (1983) Mem. Natl. Inst. Polar Res., 30, 109-121. [2] Nobuyoshi T. et al. (1997) Antarct. Meteorite Res., 10, 165-180. [3] Jarosewich E. (1990) Meteoritics, 25, 323-337. [4] Kimura M. and Yamaguchi A. (2015) XII ISAES, Goa, India.

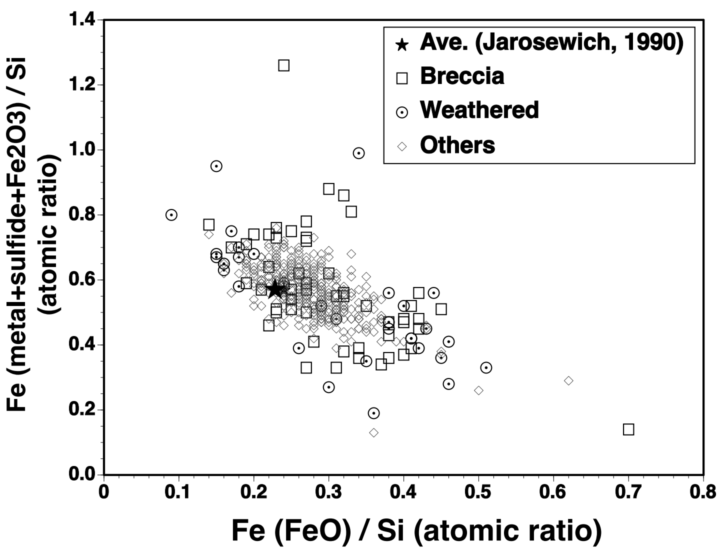

Fig. 1. The Si-normalized Urey-Craig diagram for H chondrites.