

A tree-ring oxygen isotope chronology from Yakushima Island and its dendroclimatic potential

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Recent progress in isotope dendroclimatology showed that tree-ring oxygen isotopes are a promising proxy to reconstruct past precipitation and/or relative humidity. In the present study, we developed a 300-year tree-ring oxygen isotope chronology using Japanese cedar (*Cryptomeria japonica*) growing in Yakushima Island, southern Japan, and explored its dendroclimatic potential. Two tree samples that were crossdated by visually matching ring-width variations were used for oxygen isotopic analysis. The resulting oxygen isotope series for the period 1700-2009 C.E. were highly correlated with each other ($r = 0.68$), indicating that common signals related to local climate are preserved in these data. Both the delta-18O series were individually normalized to have zero mean and unit variance, and the resulting series were averaged to build the final chronology. Response analysis with monthly climatic records (temperature, precipitation and relative humidity) from the Kagoshima station revealed that tree-ring delta-18O was primarily controlled by relative humidity and precipitation in the summer season (May-September). Perhaps the most striking feature of the delta-18O chronology is a significant increasing trend over the 20th century, indicating a decrease in summer relative humidity in the study region. We will present an extended version of the tree-ring delta-18O chronology over the past 1000 years or so.

Keywords: tree ring, oxygen isotope ratios, Yakushima Island, monsoon

Assessment of Sungkai tree-ring $\delta^{18}\text{O}$ proxy for paleoclimate reconstruction

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We measured annual $\delta^{18}\text{O}$ variations of two sungkai trees that were collected in the same area as previous study, in order to assess the reproducibility of sungkai $\delta^{18}\text{O}$ as paleoclimate proxies. Two sungkai $\delta^{18}\text{O}$ variations has a significant correlation ($r = 0.80$; $P < 0.001$) with each other and also with the previous analysis, suggesting that $\delta^{18}\text{O}$ values of sungkai are affected by external climatic factors. The annual $\delta^{18}\text{O}$ of SungkaiNAN7 has significant, positive correlations with temperature, sunlight hours and air pressure whereas it has significant, negative correlations with relative humidity and SOI. Moreover, the seasonal $\delta^{18}\text{O}$ variation acquired during severe drought of 1997-98 El Nino event shows that the maximum $\delta^{18}\text{O}$ value around 1997 latewood corresponds to rainfall/relative humidity minimum and temperature/sunlight hours/air pressure maximum with a significant time lag.

Keywords: tree ring, cellulose, stable isotope geochemistry, tropics, paleoclimate

Characteristics of ESR and TL of natural quartz from river bed sediments

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The sediment provenance would give important information on the erosion processes, uplift of the mountains and so on, suggesting the environments at the time of sediment transportation. The sediment is made of fine grains such as sand and silt. When a new procedure for clarifying provenance of such sediments is established, it will be useful to elucidate the provenance of sediments in the geohistorical environments, which may occasionally be related to stream piracy, regional tectonic setting and/or the environment changes of the hinterland.

There have been already some Electron Spin Resonance (ESR) and luminescence studies on sediment provenance. The intensity of the E₁' center in quartz is shown to be a useful parameter to investigate the provenance of aeolian dust as well as of sediments [1][2]. The crystallinity index (CI) in combination with ESR is employed to discriminate two different sources of eolian dust in the sediment core taken from the Japan Sea [3]. Quartz of four distinct origins can be distinguished using impurity (Al, Ti-Li, Ti-H, Ge) centers observed after beta irradiation [4]. Shimada and Takada (2008) and Shimada et al. (2013) also show that the Al, Ti-Li and E₁' center signal intensities from the natural quartz are useful to distinguish the sediment provenance [5][6]. Volcanic quartz is reported to emit stronger red thermoluminescence (TL) than blue one whereas plutonic quartz does vice versa [7]. Quartz of eolian origin transported from China can be distinguished from volcanic quartz originated in Japanese tephra by looking at TL color of quartz grains [8].

In this study, we report the characteristics of ESR and TL of quartz taken from present river bed sediments, to discuss the possibilities of identifying sediment provenance.

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Keywords: Electron Spin Resonance, Sediments provenance, Quartz, Sediments, Thermoluminescence, River bed sediments

A chronostratigraphic study of the upper Anno formation, in the Awa group

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We took oriented mini-core samples for paleomagnetic and rockmagnetic measurements at 79 sites and rock samples to extract fossil foraminifera from sites from the upper Anno formation distributed along the Shikoma river. We carried out rock magnetic, paleomagnetic, oxygen isotopic and carbon isotopic measurements.

Magnetic carrier was interpreted as pseudo-single domain magnetites based on the results of hysteresis and thermal demagnetization, thermomagnetic analyses.

We carried out analysis of principal component to results from the thermal demagnetization and extracted Characteristic Remanent Magnetizations (ChRMs). In the result, a relatively short reversed polarity zone found in the previous study is defined as the Mammoth subchronozone.

We obtained an oxygen isotopic curve from the result of isotopic measurements which is correlatable with the LR04 oxygen isotopic standard curve (Lisiecki & Raymo, 2005). Then we detected 6 tie points to establish an age model for this sequence

Keywords: paleomagnetic stratigraphy, oxygen isotopic stratigraphy, chronostratigraphy

Palaeoclimatic analysis for 600 ka based on the TOC contents of MD01-2407 core from the Oki Ridge, Japan Sea

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We have measured total organic carbon (TOC) and total nitrogen (TN) contents of a sediment core, MD01-2407 (932 m depth, 55.28 m length), at 2 cm interval. This core was taken from the Oki ridge at the southern part of the Japan Sea in AD 2001. We used the age model which shows age-depth relation for MD01-2407 core proposed by Kido et al. (2007). This age model used 6 marker tephra layers, 7 ¹⁴C dates, 3 TL layers and 14 delta ¹⁸O events. This core covers the past 670 kyr.

TOC content is generally high in MIS 15, 13, 11, 9, 7, 5, 3 and 1 (about 1.5 - 5.0 %), and low in MIS 16, 14, 12, 10, 8, 6, 4 and 2 (about 0.8 - 1.2 %). This fluctuation pattern is very similar to the marine oxygen isotope curve LR04. TN content shows similar fluctuation with TOC. C/N ratio is constantly 9 - 10, suggesting that TOC is originated mainly from marine planktons. Temporal change of TOC of the sediment can reflect the change of biological productivity in the Japan Sea (Oba and Akasaka, 1990), which may be controlled climate change. This is an excellent record of paleoclimate over Middle and Late Pleistocene in the middle latitude region.

Keywords: TOC, TN, Japan Sea, MD01-2407

A standard local chronology of late Quaternary based on the TOC profiles of the sediment cores from the Japan Sea

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The TOC content was measured for the late Quaternary sediments of the Japan Sea with high time resolution (ca. 100 yrs interval), and show the good similarity to the delta ^{18}O curve of NGRIP not only in the orbital scale but also the D-O cycle scale (Urabe et al., 2013). In this study, we use TOC profile of the MD179-3312 core from the Japan Sea, and we align the TOC profile to the delta ^{18}O in NGRIP using signal matching, the Match protocol (Lisiecki and Lisiecki, 2002). Before this matching process, there were ca. 4000 years gaps in maxima between both signals, and the gaps are variable. Based on the matched TOC profile, we calculated the ages of TOC peaks, and we proposed a new age of TL layers recognized in MD179-3312 (Kakuwa et al., 2013) on the basis of the matched chronology.

Recently, detailed TOC profiles of the sediment cores were reported from several sites in the Japan Sea, and they show very similar profiles. Therefore, we tried to compile the TOC profiles, using the same match protocol. The matched MD179-3312 profile mentioned above is used as a tentative standard, and TOC profiles of three sediment cores, namely MD179-3304 off Joetsu, MD01-2407 at Oki bank and MD01-2408 off Akita were matched to the tentative standard. This compiled TOC curve (TOC_{JSCOM}; Japan Sea TOC compile) has a reliability due to averaging the four cores data. This TOC_{JSCOM} have a good similarity with the TOC profiles from lake sediments in Japan. When we compared the TOC_{JSCOM} with the delta ^{18}O of stalagmites from the Hulu/Sanbao caves in the south of China (Wang et al., 2001, 2008), we found the improved chronological correspondence between both proxies in MIS 1/2 boundary, lower MIS 3, 4, 5.1, and 5.2. The difference of the trends is recognized in MIS 5.5, and a part of this discordance is due to the local environmental condition of the Japan Sea.

Keywords: Late Quaternary, Japan Sea, TOC, Chronology

A Long-term pollen record of the C9001C core from the deep-sea bottom, off Shimokita peninsula, northeastern Japan

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We used a pollen analysis method for a deep-sea core to reconstruct paleoclimatic changes with the Milankovitch time scale.

In this study, we obtained a continuous pollen record and reconstructed paleovegetation and paleoclimate changes for the past several kyrs from the C9001C core, drilled from off Shimokita Peninsula.

We have applied the Modern Analogue Method to obtain a quantitative paleochimate reconstruction. In the results, a positive correlation has shown on between the paleotemperature parameter and the glacial - interglacial cycle. On the other hands, the summer precipitation parameter matches with the precession cycles but not with the glacial - interglacial cycles. The annual temperature parameter variability show strong negative correlation. These results are support hypothesis of the East Asia monsoon fluctuation mechanism

Keywords: pollen, monsoon, marine core

Carbon and oxygen stable isotope records of benthic foraminiferal shells at DSDP Site 296

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Carbon and oxygen stable isotope records of benthic foraminifera at DSDP Site 296 (2920 m water depth) from the Kyushu-Palau Ridge were measured. Sediment samples for upper 300 m of DSDP Site 296 were taken at every ~2 m and freeze-dried and washed on a 63 micro m mesh sieve and dried in an oven at 40 degree C. The dry samples were sieved through a mesh with 250 micro m opening. Two epifauna species, *Cibicides wuellerstorfi* and *Cibicidoides mundulus* were picked for isotope measurements. The foraminiferal shells were cleaned by soaking them in 99.5% methyl alcohol, followed by ultrasonication until all chambers were open. After confirming that all dirt had been removed, we washed the shells in Milli-Q water and dried them in an oven at 40 degree C. The dried samples were analyzed using IsoPrime mass spectrometry (Center for Advanced Marine Core Research, Kochi University). Analyses were calibrated to the CO-1, and the average analytical errors for delta 13C and delta 18O were less than 0.03 permil and 0.10 permil, respectively.

Age model of DSDP Site 296 is established by planktic foraminiferal and calcareous nannoplankton stratigraphy (Elias, 1975; Ujiie, 1975). Continuous stable isotope records except for a stratigraphic gap at ~250 mbsf are obtained for the past 20 Myrs. These records are basically consistent with those by Zachos et al. (2001).

Keywords: North Pacific, Benthic foraminifera, Stable isotope, Miocene, Pliocene

A Southern Ocean trigger for Northwest Pacific ventilation during the Holocene?

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Holocene ocean circulation is poorly understood due to sparsity of dateable marine archives with submillennial-scale resolution. Here we present a record of mid-depth water radiocarbon contents in the Northwest (NW) Pacific Ocean over the last 12,000 years, which shows remarkable millennial-scale variations relative to changes in atmospheric radiocarbon inventory. Apparent decoupling of these variations from regional ventilation and mixing processes leads us to the suggestion that the mid-depth NW Pacific may have responded to changes in Southern Ocean overturning forced by latitudinal displacements of the southern westerly winds. By inference, a tendency of in-phase related North Atlantic and Southern Ocean overturning would argue against the development of a steady bipolar seesaw regime during the Holocene. This study was also published in Scientific Reports.

Keywords: Holocene, Northwest Pacific, Radiocarbon, Southern Ocean overturning, Southern westerly winds

Multiple early Eocene hyperthermals reconstructed from the Indian Ocean deep-sea sediments

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From the late Paleocene to the early Eocene (ca. 56 Ma), an extreme global warming by 5-8 °C occurred within several thousand years, which is termed as the Paleocene-Eocene Thermal Maximum (PETM). The PETM is known to accompany severe ocean acidification and a prominent negative carbon isotope excursion in both marine and terrestrial environments, which indicate a massive and rapid injection of isotopically light (¹²C-enriched) greenhouse gas into the ocean-atmosphere system. Recently, additional PETM-like global warming events (called as "hyperthermals") have also been identified during the early Eocene period of ca. 56-52 Ma [2]. As is the case with the PETM, the early Eocene hyperthermals also accompanied rapid and pronounced negative carbon isotope excursions. Besides, the hyperthermals appear to be in phase with the oscillations in the eccentricity of Earth's orbit [2, 3], which suggests that the orbital forcing affected to earth's climate and global carbon cycle even in the warmer Earth without large continental ice sheet during this period.

Geologic records of the hyperthermals have so far been reported from all over the world (e.g., the Pacific, the Atlantic, the Arctic, Europe and North America). The Indian Ocean, however, is the exception where only few published data are available for reconstruction of the hyperthermals and thus, the global extent of the hyperthermals remains uncertain. Here, we analyzed $\delta^{13}\text{C}$, $\delta^{18}\text{O}$ and CaCO_3 contents of 376 bulk sediment samples taken from four DSDP/ODP cores (DSDP Site 213, DSDP Site 259, ODP Site 738C, ODP Site 752). The analytical results show that sediments from Site 738C and Site 752 contain multiple negative carbon and oxygen isotope excursions and reductions of carbonate contents, which appear to corresponding to the PETM and the early Eocene hyperthermals. Observed hyperthermals from the both sites are inferred to be H1 (Eocene Thermal maximum 2; ETM2)/H2 and I1/I2 events [3]. The observed carbon isotope excursions of ETM2 event ($\sim -1\text{‰}$ at Site 752 and $\sim -0.5\text{‰}$ at Site 738C) and I1 event ($\sim -0.6\text{‰}$ at both sites) are comparable with those reported from the other regions, such as the Pacific and the Atlantic Oceans. Our results strongly suggest that the hyperthermals in the early Eocene period were a global event including the Indian Ocean.

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Keywords: deep-sea sediment, Indian Ocean, climate change, hyperthermals

Preliminary analyses on a LGM simulation using MIROC-ESM :climate and dust aerosol representation

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Future Projection using Earth System Model (ESM) is an important contribution for Intergovernmental Panel on Climate Change Assessment Report 5 (IPCC AR5) from the modelling studies. Therefore, it is important to investigate ability of models and improve them. Especially, Last Glacial Maximum (LGM, 21,000 years before present) is recognized as a benchmarking period because it is the coldest time during relatively recent past. We report the preliminary analyses on climate and dust aerosol representation of the LGM experiment using an ESM, MIROC-ESM (Watanabe et al. 2011).

MIROC-ESM which contributed to IPCC AR5 was used for the study. The resolution of the Atmosphere General Circulation Model is T42 with 80 layers for the vertical levels and the resolution of the Ocean General Circulation Model part is about 1° with 44 vertical levels. An aerosol module SPRINTARS (Takemura et al. 2000, 2002, 2005) is calculated online.

Following the protocol of Coupled Model Intercomparison Project phase 5, we performed two experiments. One experiment is called PI, which corresponds to pre-industrial time, i.e., 1850 A.D. The other is called LGM, which is supposed to represent climate at LGM (Sueyoshi et al. 2013). The differences of the boundary condition from PI are lower greenhouse gases, the orbit of the Earth and the topography (ice sheets and sea level drop).

The climate of PI is reasonably well represented as a state-of-the-art model (Watanabe et al. 2011). The sea surface temperature drop at LGM is reasonably comparable with MARGO dataset (MARGO project members 2009). However the 7 to 10 °C temperature drop suggested by the Antarctic ice cores (Stenni et al. 2010, Uemura et al. 2012) is reasonably represented, the 21 to 25 °C cooling suggested by the Greenland ice cores (Cuffey et al. 1995, Jonsen et al. 1995, Dahl-Jensen et al. 1998) is not enough simulated in the model. The modelled net cooling over the Greenland summit is about 15 °C. Tackling this defect is important to improve future projection. One of the conceivable reasons is the problem on representing enhancement of mineral dust aerosol in the model, which has been pointed out in IPCC AR5. We have compared the modeled dust amount with a dataset called DIRTMAP (Kohfeld and Harrison 2001). As a result, there are problems on the representation of dust over the Greenland both for PI and LGM. In the LGM experiment, the plant functional types (PFT) are basically unchanged from PI. Taking into account the change of PFT may lead more dust generation at LGM and enhance the cooling. The Antarctic dust is significantly lower than the dataset at LGM. The dust emission from Patagonia, the major dust source of the Antarctic ice core, is too low in the LGM experiment. This seems to be caused by too high soil moisture. The precipitation over Patagonia is already too high in the PI. Improving the PI precipitation amount may also affect the LGM precipitation amount and improve the soil moisture conditions.

We present the preliminary analyses on the dust at LGM using MIROC-ESM. As a result, there is a difficulty on representation of the dust enhancement over the ice sheets. Further improvements of the model, for example, taking into account the PFT change or better representation of the precipitation at PI may work to better representation of dust amount/distribution at LGM. Over the Antarctica, the cooling at LGM is expressed in the model but the dust amount is far from the estimation of the ice core data, i.e., the current simulated cooling may be a result of wrong reasons. We are going to improve the processes of the dust emission and investigate deposition procedures and estimation of radiative forcing.

Keywords: LGM, dust, climate sensitivity, Earth System Model

MIS30-P12

Room:Poster

Time:April 28 18:15-19:30

A 3.3-kyr record of environmental changes in Asian continental interior by Lake Baikal core analysis

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We report chemical analysis (TOC, TN, TS, BioSi, and etc) of Lake Baikal sediment.

Observation of stalagmite laminae for paleoclimate reconstruction at Taga Mine Cave, Shiga Prefecture, Japan

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A lot of studies on paleoclimate reconstruction using stalagmites have been done all over the world. However, there are only a few stalagmite paleoclimate researches in Japan. In this study, we observe laminae of stalagmites collected at Taga Mine Cave, Shiga Prefecture, Japan (TAGA3, TAGA5, TAGA7, TAGA11, TAGA12) for paleoclimate reconstruction.

Stalagmite paleoclimate reconstruction has a potential to get high-resolution (annual~decadal) age proxy data, if stalagmite samples have annual laminae. However, some stalagmites have a few types of laminae within a sample (Baker et.al,2008). In this case, it is important to elucidate which types of laminae is annual.

When we observe the thin section of our samples by microscope, all samples show laminae. These laminae consist of natural organic matters because of fluorescent by UV excitation (Baker et.al,2008). Laminae interval is variable from several μm to a few hundred μm . Laminae of our samples are similar to the one from China and Turkey (Tan et.al,2006 , Baker et.al,2008).

Especially, sample TAGA3 has more obvious laminae than the other samples, but has the laminae which looks like sub-annual or supra-annual laminae reported in China (Tan et.al,2006). In addition, laminae are wavy in some parts of TAGA3. If we can distinguish annual laminae by U-Th age and find the feature of annual laminae, we will get high-resolution paleoclimate proxy data.

Keywords: stalagmite, laminae, paleoclimate

New age model of off Takashima drilling sediment

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Several kinds of studies have been carried out regarding Off Takashima drilling core in Lake Biwa, Japan and a lot of achievements have been reported. In recent years, we have been carrying out chemical analysis on biogenic silica content of cored sediment with high time resolution. However, there have been some age problems regarding uppermost part of the core, namely the last 45 k years. In order to solve the age model problem, we carried out piston core sampling near the Off Takashima drilling site in 2012. About 30 carbon-14 data have been obtained. In addition to well-known wide spread tephra dates, these C-14 dates are converted into new age model. Correlation between Off Takashima drilling core and newly obtained piston core sediment enabled to establish new Off Takashima age model. Last year we reported tentative correlation based on water content profile of both cores. This time, we analyzed grain size, total organic carbon content and total nitrogen content of piston core sediment and compared with those of Off Takashima drilling core. Based on total organic carbon content, correlation between two cores and age model of Off Takashima drilling core are improved greatly.

Keywords: Lake Biwa, sediment, paleoenvironment, age model

Climate change history of the last 45ka of Lake Biwa based on grain size and TOC, TN of BWK12-2 piston core

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Based on newly established age model of BWK12-2 piston core sediment, obtained near the Off Takashima drilling station in Lake Biwa, Japan and with about 30 C-14 dates and well dated wide spread tephra, we analyzed grain size and total organic carbon (TOC) and total nitrogen (TN) contents of the sediment. Analyzing interval of those sediments were, 4cm to grain size and 2cm to TOC and TN whose time resolutions were 30 to 120 years and 15 to 60years respectively. Comparison with Marine Isotope Stage profile shows distinct resemblance to MIS1, however, difference between MIS2 and MIS3 is not clear. On the other hand, abrupt cooling events, such as Heinrich events and Younger Dryas, are clearly recognized. Abrupt warming, such as Dansgaard Oeschger events are not clearly recognized.

Keywords: Lake Biwa, sediment, paleo climate, grain size, TOC, TN

Late Holocene change in lacustrine environment inferred from diatom fossil analysis of lake bed core

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Detail diatom fossils analysis of a lake bed core provided successive reconstruction of lacustrine environmental change after ca. 4700 cal BP in the Lake Hamana, central Japan, with high temporal resolution. In addition, two suspected thin layers as some kind of event deposits were recognized based on allochthonous sediments and/or diatom fossils.

Lake Hamana is a coastal brackish lake located along the Enshu-nada coast. Ikeya *et al.* (1990) performed numerous geological and paleontological analyses on lake bed sediments and reconstructed roughly the Holocene lacustrine environment and geomorphological development of the lake. According to them, after sea area had expanded landward associated with the Jomon Transgression, an inner bay and a fresh water lake occurred at a relatively stable sea-level condition. Furthermore, Morita *et al.* (1998) suggested that fresh water and brackish water conditions had been formed alternately during the Late Holocene, which indicating geomorphological changes presumably caused by some mega thrust earthquakes occurred in the Nankai trough. However, lower temporal resolution made impossible them to clarify detail lacustrine environmental changes.

In order to reconstruct detail lacustrine environmental change of the Lake Hamana during the Late Holocene, diatom fossil assemblages of the 350 cm-long lake bed core were investigated. The core sediments consisted of muddy deposits mainly including a thin sandy layer and two obvious tephra layers. The refractive index of volcanic ashes and core stratigraphy indicated that the lower tephra layer was the Amagi-Kawagodaira pumice (Kg, 3126-3145 cal BP, Machida and Arai, 2003) and the upper one was the Fuji-Osawa scoria (Os, 2.5-2.8 ka, Machida and Arai, 2003). The age model of the core was reconstructed based on the tephra layers and seven radiocarbon ages.

Six diatom zones were identified based on major species composition changes in the diatom assemblages. Stepwise development of the lacustrine environment in the Lake Hamana was suggested as below: Vigorous seawater inflow inferred by marine diatoms (Stage I, 4600-4700 cal BP); A closed inner bay environment with laminated sediments due to formation of sand barriers (Stage II, 4500-4600 cal BP); A circulative brackish lacustrine environment by active mixture of riverine fresh water with enhanced inflow of seawater since 3500 cal BP (Stage III, 2650-4500 cal BP); Gradual salinity decrease of the lake water by reduced seawater inflow (Stage IV, 2250-2650 cal BP); Lake water from brackish to fresh since 2250 cal BP with intermittent salinity increase in the middle of this period, water depth of the lake getting deeper (Stage V, 1498 AD-2250 cal BP); Re-development of an inner bay environment after the Meio earthquake in 1498 AD with temporal salinity increase during 1600 AD to 1750 AD (Stage VI, after 1498 AD).

Additionally, two possible event layers (A and B layer in ascending order) were found. The A layer, during 321-322 cm depth, was characterized by exceptionally high percentage of *Plagiogramma* sp. This temporal abundance accompanying increases of *Thalassiosira* sp. and *Thalassionema nitzschioides* indicates an abrupt environmental change and/or an allochthonous sediments supply. Nevertheless, it is difficult to specify the cause of this layer because the habitat of *Plagiogramma* sp. is still unknown. On the other hand, the B layer was corresponding to the thin sand layer in the range of 285-288 cm depth showed short-term abundance of fresh water diatom species. This indicates that relative coarse sediments supplied abruptly from fresh water environment, ponds and/or marshes, around the lake to the central part of the lake.

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Keywords: LakeHamana, lacustrine environment, coastal lagoon, diatom fossil, 1498 Meio earthquake, Holocene

Reconstruction of the Last glacial to Holocene climate changes in Shaamar loess-paleosol succession, northern Mongolia

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Two atmospheric circulation systems, the mid-latitude Westerlies and the Asian monsoon, play key roles in northern-hemisphere climatic changes. However, the variability of the Westerlies in mid-latitude Asia and their relationship to the Asian summer and winter monsoon remain unclear. We examined the variations in the grain size and elemental composition from the 30 m long loess-paleosol succession in Shaamar area, northern Mongolia, which could be recorded the interplay of the Westerlies and Asian winter monsoon for the last 30 k.y. We then compared our results with the multi-proxy paleoclimate records (e.g., eolian grain sizes, lake levels, pollen assemblages) of the Asian summer and winter monsoon regions and the Westerlies affected region.

According to the compiled data of the Wang and Feng (2013), the Holocene climatic variation patterns (mainly from lake levels and pollen records) in Asia are categorized into 4 characteristic regions, such as the Summer monsoon region (southern and northeastern China), Westerlies affected region (northwestern China), Winter monsoon region (southern Siberia), and Mixture of westerlies and winter monsoon affected region (Mongolia). Specifically, summer monsoon region is characterized by dry earliest Holocene (12-11 ka), humid early to middle Holocene (11-6 ka), and the moderate-humid late Holocene (last 6 ka), corresponding to the Northern hemisphere summer insolation changes. Westerlies affected region is characterized by dry early Holocene (12-8 ka) and humid middle to late Holocene (last 8 ka). Winter monsoon region is characterized by the humid early Holocene (12-8 ka) and dry middle to late Holocene (last 8 ka). On the other hand, Mongolian records (e.g., Lake Khuvsgul, Lake Gun Nuur) demonstrate humid early Holocene (12-9 ka), dry middle Holocene (9-5 ka), and humid late Holocene (last 5 ka), which seems mixture of westerlies and winter monsoon affected region.

Shaamar loess-paleosol succession record is characterized by the humid early Holocene (12-8 ka) and dry middle to late Holocene (last 8 ka), similar to the winter monsoon region in southern Siberia. Thus, it is suggested that the eolian sediment record in Shaamar could be affected more strongly by winter monsoon influence, although Shaamar section is located closely to the mixture of westerlies and winter monsoon affected region (e.g., Lake Khuvsgul and Lake Gun Nuur). Except for the Chinese Loess Plateau, Shaamar loess-paleosol succession is only the continuous eolian sediment record in mid-latitude Asia. Thus, Shaamar loess-paleosol succession should provide us rare glimpse for understanding the interplay of westerlies and winter monsoon in Asian mid-latitude. We will further examine the Last glacial records of the Shaamar loess-paleosol succession and compare with other records of the Asian summer and winter monsoon regions and the Westerlies affected region.

Keywords: Mongolia, Loess-paleosol succession, Westerlies, Winter monsoon, Holocene, LGM

Reconstruction paleoenvironment by using diatom fossil assemblage analysis in Imuta-ike wetland, Satsumesendai, Kagoshim

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Paleoenvironmental reconstruction, using diatom assemblage analysis have been carried out in Imuta-ike, Satsumasendai, Kagoshima, Japan. In this site, there are deposit peat layer which is rare in west Japan, 6 visible tephra layer and 2.5m depth laminated layer. Boring survey conducted center of Imuta-ike at Feb. 2011, we was able to got 25m depth core. It can be traced back to 30,000 years past, can be reconstructed until modern environment from ice age. Following environment changes are reconstructed. Since about 30,000 years ago, peat and silt continuously has deposited, but accumulate speed has changed.

About 30,000 yr BP to 23,400 yr BP, we can't reconstruct detail environment change, because of the small number of diatom. About 23,400 yr BP to 13,600 yr BP, inflow river has been existed. And edge of the lake, moor has been formed. About 13,600 yr BP to 10,800 yr BP, moor became land, then pH rose. About 10,800 yr BP to 4,600 yr BP, it starts the postglacial age, increase precipitation and water level was rose. After K-Ah, tephra deposited the lake and water depth was shallow. About 4,600 yr BP to 1,500 yr BP, those days was dystrophic lake and it started to form wet land in west side of the lake. About 1,500 yr BP to present, it continues aggradation, water depth has been shallow. It progresses wet land formation so that water pH was dropped.

Keywords: diatom, Holocene, climatic change, pH change, volcanic stratigraphy, annually laminated lake deposit

Reconstruction of Paleo-environment at coastal lakes along the Soya Coast, Antarctica, using fossil diatom assemblages

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Soya Coast, located at East Antarctica distribute wide ice-free areas such as Langhovde, Skarvsnes, Skallen and Rundvagshetta. The research areas of this study are five lakes in the ice-free coast as follows; Lake Nurume-ike and Lake Yukidori-ike at Langhovde, Lake Oyako-ike at Skarvsnes and Lake Maruwan-minami-ike and Lake Maruwan-oike at Rundvagshetta.

Matsumoto et al.2014 described the Holocene paleo-limnological changes at Lake Oyako-ike. They described soft-x-ray analysis, carbon 14 dating, elemental analyses, Chlorophyll compounds and carotenoids, and algae and cyanobacteria analyses. The paleo-environment of the lake shifted from the open coastal environment, through stratified saline lake, and then to high productive fresh water lake during these two thousand years. They presume that these environmental changes have been affected by isostatic uplift by retreating continental glaciers.

Diatom fossil assemblages at the lake deposit (Ok4C-1) divided into five assemblages zones, from Zone 1 to Zone 5 to upward. The dominated species of each zone is as follows. Zone 1:*Paralia sulcata*, marine species, Zone 2:*Staurosira construens*, Zone3:*Tryblionella littoralis*, marine species, Zone4:*Chamaepinnularia cymatopleura*, brackish species and Zone 5:*Amphora oligotraphent* *Navicula gregaria*, *Diadsmis* spp., freshwater species. The shifts of diatom assemblages presumed the lake water environment shifted from coastal marine environment through freshwater lake environment. This result was fitted to the results of the previous study. Now, we are analyzing other four lake sediment cores.

Keywords: Antarctic coastal lakes, paleolimnology, diatom, the Holocene, Sediment core

Holocene climate changes detected in the bottom sediments of the glacier lake, southern Peru

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We attempt to reconstruct climate changes during the Holocene by using a glacier lake on the southern Peru. For this, we had undertaken field investigation as echo sounding and piston coring at Lake Yauriuri, which is 130 km apart from Nazca city. The lake is one of typical glacier lake at height of 4,384 m. By the seismic record of the lake bottom from echo sounding, it is identified that 10-m thick mud layer with the intercalated fine sand layers on the bedrocks. And, two sediment cores were taken from the southwestern point at 50 m in water depth. The length of the cores is 50, and 170 cm, respectively. Lithology of the sediment shows that almost homogenous dark grey slit with two thin brownish flood-origin layers. We have analyzed physical properties, magnetic susceptibility, color reflectance, chemical compounds by XRF, CNS and ICP-AES with multiple radiocarbon dating for the whole core section. Our results indicated abrupt changes of S and Ti contents at 4,000 and 7,000 cal BP, suggesting that past lake level fluctuation and precipitation over the last 11,000 years caused by climate changes. These past environmental variations in Lake Yauriuri may have the similar pattern with other records in inland area of Peru as well as off shore Peruvian marine records.

Keywords: Peru, Laguna YauriUri, climate change, Nazca Culture