Japan Geoscience Union Meeting 2013
(May 19-24 2013 at Makuhari, Chiba, Japan)

AHW30-P01 Room:Convention Hall Time:May 22 18:15-19:30

Phosphate oxygen isotopes as a tool to trace phosphorus sources and cycling in a watershed

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Introduction

Phosphorus (P), which is an essential element for all of life on the earth, often limits the productivity of aquatic ecosystems, especially of freshwater ecosystems, because of its scarcity relative to other macronutrients. In contrast, modern anthropogenic P loadings have caused serious eutrophication and deteriorated ecosystem services all over the world, stimulating social needs for studies on P cycling. Although identification of the primary P sources can provide useful information for designing the best ecosystem management practices to control eutrophication, standard methods have not yet been established because P-involved chemical processes are complicated and P has no stable isotopes as natural tracers. With traditional P transport models, for instance, we have difficulty in estimating the relative contribution of P loadings from a variety of sources. Recently, however, a new isotopic technique has been developed to measure oxygen isotope ratio of dissolved inorganic phosphate ($d^{18}O_p$), which distinguishes different phosphate sources and also reflects the degree of phosphate turnover by organisms.

Here we apply the phosphate oxygen isotope analysis to a synoptic survey to identify natural and anthropogenic P sources and evaluate its relative importance to biological P recycling in the Yasu River, the largest tributary river of the Lake Biwa Watershed.

Materials & Methods

We collected river waters in October 2012 from 36 sites across the mainstream of the Yasu River and its branches, whose catchment areas greatly vary in land use pattern. We also collected water samples from 8 sewage treatment plants, 2 agricultural waste water plants and 1 livestock farm as potential point sources of anthropogenic P. A concentrated liquid phosphate fertilizer which is commonly propagated for agricultural purposes in this region was provided by a fertilizer manufacturer and evaluated as an indicator of agricultural non-point P source. Furthermore, we collected sands from the riverbed of 5 headwaters as natural P sources. The sand samples saturated with pure water were shaken at the ambient water temperature to naturally desorb dissolved inorganic phosphates. These samples were treated with magnesium-induced coprecipitation (MagIC) method for phosphate extraction and then converted to silver phosphate after purification through the sequence of resin separation and precipitation. We determined $^{18}O_p$for each of these silver phosphate samples using a thermal conversion elemental analyzer coupled to a continuous flow isotope ratio mass spectrometer via a helium stream. The delta value was calculated as follows,

$d^{18}O_p = (R_{sample} / R_{VSMOW} - 1) * 1000$

where R_{sample} is the ratio of $^{18}O/^{16}O$ in our sample and R_{VSMOW} is the ratio of $^{18}O/^{16}O$ in the isotopic standard for oxygen, Vienna standard mean ocean water (VSMOW). The raw values were corrected by normalizing to internal working standards of silver phosphate, which have been calibrated to the VSMOW.

Results & Discussion

We detected significant differences in the $d^{18}O_p$ among a variety of potential P sources, showing this technique is applicable to trace P sources in the river ecosystems. River waters also showed a marked variation in their $d^{18}O_p$ among sites within the river. Based on an isotopic equilibrium model which assumes theoretical equilibrium of temperature-specific oxygen isotope exchange between dissolved phosphate and ambient water under rapid biological P turnover, we evaluated the relative importance of biological P recycling to external P loadings. Our data revealed that P is completely recycled by organisms in some sites while there is a surplus of P in other sites. We discuss how human density and land use pattern can affect P pollution and also what conditions increase the potential for biological P recycling in the watershed ecosystems.

Keywords: Biological recycling, Lake Biwa Watershed, Land use, Non-point source, Phosphate oxygen isotope analysis

Japan Geoscience Union Meeting 2013
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AHW30-P02 Room:Convention Hall Time:May 22 18:15-19:30

Application of SWAT to the Sakura Riv. watershed. 2.Incorporation of irrigation & management operations into the model.

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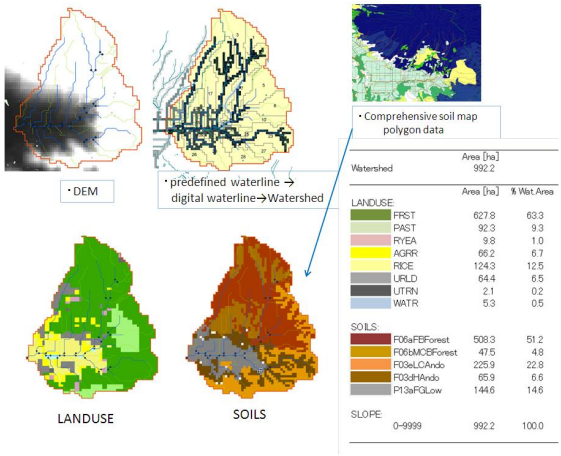
To apply SWAT to agricultural watersheds in Japan, the comprehensive soil taxonomy polygon data and the SolphyJ (Agricultural soil profile physical properties database, Japan) were utilized as input data. To predict the water and nitrogen flow-out of Sakasa river, which is a sub-basin of Sakura River, SWAT simulation was done after input of parameters about daily irrigation, fertilizing, harvesting, and physical parameters relating river water flows.

As a first approximation, the predicted water flow was almost agreed with the measured one.On the other hand, the predicted nitrate nitrogen flow was a little larger than the measured one probably because of lack of denitrification in the ponded water above paddy fields.

Keywords: SWAT, irrigation channel, paddy field, agricultural management, comprehensive soil taxonomy



Japan Geoscience Union Meeting 2013
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AHW30-P03 Room:Convention Hall Time:May 22 18:15-19:30

Estimating the groundwater contribution into a river situated in the alluvial fan of the Tedori River

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Groundwater resources should be managed from the viewpoint of sustainable water use, and on the other hand, protection of biodiversity is also important. Water cycle in alluvial fans provides benefit to human activities as well as aquatic biodiversity, and hence it is required to understand the interactions between surface water and groundwater in alluvial fan areas. In this study, groundwater contribution into the Yasumaru River, a small river situated in the base of the alluvial fan of the Tedori River, was illustrated with radon (^{222}Rn), water temperature and electrical conductivity (EC) of the river water.

Water flowing in the Yasumaru River and groundwater in wells around the Yasumaru River were sampled five times (May, July, September, November and December) in 2012, at the points shown in Fig. 1. Water temperature and EC were measured in situ, and ^{222}Rn concentration was determined by analyzing toluene-extracted samples with a liquid scintillation counter.

Distributions of the measured temperature, EC and ^{222}Rn are shown in Fig. 2. In general, concentration of ^{222}Rn is usually mentioned as an indicator of groundwater. Zones with raised ^{222}Rn concentrations in river water are compatible with areas where groundwater discharge occurs.

In the upstream part of the Yasumaru River, the uppermost point with ^{222}Rn of $>$ 1.0 Bq/L varied with the seasons, Y28 in July and Y24 in November, which suggests that the upper end of the area of groundwater discharge could flactuate. The mobility of the groundwater-discharge area seemed to be related to irrigation in paddy fields around the upstream part, because July is in the irrigation period and November is in the non-irrigation period. Additionally, the fact that ^{222}Rn was higher than 1.0 Bq/L at Y28 in December is not contradictory to the suggestion about the irrigation-groundwater relationship, because the paddy fields were waterlogged by much snowfall and rainfall.

In the downstream part, ^{222}Rn concentrations were drastically changed with the seasons, due to open/close condition of the floodgate lying between the upstream and downstream parts. Zones with higher EC were found, which was likely caused by inflow of high-EC effluents from the surrounding area. In addition, because the downstream area is situated in a residential area, rainwater collected by drainage ditches could come directly into the river.

Fractions of groundwater contribution into the Yasumaru River were estimated by the measured ^{222}Rn concentrations and water temperatures. The maximum fractions of groundwater contribution (in May, July, September, November and December, respectively) calculated by ^{222}Rn were 6.1%, 11.7%, 12.9%, 7.2% and 25.5% for the upstream part, and 28.0%, 22.0%, 43.6%, 25.0% and 29.4% for the downstream part. Meanwhile, those calculated by water temperature were 15.6% in July and 60.3% in December for the upstream, and 42.7% in July and 61.6% in December for the downstream. The lower values of the contribution estimated by ^{222}Rn were likely caused by underestimation due to decrease of ^{222}Rn by sublimation and radioactive decay. Similarly, the estimation of groundwater contribution by water temperature had a fear of under-/over- estimation due to insolation and thermal equilibration with the air.

Keywords: radon, radioisotopes, environmental isotopes, water temperature, groundwater discharge, multifunctionality in agriculture

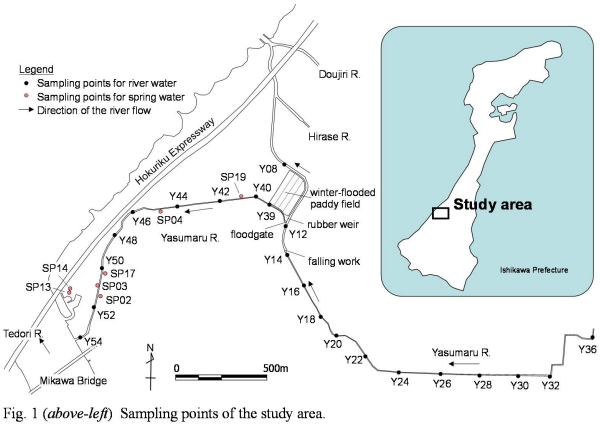

Fig. 1 (*above-left*) Sampling points of the study area.

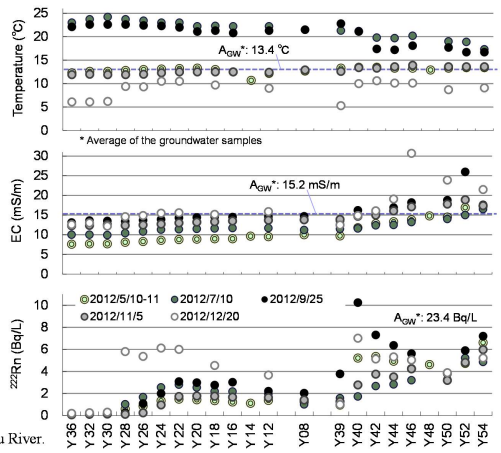

Fig. 2 (*right*) Distributions of water temperature, EC and ^{222}Rn concentration along with the Yasumaru River.

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Runoff analysis of the water resource from Odaigahara

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The system to estimate an amount of water runoff using GIS data was developed. The water runoff was analyzed by the systems using GIS data with 100m mesh scale, precipitation data and flow rate data of rivers. The analysis system clears the amount of water runoff by the typhoon No.12. The Kino River flow is 498 million m3 per 8 days, and the Shinguu River is 1.6 billion m3, and the Miya River is 425 million m3. The amount of water runoff is compared by the value of observing station, and the accuracy of system is checked.

Keywords: Runoff analysis, Kii Peninsula, Typhoon, River flow, Outflow

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A control method for erosion along fence lines on sloping pastures by installing fences for controlling cattle behavior

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A control method for erosion along fence lines on sloping pastures by installing fences for controlling cattle behavior
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Keywords: sloping pasture, soil erosion, fence

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Atmospheric deposition of radiocesium in forest sites on the periphery of the Kanto plain

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TEPCO's Fukushima Daiichi Nuclear Power Plant (FDNPP) accident has resulted in emission of huge amounts of radioactive substances to the atmosphere. The radionuclides were transferred and influx as wet and dry depositions into the surrounding area. The objective of this study was to determine the atmospheric radiocesium (^{134}Cs, ^{137}Cs) depositions at forest sites on the periphery of the Kanto plain after the accident.

Bulk precipitation and throughfall samples were collected at 15 forest sites in Ibaraki, Gunma, Tokyo, Saitama, and Niigata prefecture. The sampling points were located between 120 to 250 km distances from FDNPP. Radiocesium (^{134}Cs, ^{137}Cs) of the dissolved fraction were measured by the gamma-ray spectroscopy with Ge detector. From all the samples collected during the period from 15 to 23 March 2011, radiocesium was detected. The total amounts of 134Cs and 137Cs depositions including this period by bulk precipitation ranged from 4,000 to 40,000 Bq m^{-2}, and those of throughfall ranged from 1,000 to 25,000 Bq m^{-2}.

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The annual output of radiocaesium in stream water from a forested watershed

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Radiocaesium (Cs) was released by the accident in Fukushima Daiichi nuclear power plant. Although the woodland is thought to have strong tendency to maintain radiocaesium within a forest ecosystem, there is an anxiety that radiocaesium flows downwards through stream water at the freshet because the terrain of mountain area in Japan is steep and a lot of rainfalls exist. Then, the behavior of radiocaesium in stream water in a forested catchment in Fukushima Prefecture was investigated. In this time, we report on the runoff of radiocaesium in 2012 and its feature.

The investigation was carried out in a small catchment in the Tadano experimental forest of the Fukushima Prefecture forestry research center in Koriyama city, Fukushima Prefecture (Annual rainfall 1163 mm ; drainage area 1.2 ha, the elevation 358 to 409 m, and the relief 0.42). The geology is a sedimentary rock (sandstone and tuff). As for the vegetation, the deciduous broad-leaved species such as Quercus serratas exists together with the Japanese red pine woods in the Cryptomeria japonica and the Chamaecypari obtusa plantation (about the 48 years old). The discharge was observed by setting up the v-notched weir and the water level gauge in the catchment end. The automatic water sampler was set up near the weir and collected stream water (volume; about 2L) every one hour when the freshet. The turbidity was measured by a turbidity sensor that was able to be installed in the automatic water sampler, and it was recorded every ten minutes automatically.

Based on 28 data of five freshets (March 23, 31, May 3, 28 and June 19 in 2012) of which the analysis had been completed, the relation between the turbidity and 137Cs concentration in stream water were examined. Its relationship had high correlation ($r = 0.828$, $p < 0.001$). From this relation, turbidity and discharge, ^{137}Cs runoff for the observation period (267 days of March 20th - December 11th) was estimated as 183 Bq m^{-2}. We divided daily radiocaesium runoff data into two categories by daily rainfall (5 mm day^{-1}) and found that 84 % of ^{137}Cs discharged during the flood flow (> 5 mm day^{-1}). When converting ^{137}Cs runoff in the observation period into the yearly value (365 days), the estimated annual ^{137}Cs runoff became 250 Bq m^{-2} yr^{-1}. This is about 0.3% of ^{137}Cs fallout around our site (80 kBq m^{-2} by Ministry of Education, Culture, Sports, Science, and Technology; airplane monitoring 2011/10/13).

Keywords: forest, stream water, radiocaesium

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The runoff characteristic of radioactive Cs in the Hirose river basin, Fukushima prefecture

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[1]NARO, Institute for Rural Engineering

The runoff characteristic of radioactive Cs are studied in the Hirose river basin, Fukushima prefecture.

Keywords: radioactive Cs, runoff, Hirose river, L-Q equation

Japan Geoscience Union Meeting 2013
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Pseudo Model for Phosphate Adsorption from Water onto Different Adsorbents

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Release of Phosphate from wastewater to resources of water constitutes the main risk for reduced water quality. At the same time Phosphate is an essential nutrient for all forms of life and can not be replaced by any other element. Current global reserves of Phosphate are expected to be exhausted in 50 years. Phosphate is mostly obtained from mined rock phosphate and there is a lack of alternatives to substitute it. Therefore, in this study the removal of Phosphate using different adsorbents was studied by conducting batch tests and kinetic adsorption model. The kinetic adsorption model was applied to predict the rate constant of adsorption based on pseudo equations. Thorough the investigation, pseudo first order and second order kinetic absorption model showed that the kinetic adsorption is consistent with the second order model from which it can be inferred that the mechanism of Phosphate adsorption is chemisorption.

Batch tests and kinetic adsorption models results showed that using the marble dust as adsorbent among other materials could be remove more than 93% of Phosphate from aqueous solution.

Keywords: adsorption of Phosphate, adsorption model, kinetic model, pseudo equation, batch Test

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Relationship between catchment scale and the spatial variability of stream discharge and chemistry

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We investigated whether the representative elementary area (REA) concept can be adopted in catchments with multiple geologies. REA was defined as a certain threshold size of catchment area above which spatial variability among small catchments becomes small and can be ignored. From the definition of REA, in the area above the size of REA, only some knowledge (minimum knowledge) of the underlying distributions is needed for continuum assumptions. For verifying the adoption of REA concept in meso-scale catchments with multiple geologies, we need to examine whether the spatial variability of discharge and chemistry can be explained by mixing based on geology percentages. We observed stream discharge at 65 points and water chemistry at 157 points in a 55 km^2 catchment that included multiple geologies. At observation points with uniform geology, stream chemistry became constant beyond about 1km^2 in granodiorite and volcanic rocks. The values to which stream chemistry converged were different between the two geologies. At observation points with multiple geologies, spatial variability remained large beyond a few square kilometers. SiO_2 and Mg^{2+} concentrations became constant above 10 km^2, but Ca^{2+} and electrical conductivity did not become constant until 55 km^2. Our calculation revealed that almost all observed variables were explained by mixture based on geological percentages, in 1-17km^2. However, above 17km^2, observed values were higher than calculated values. In regions with multiple geologies, the adoption of the REA concept with minimum parameter, geology, was confirmed at 1-17 km^2. However, above 17 km^2, our results indicated that the REA concept does not apply.

Keywords: spatial variability, stream water, catchment scale, water chemistry, bedrock geology, REA

Japan Geoscience Union Meeting 2013
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A study of the quality of the water and the nitrogen isotope ratio of the groundwater in Kanagawa.

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Introduction

As the technique of solving the cause of groundwater contamination by nitrate nitrogen, there is a method of using the nitrogen stable isotope ratio in groundwater. In this approach, it is a method to estimate the groundwater nitrogen origin from the difference of the nitrogen isotope ratio during artificial manure and domestic animal raw sewage, life drainage to become the polluter. However, the nitrogen isotope ratio in groundwater is often different from a nitrogen isotope of the pollution origin by isotope concentration by influence and nitrification or the denitrification of the different pollution origin.

Therefore, in this study, I examined the change tendency of a characteristic and the groundwater quality and the nitrogen isotope ratio every area using findings for the nitrate nitrogen high density groundwater area in Kanagawa.

Result

For from 2002 to 2011, I investigated it in the neighboring areas of the environmental standard excess spot to elucidate a cause of the groundwater contamination with nitrate nitrogen. An investigation was carried out so far in 22 areas, 184 wells. Investigation was conducted in Ebina City (two areas), Miura City (one area), Samukawa Town (one area), Chigasaki City (two areas), Ayase City (four areas), Hadano City (nine areas), Isehara City (one area), Nakai Town (one area), and Oiso Town (one area).

In each investigation, I assumed a range of a radius of 1-2km around the environmental standard excess well an area for and sampled groundwater from a 5-15 well in 1 area. The gathered groundwater measured the concentration of dissolved matters and the nitrogen stable isotope ratio. In addition, using land use classification figure of the Geographical Survey Institute publication, I calculated the land use division ratio in the area for.

Consideration

In the investigation that I went for so far, each nitrate nitrogen pollution cause was classified below. The artificial manure alone origin were 9 areas in 22 areas (41%), the life drainage independent origin were 1 area (5%), artificial manure, the life drainage mixture origin were 7 areas (32%), artificial manure, other mixed origin were 2 areas (9%), and unknown origin were 3 areas. In all 22 areas, the origin by the life drainage were only 1 area. On the other hand, in 19 areas where a cause became clear, influence of the artificial manure was seen in 18 areas. From this, in the nitrate nitrogen high density groundwater area in Kanagawa, it was revealed that it was supposed influence by the artificial manure at most spots.From this, in the nitrate nitrogen high density groundwater area in Kanagawa, it was revealed that it was supposed influence by the artificial manure at most spots.

Keywords: nitrate nitrogen, nitrogen isotope ratio

Japan Geoscience Union Meeting 2013
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Seasonal variation in nitrous oxide concentration of groundwater and its emission potential in agricultural watersheds

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Distribution characteristics and seasonal change of nitrous oxide (N2O) in an unconfined aquifer were examined, based on changes in concentrations of N2O, nitrate-nitrogen (NO3–N) and other chemical components in the groundwater flow of an agricultural catchment affected by significant fertilizer application. N2O concentrations were about 0.004 mgN L-1 in the upstream area, and were positively correlated with NO3–N concentrations. These results suggest that the nitrification process influences N2O concentrations in upstream areas. In the downstream area, N2O concentrations in deeper groundwater ($>$ 15 m) were significantly higher (0.013 mgN L-1), but they were very low in shallower groundwater ($<$ 15 m), below the detection limit. Spatial distributions of dissolved oxygen (DO) and dissolved organic carbon (DOC) suggest that shallower groundwater is characterized by a strong reducing condition and high organic carbon content compared to deeper groundwater. These results suggest that a complete denitrification process (NO3- to N2) occurs in shallower groundwater, whereas an incomplete denitrification process causes the increase of N2O concentrations found in deeper groundwater. N2O concentrations in winter were significantly high, but N2O concentrations in summer were low. Groundwater level in summer was higher than that in winter. These results suggest that groundwater level influences the denitrification process. N2O discharge from groundwater to sea water was 1.95kgN. The N2O discharge was 0.3% compared with the NO3–N discharge.

Keywords: nitrous oxide, groundwater, agricultural watersheds, nitrate, emission, seasonal variation

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Characteristics of nutrient condition and phytoplankton variation and its controlling factors in agricultural reservoirs

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[1]JSPS PD, CMES, Ehime Univ., [2]Grad. School of Hiroshima Univ.

Reservoirs and ponds have been used as important water resources in the agriculture area with little rain, and its importance will increase with the worldwide climate change. However, the lack of maintenance causes eutrophication and phytoplankton bloom, which often induces the problem such as clogging of irrigation line. For the sustainable use of agricultural reservoirs, it is important to clarify the trigger of eutrophication and control it based on the characteristics of reservoirs. We aimed to confirm the characteristics of nutrient condition and phytoplankton variation and its controlling factors in agricultural reservoir, nutrients and fluorescence data were collected and the relation with residence time was examined on the 6 ponds (P1˜P6) located on a small island intensively cultivated by citrus farms in western Japan.

Residence times of pond water were estimated to be from 7 to 2,348 days, which decreased about 1/3 from August to December in P1, P2 and P3. Nutrient condition in the pond water was totally in the significant N-rich and P-limited condition compared with the Redfield ratio in both summer and winter. The estimated budget of DIN, DIP and DSi suggests that the ponds acted as a sink of nutrients to the downstream environment throughout the year. Fluorescence was totally higher in the ponds with shorter residence time. It suggests the possibility of that cyanobacteria with relatively low chlorophyll content was dominant in the longer residence time ponds, while other phytoplankton such as diatom and green algae was dominant in the shorter residence time ponds in the study area. On the seasonal variation, residence time decreased while fluorescence increased in P1 and P2 from August to December. It suggests that the dominant species of primary producer changed from cyanobacteria to diatom from summer to winter. These results suggest that residence time is one of the critical factors for controlling the phytoplankton variation in the ponds.

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Evaluation of phosphorus species and their relationship to benthic microalgae in an estuarine tidal flat

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Estuarine tidal flat ecosystem plays a significant role in suppressing eutrophication of marginal seas through the uptake and accumulation by organisms comprising complex foodweb. Nitrogen and phosphorous are known to be major two elements that potentially cause eutrophication, although their behavior in tidal flat ecosystems are distinct. While nitrogen, one of the main nutrients input to intertidal flats, is supposed to be removed from there finally by denitrification, the other major nutrient, phosphorus stays in the subaqueous ecosystem, in various forms such as hydroxide, ions, and organic matters. So far, numbers of studies on phosphorus cycle in tidal flat have been operated. However, the quantitative analyses of contribution of benthic microalgae to the phosphorous cycles in tidal flat ecosystem have not yet been fully addressed.

In this study, we chose Fujimae tidal flat, Nagoya City, Central Japan, as research field and examined contribution of microalgae to the phosphorous cycles in the tidal flat ecosystems, by analyzing major and minor compositions of sediments, concentration of chlorophyll a and opaline silica, and numbers of diatoms on the surface and with the subsurface of sediments.

Bulk concentrations of phosphorous obtained by XRF analyses are positively correlated with biomass calculated from chlorophyll($r = 0.78$), suggesting that phosphorus is the limiting nutrient in this tidal flat. In addition, results of a sequential extraction of phosphorus show that iron-binding phosphorus accounted for more than 50 % on the sediment surface, and authigenic apatite and detrital apatite accounted for about 50 % at the 15 cm depth of the sediment. While insoluble phosphorus including benthic microalgae and terrigenous organic matter accounted for 3 % and 8 %, respectively.

Further observation and analysis will identify the relationship between phosphorus forms and benthic microalgae, and their response.

Keywords: phosphorus, estuarine tidal flat, benthic microalgae

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Evaluation of heavy metals pollution in sediment in the Nagara River Estuary Barrage region

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Heavy metals are the most common and serious pollutants in natural environment because of their toxicity, persistence and bioaccumulation problems. The excess occurrence of heavy metals in sediment can be attributed to either natural or anthropogenic sources. Heavy metals that released from these sources tend to be absorbed onto suspended particulate matters, furthermore, incorporated into bottom sediment as SPM precipitated. Sediment acts as carrier and source of heavy metals in aquatic environment, and reflects water quality.

The Nagara River had long been recognized as one of the cleanest rivers in Japan. However, in 1995, for the purposes of flood control and water use, the Estuary Barrage has been brought into operation, and the natural environment of the Nagara River has changed remarkably. So far, the studies carried out by numbers of researchers and communities which were mainly focused on downstream of the Estuary Barrage, and the upstream area was not studied that much. However, unpublished work by Hiramatu (2009) suggests that by the Barrage (the Nagara River Dam) and inflow of poorly treated sewage waters cause the environmental problems at its upstream area.

We collected systematically 70 sediment samples within a stretch of 30 km along the upstream of the Barrage, from 2009 to 2011, using Ekma-Birge Grab. Sediment samples were dried at 105 ?C for 24 hours and homogenized. These samples were fractionated using a series of sieving process according to needs of further analysis. The grain size distributions of sediment samples suggest that the fraction <180micrometer would be a reasonable choice for further analysis. Major components (SiO2, TiO2, Al2O3, Fe2O3, MgO, MnO, Na2O, K2O and P2O5) and minor components (Ba, Co, Cr, Cu, Nb, Ni, Pb, Rb, Sr, Th, Y, Zn, and Zr) were analyzed by X-ray fluorescence (XRF) spectrometer. FLASH 2000 organic elemental analyzer was employed to analyze the C, N, H, and S.

Compare to the upper stream, the content of finer fraction, and that of P2O5 and Ctotal in sediment increased at the Barrage area. Meantime, the high C/N ratios (C/N>10), suggest terrestrial organic matter likely to be responsible. The major compositions (SiO2, TiO2, Al2O3, Fe2O3, MnO, MgO, CaO, Na2O, K2O, P2O5) of the sediment are in a great agreement with the upper crustal average of Japan. Compared to the upper crustal average values of Japan (Togashi et al, 2000), these elements are enriched or depleted to various degrees; Co (x1.5-2.2), Cr (x0.3-2.1), Cu (x0.2-2.1), Ni (x0.5- 1.7), Pb (x0.9-3.6) and Zn (x1.5-4.2). The enrichment factors of heavy metals differ from site to site, and some samples are remarkably enriched in Zn and Pb. According to the location of these enriched sites, Sakai River, Sai River, and Kuwabara River, these three branches likely to be contributing to the enrichment of those two elements.

Keywords: Nagara River, sediment, heavy metals

Japan Geoscience Union Meeting 2013
(May 19-24 2013 at Makuhari, Chiba, Japan)

AHW30-P16 Room:Convention Hall Time:May 22 18:15-19:30

The effect of small impoundments on nutrient transport in a suburban watershed

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There are small impoundments on streams such like weir in the worldwide. In spite of large number of them, the effect of those on nutrients retentionis little understood. The objective of this study is to confirm effect of small impoundments on nutrient transport on a catchment scale. Seasonal variation of DN:Cl- ratio which indicates that the ratio increased in summer season and decreased in winter seasonwas confirmed at impoundments. The result of relationship between residence time and difference of concentration of nitrate indicates that greater decrease of nitrate confirmed when it has relatively long residence time. Especially, attenuation of nitrate would start from 2 days of residence time, which is shorter than days that large impoundment start from 8-10 days. Therefore, it is suggested that small impoundments are more effective for nitrate attenuation than large ones. In contrast, the relationship with difference of concentration of DN shows that there is a possibility that the large impoundment could be changed from sink to source. However, small impoundment is easy to maintain itself than large reservoir as dams, by dredging of sediment and removal of colonies of phytoplankton. For conservation of water environment in watersheds which are loaded anthropogenic nitrogen, the small impoundments should be used as places for purification of nitrogen in meaning of a kind of reservoir operation.

Keywords: small impoundment, residence time, nitrogen removal, Yamato River

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The comparative study of the water quality in Izu Islands

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1.Introduction

Understanding of the water environment in the islands is important for the use of water to people living in the island, the value of research in terms of understanding of the sub-regional water environment (islands).The target area, Izu islands are volcanic islands, which were created by volcanic activities. Their water environment can be considered as extra ordinary. There are various characteristics of the islands, but especially volcanic islands have high permeability of water, less permanent rivers and difficulties to contain fresh water (Shindo 1992etc.). In this study, I set Izu islamds, which were bult by volcanic activities and an isolated island, through the comparison of the findings, he explores the challenge to clarify the current status of the water environment in each island.

2.Target area

The islands were created by volcanic Submarine caldera volcano and both Izu Islands are composed of Izu Oshima people have lived since the Edo period large, Hachijo, Miyakejima, Niijima, Kozu-shima, Mikura, in the Toshima area in particular that Ru is Nanashima Izu, 287km, about most Honshu near Izu-Oshima is at a distance of about 25km from Hachijo Island's southernmost Izu Peninsula from Tokyo. Compared to the mainland, precipitation of the Izu islands, is much more, but it can not be said that the islands are blessed the freshwater environment except for the Mikura-Hachijo spring water rivers and constancy is a rich variety in order to obtain fresh water Efforts have been made (Shindo 1992).

3.Results and Discussion

As you can see in the water composition part, all through the islands, from the effects of sea-based rainwater environment of isolated island was great.

If you look at the key diagram, there's a variation in the vertical direction, from the fact that the point was strongly influenced by water type Na-Cl significant impact from the sea and the rain is coming in the upper right plots in other areas which can be mixed with groundwater that are relatively long residence time are ploted on the per-left and lower left. The Islands with Strong influence of rainfall are plotted to the right of the key diagram. In any islands, percentage of NaCl has a lot to do in the water composition, looking at the distribution of the diagram.

There's some densely populated areas, distributed in the water environment of Izu Islands, the remarkable human pollution can't be seen in the Islands, except for such areas. Natural effects such as annual precipitation, drought are considered as heavily involved.

4.Conclusion

This study, in the island that is seemingly similar conditions, shows a variety of water, we have found that there is a large difference. From now on, I continue pursuit field surveys and analysis, then clarify the current status and issues of the water environment of the islands.

Keywords: Volcano, Izu Islands, Precipitation, Dissection

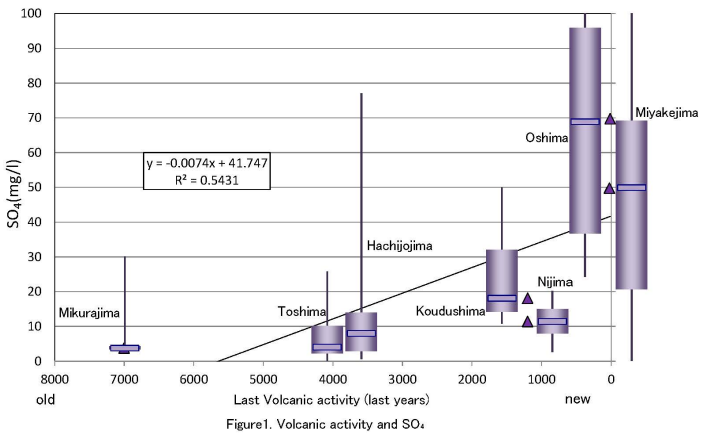

Figure1. Volcanic activity and SO_4

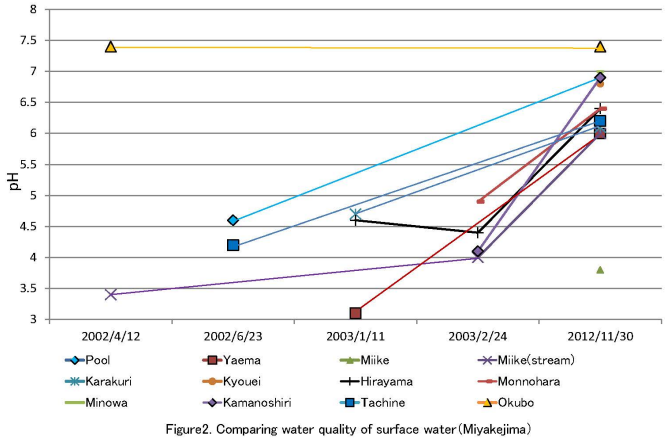

Figure2. Comparing water quality of surface water (Miyakejima)

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Variation characteristics of stream water quality in the Shiribetsu River basin

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1 Introduction

Shiribetsu river is known as a clear stream in Japan. It is a valley it has Mt.Yotei and the Niseko federation in the head of a river, and with abundant eminences. In the valley, it is a farm area in eminent Hokkaido, and there are a lot of use as the agricultural water. The Ministry of Land, Infrastructure and Transport is continuously doing the water quality observation. However, the water quality observation intended for the entire valley including the branch doesn't have the example. In this study,Shiribetsu river basin was observed, the point change in the river quality and the season change were clarified, and the understanding of the stream water quality change characteristic of the valley was tried in the present study.

2 Shiribetsu river basin

The Shiribetsu river is originated the source in deflection Gaku, and flows to the west aiming at the Sea of Japan. It is a class A river that flows into the Sea of Japan. They are 126km in the length , and 1,640 km2 in the valley area.

3 Research method

The stream water quality observation was done every other month in March, '3-2013 2-2012, and 63 points or less (fixed point 44) were investigated. The observation item is AT,WT,EC,pH,RpH flowing quantity.It analyzed IC,TC,TOC,and the ion chromatograph was analyzed (Na+,K+,Ca+2,Mg+2,Cl-,NO3-,SO42-),and it made to figure by GIS and it analyzed it.

4 Result and consideration

The water quality of the main stream showed the water quality of the Na-HCO3 type, and EC changed from the upstream to the downstream in 43-95microS/cm when diluting it with snowmeltwater. It is thought that it is because the amount of the base flow is large 51-126microS/cm in July that was the highest. It returns normally by the confluence of the branch though pHs rise temporarily up to 8.4 by manure in the middle reaches of the main stream part.

5 Summary

Geological features and the land use's analyzing hydrology characteristics from the main dissolved matter necessary, and influencing the river quality greatly became clear in the present study. It wants to calculate the loading dose in using small and each middle reaches region, and to tie to further clarification GIS of the water quality formation mechanism in the future.

Keywords: Shiribetu river basin, stream water quality, seasonal variation, spring, Mt.Yotei

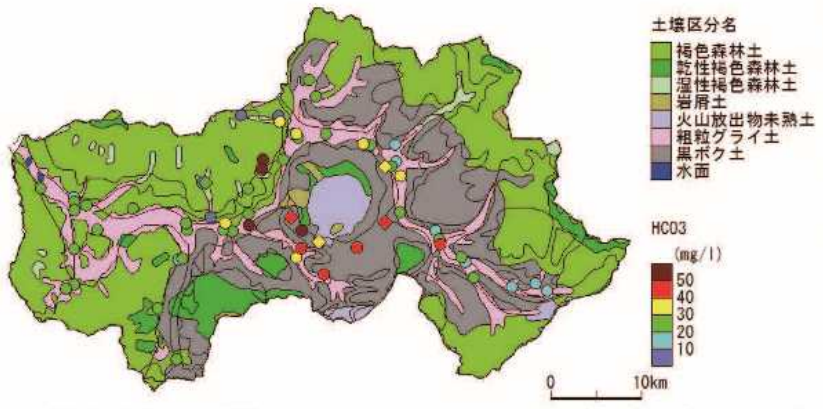

Fig. 1 Soils and HCO3 concentration on the stream water (september)

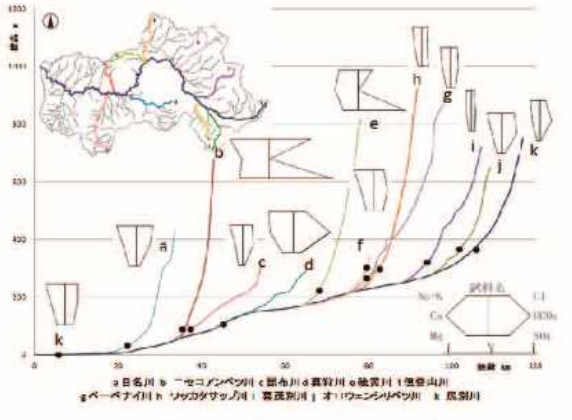

Fig.2 Longitudinal Profiles of the Rivers and water quality composition