Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

MIS28-19 会場:202 時間:5 月 28 日 11:30-11:45

日本の湖沼堆積物に含まれる極細粒元素状炭素量の変動
Temporal variation of very fine elemental carbon in lake sediments in Japan

入野 智久 [1*] ; 中井 淑恵 [1] ; 芦 松 [1] ; 山田 和芳 [2] ; 米延 仁志 [3] ; 多田 隆治 [4]
IRINO, Tomohisa[1*] ; NAKAI, Yoshie[1] ; LU, Song[1] ; YAMADA, Kazuyoshi[2] ; YONENOBU, Hitoshi[3] ; TADA, Ryuji[4]

[1] 北海道大学, [2] 静岡県 文化・観光部 文化学術局 ふじのくに地球環境史ミュージアム整備課, [3] 鳴門教育大学, [4] 東京大学
[1]Hokkaido University, [2]Museum of Natural and Environmental history, Shizuoka, [3]Naruto University of Education, [4]University of Tokyo

Elemental carbon (EC) is a combustion product which is composed of rich C and depleted O, H, S, and N. Biomass burning is major source of Pre-industrial EC, while fossil fuel burning is the most important source since the 18th. EC transferred in the atmosphere as aerosols, and aerosols including EC have a great impact on the climate, where EC is the second strongest contribution to global warming and changing albedo by darkening of snow and ice surface. On the other hand, aerosols including EC have also negative effect on radiative forcing. Although it is difficult to evaluate net EC effect on climate, evaluation of temporal variability of atmospheric EC is necessary to understand the relationship between biomass burning and climate.

EC is not a single chemical compound and distinguished into two types , char and soot. Char is produced by pyrolysis, while soot is formed via gas-to-particle conversion. The char particles which are countable under microscope are called charcoal. There have been many research to reconstruct paleo-fire by counting charcoal, which showed that the fire sometimes synchronize with human activity especially in the late Holocene. However, very fine EC particles that can be transported for a long distance has not been evaluated well for paleo-archive although boreal forest fire frequently emits wide-spread smoke which must have deposited as the sediment in lacustrine and marine environment.

In order to evaluate the flux of biomass burning products transported for a long distance and deposited in marine and lake sediments, we have tried to apply a thermal optical transmittance (TOT) methods to quantify the amount of very fine grained elemental carbon within sediment samples. Organic carbon (OC) and elemental carbon (EC) contents in standard materials such as sucrose, humic acid, fluvic acid, and fullerene were examined by TOT method as analogue carbonaceous materials within sediments. As a result, some OC fraction was turned out to be tolerant to temperature of 550-700 degree C under O2 atmosphere. Therefore, we defined EC as the carbon fraction detected at 700-850 degree C under O2 atmosphere. We applied this method to fine (<2 microns) and coarse (>2 microns) fractions separated from sediments collected from the Lake Kushu in the northern Japan and the Lake Suigtsu in the central Japan. Temporal variation of EC content in the fine fraction shows different pattern than that in the coarse fraction, which suggests that the coarse EC is local signal while the fine EC reflects both local and distal biomass burning frequency. Ratio between fine EC / coarse EC in the sediments from the northern Far East marginal sea and lake could be used as a proxy for regional-scale biomass burning history in northeastern Asia.

キーワード: 久種湖, 水月湖, 元素状炭素, 完新世
Keywords: Lake Kushu, Lake Suigetsu, Elemental carbon, Holocene