HOME: A Modeling Framework for Integrating Eco-hydrological Models in the Heihe River Basin, China

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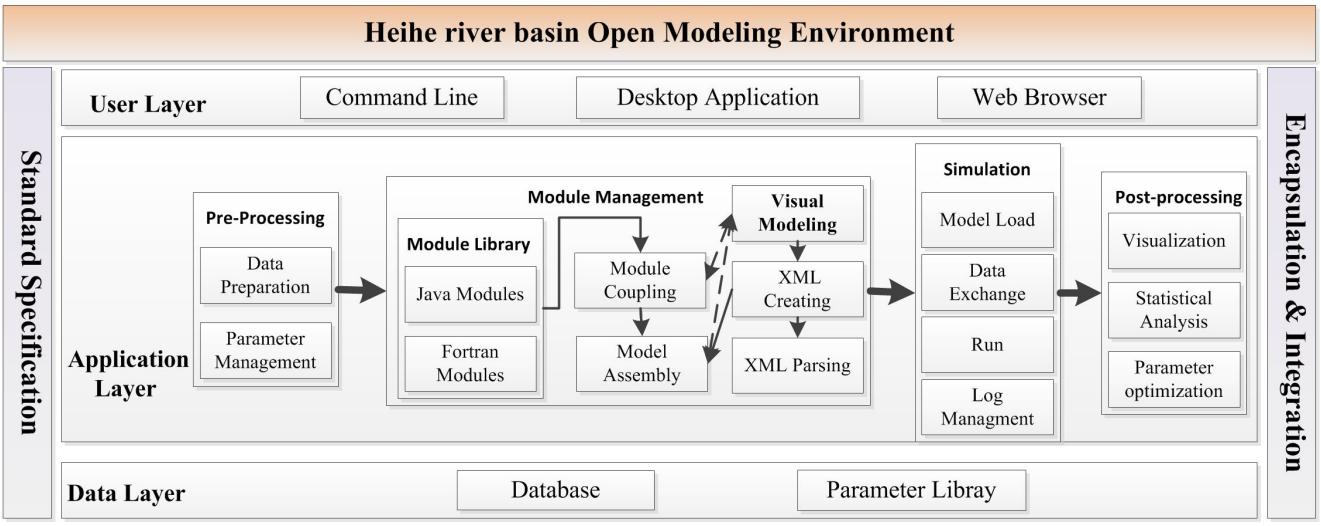
This study develops a modeling environment that can integrate a large number of eco-hydrological models and modules. The need to integrate the multiple eco-hydrological coupling models used in the Heihe River Basin (HRB) led to the development of the Heihe river basin Open Modeling Environment (HOME). The HOME enables us to answer questions about ecological and hydrological processes and about the water resources in the HRB. The HOME can also be used to integrate the models generated by other projects in the Heihe Major Research Plan of the Natural Science Foundation of China, and will provide researchers with user-friendly pre-process, simulation, post-process, and other convenient software tools. The HOME software has ten components: Module Builder, Context, Model Builder, Data Exchange, Runtime, Module Library, Database, Parameter Library, Toolkit, and GUI. A researcher can use the HOME GUI to construct a series of models; the software allows researchers to exchange variables between modules, and to place modules with different spatial and temporal scales in different contexts. Once the variables are selected, the organizational model can be run in the command line interface and the GUI environment of HOME. In our case study, HOME was used to integrate surface and underground water models and to optimize the models' parameters.

Keywords: Integration platform, Modeling framework, Heihe river basin, Eco-hydrology model, Heihe Plan



The ecohydrological effects of dew in a desert environment,northwestern China

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Dew, as a supplementary water source, may have an important ecological role in arid and semi-arid regions. During August and September of 2007, 2008 and 2013, measurements on dew formation amount and duration were carried out in three different habitats (dunetop, footslope and interdune lowland) of a fixed sand dune in Northwest China. The results indicated that there was a positive correlation between dew amounts and relative humidity, but a negative correlation between dew amounts and mean temperature. Clear mornings were characterized by higher dew amounts and longer dew duration, whereas less dew was recorded during cloudy and especially windy mornings. Dew continued to condense even after sunrise, although a shorter warming time after dawn is also of vital importance in dew formation. The higher average maximum dew quantities (0.06 mm) and longer average dew duration (2.3 h) occurred in the interdune lowland; the lower and shorter average dew amounts (0.048 mm) and duration (1.9 h) were obtained at the dune top. The footslope habitat exhibited intermediate values. Clearly, the differences in dew deposition can be partially attributed to the distinguishing characteristics of the microhabitats. The present study highlighted the impacts of these characteristics on near-ground dew condensation accumulation and evaporation in a fixed sand dune, and may facilitate evaluation of the role of dew in arid and semi-arid environments. In addition, the ecological implications of dew as a water resource in the desert ecosystem cannot be neglected. Dew may improve survival rate of desert plant species and reduce plant transpiration rates, as well as to help in priming the seeds of annual desert plant species during dry seasons.

Keywords: Dew amounts, Dew duration, The ecohydrological significance

Evaluate the spatial and temporal variation of N_2O and associated flux into the air

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In order to evaluate the spatial and temporal variation of N_2O and associated flux into the air in a granite unconfined aquifer of Ikuchi Island, water samples were collected from 9 observation wells with different depths and 6 observation wells in the groundwater discharge area from 2013 to 2015 and analyzed for N_2O, NO_3^--N and Cl^-. The results showed that the concentrations of dissolved N_2O changed with water depth, which can be attributed to the C/N ratio. When the C/N ratio ≤5, high concentrations of dissolved N_2O occur. In addition, the N_2O concentrations increased with the redox condition of water changes from oxidation to reductive. However, when water was in strong reductive conditions such as ORP ≤-200mV, the relative low concentrations of N_2O took place, since N_2O can change into N_2 due to the complete denitrification. Dissolved N_2O concentrations also increased in dry seasons, when most of observation wells being in a reductive state. In the groundwater discharge area, dissolved N_2O and NO_3^--N concentrations decreased along the groundwater flow pathway, which results from the dilution of seawater and denitrification. The flux of N_2O into air was estimated to be 49$gha^{-1}year^{-1}$, the same level as seawater emission rate. Whereas, in a high precipitation event(precipitation ≤30mm/day), 5$gha^{-1}day^{-1}$ (about 10 percent of annual N_2O emission) would emission into air.

Characteristics of the chemical composition of the spring water and groundwater in the volcanic rock areas

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In basaltic, andesitic, rhyolitic volcano, geological conditions was studied with the effect of the water quality of the spring water and groundwater. We collected 89 water samples from Izu Oshima, Mt.Fuji, Hawaii Island, Kouzushima and Yatsugatake. Total 89 water samples were analyzed for cations and anions using Ion Chromatography and Inductively Coupled Plasma Atomic Emission Spectroscopy.

As a result, the spring water and groundwater of basaltic volcano tend to have high content of Mg^{2+} depend on the chemical composition of the rocks. Also, the spring water and groundwater of rhyolitic volcano was found that it has low content of Mg^{2+} as compared to Na^{+} and Ca^{2+}.

In general, the spring water and groundwater in the island can be seen cations composition similar to seawater. High Ca^{2+} content, compared to seawater Ca^{2+}/ Na^{+} can be explained by the extraction of the cation of the rocks. On the other hand, the water quality of the spring water and groundwater of land volcano such as Mt.Fuji and Yatsugatake has less influence from sea salt particles. Therefore, it is considered that the influence of the rock is more significant in Mt.Fuji and Yatsugatake.

Keywords: spring water, groundwater, basaltic volcano, rhyolitic volcano, andesitic volcano

Identification of crop type distribution using remote sensed data and its application for crop water requirement

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Water security is a major concern in the Kathmandu, capital city of Nepal and its surrounding valley area, due to increased water demand caused by rapid growth of population and urbanization. The situation of water scarcity become more serious in recent years through overuse of water resources and aggravated by water pollution. For the sustainable use of water resources, it is necessary to clarify the balance of water demand, supply and availability in the valley based on scientific data analysis. However, data for the water balance analysis is not well organized and provided for water managers. For example, the spatial and temporal variation of agricultural water use is not well understood even though agriculture is one of the major water sectors and larger amount of water is used in the cropland for maintain agricultural production.
The objective of this study is to estimate the spatial and temporal distribution of crop water requirements (CWR) in Kathmandu valley. Due to the limitation of data for calculating agricultural water use (crop type, crop calendar, etc.), integrated analysis of satellite observations and field observed data, agricultural census data and numerical model is carried for mapping of CWR.
Crop map is produced using time-series of satellite derived vegetation index (Normalized Vegetation Index : NDVI derived from Moderate Resolution Imaging Spectroradiometer : MODIS) and field survey of cropping pattern at some reference sites in the valley. This crop map provides spatial pattern of crop type, duration of growing season, and the time of planting/harvesting in the valley. The census data of cropland area provided by Central Bureau of Statistics, Nepal is used for correction of satellite-derived map of cropland extent.
CWR for each crop types are estimated using CROPWAT model developed by the Land and Water Development Division of FAO. CROPWAT is tool for calculation of crop water requirements and irrigation requirements using soil, climate and crop data.
Then, spatial distribution of CWR and its seasonal variation in Kathmandu valley are provided based on combined use of crop map with CROPWAT model. In addition, balance of precipitation and CWR is also investigated using estimated CWR and gauge-corrected high resolution satellite precipitation product (PERSIANN-CCS). The hotspots of agricultural water stress, the area of higher CWR compared with precipitation, are identified through this water balance analysis. Furthermore, the seasonal change of water balance in whole Kathmandu valley is also investigate, and it is found that irrigation water supply is necessary to fulfil CWR for these hotspots, especially in the late fall season.

Keywords: Normalized Difference Vegetation Index(NDVI), CROPWAT, crop water requirement(CWR)

Predicting future uncertainty constraints on global warming projections

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Projections of global mean temperature changes (d*T*) in the future are associated with intrinsic uncertainties. Much climate policy discourse has been guided by “current knowledge” of the d*T*s uncertainty, ignoring the likely future reductions of the uncertainty, because a mechanism for predicting these reductions is lacking. By using simulations of Global Climate Models from the Coupled Model Intercomparison Project Phase 5 ensemble as pseudo past and future observations, we estimate how fast and in what way the uncertainties of d*T* can decline when the current observation network of surface air temperature is maintained. At least in the world of pseudo observations under the Representative Concentration Pathways (RCPs), we can drastically reduce more than 50% of the d*T*s uncertainty in the 2040s by 2029, and more than 60% of the d*T*s uncertainty in the 2090s by 2049. Under the highest forcing scenario of RCPs, we can predict the true timing of passing the 2°C (3°C) warming threshold 20 (30) years in advance with errors less than 10 years. These results demonstrate potential for sequential decision-making strategies to take advantage of future progress in understanding of anthropogenic climate change.

Keywords: climate change, climate change projection

Relative role of meso-alpha scale disturbance over Japan Sea on the rapid-developed low pressure near of Japan in winter

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In this study, we focus on the effect of meso-alpha scale disturbances (MD) on Japan-Sea Convergence Zone (JPCZ), on the rapid-developed low pressure near of Japan in boreal winter. We used for data analysis JRA-55 and MSM by JMA. To detect low system, automatic detection algorithm was applied using sea-level pressure element in JRA55. In addition, relative vorticity at 900 hPa data was used for the detection of MD. We checked strong lower-level easterly wind from warm front to Japan Sea to supply water vapor. We also conducted composite analysis with or without MD. By composite analysis, we confirmed again low-level easterly with water vapor, low system lost 23% water vapor by the presence of MD. On the other hand, it is not clear the significant difference in deepen rate of low w/wo MD. We also try to isolate by additional indicators (w MD: Q2, wo MD: precipitable water), then we can explain the effect of MD on deepen rate of low system.

Keywords: low pressure near of Japan in Winter , meso-scale disturbance, water vapor

Land use / land cover changes and its effect on flow regime in Vietnam's Dong Nai upstream river basin

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Land use and land cover change (LUCC) is one of the major drivers for flow regime alteration. Evaluating the impacts of them on the flow regime has been a subject of ongoing research widely conducted in different countries in the world (e. g. Bewket and Sterk, 2005; Costa et. al., 2003; Dao et. al. 2014; Kashaigili, 2008, Kashaigili and Majaliwa, 2013; Li et. al., 2009; Mou et. al., 2015; Nie et. al., 2011). In Vietnam, studies on hydrological alterations have been receiving much more attention since 2009, due to the increased awareness after "the climate change and sea level rise scenarios for Vietnam" has been issued. However regional scale environment assessment studies especially on the hydrology in Vietnam are still limited. The Dong Nai river basin, the second largest catchment in Vietnam located at the country's key economic development region, account for 23% of Viet Nam's GDP (ADB, 2009). This water resource is one of the important elements to ensure the region is developed sustainably. The purpose of this study is to evaluate LUCC and its effects on the flow regime of Dong Nai upstream river basin tropical basin by using the resutls of flow-duration curves analysis.

Results from land cover classification of Landsat images of years 1973, 1989, 1994, 2005 and 2014 indicated that forest area has decreased significantly in the period 1994-2005 due to land conversion for agriculture. The proportion of forest area and agricultural land is 73.05% and 23.52% in 1994, 51.60% and 40% in 2005, 44.64% and 50.46% in 2014. Furthermore by the comparison of annual maximum NDVI value during first 15 days of January in whole area, we found that land cover change occurred since the year 1998 leading to the vegetation area was sharply reduced in 1999. In additional, vegetation recovered from 2000 to 2003 before reduced again since 2004.

In this study the Tri An reservoir (basin outlet) and the Da Nhim reservoir (this subbasin area is 154 km^2) inflow were used as the stream flows data (1993 to 2009, daily) to analyzed the changes in plentiful - ordinary - low - scanty runoff and flow-duration curves. At the Da Nhim point, we saw the sudden increasing in all of plenty - ordinary - low - scanty runoffs at 1999 and the decreasing trend after that. While at the basin outlet, Tri An dam only scanty runoff did not show the similar tendency. Correspond to vegetation change, the maximum flow increased in 1999, decreased after and increased again in 2006.

Using the spatial and temporal scales sattelite data, Landsat and GIMMS-NDVI, the relationship of LUCC and flow regime in the humid tropical Dong Nai river basin was clarified. The large-scale of LUCC lead to an increase in maximumm flow and ordinary - low runoffs.

Keywords: Dong Nai river basin, LUCC, flow regime, flow-duration curve

Sources of deep saline groundwater in the Osaka Basin

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Osaka Plain is on a sedimentary basin >1500m deep, which is one of the large reservoirs of groundwater in Japan. In the deepest part of the basin, saline groundwaters, of which the highest chloride concentration is >15000mg/L , have been reported (e.g., Kajikawa, 2004; Nakaya et al., 2009). Source of the saline waters has not been clearly understood. In this study, groundwaters sampled from the Osaka basin and its surroundings were analyzed for chemical components and isotope compositions of water oxygen and hydrogen and dissolved boron to specify the origins of saline groundwater.

Based on the 3D mapping, highly saline groundwaters distributed in and just above the basement rocks of the Osaka Basin. Also, groundwaters containing >100mg/L Cl^- distributed along Arima-Takatsuki tectonic line, beneath Uemachi plateau and at the foot of Izumi mountains. Low chloride (<100mg/L) groundwaters ranged within δD: -60‰~-45‰ and $\delta^{18}O$: -9‰~-6‰, and the isotope ratios were plotted on the global meteoric water line (Craig, 1961). While, those isotopic characteristics of groundwaters with >100mg/L Cl gave two different trends from the global meteoric water line; one was on the area between the mixing lines of seawater and local meteoric waters, and the other was on the trend similar to the so called Arima brine, which gave the oxygen isotope shift. These characteristics were clearer for the relationships between chloride concentration and hydrogen isotope ratios, i.e., the latter ones have lower δD (-60‰~-40‰) than those of mixing water of seawater and local meteoric water. Except one from the southern area (Ishibotoke), which have been defined as Arima-type brine, the saline groundwaters with >1000mg/L Cl^- similar to the Arima brine did not show high-temperature water-rock interaction judged from low Li/Na ratio and boron isotope ratios, which showed the mixing of seawater. However, some of saline groundwaters plotted on the mixing area between seawater and local meteoric waters, especially from the basement granitic rocks experienced water-rock interaction at high temperature. Thus, the most of saline groundwaters in the deepest part of Osaka Basin would be originated from seawater, and had different evolution processes to obtain the unique chemistries.

Keywords: saline water, isotope, Osaka

Water Environment and Human Environment. (For example 2011 TOHOKU Great Earthquake)

*Masaru Nishizawa[1]

1.none

Abstract
1. The structures were destroyed by earthquake and tsunami. The upshot is that was destroyed heart and body.
2. The children (The young) is a future treasure.
3. The politician and government official does not handle the administration for the good of the notion. They give oneself airs because of one’s official position.
4. Mankind is now in damage of total destruction.
5. I build much my hopes on the academic congress.

Analytical Possibilities of X-Ray Fluorescence Spectrometer (XRF) for Trace Metals Determination in Soil by Using Reference Standard

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Abstract
Certified standard reference soils were used in this study for investigating the accuracy, precision and repeatability of the XRF method for metals determination in soil in comparison with the traditional analytical methods.
Major and trace elements in soil cannot be measured simultaneously by using any conventional analytical techniques including atomic absorption spectroscopy (AAS), inductively coupled plasma mass spectrometer (ICP-MS) because for matrix effect. Compared with traditional methods, XRF has some potential advantages for soil heavy metal analysis, it is nondestructive with rapid throughout, simple sample preparation and cost savings mater, avoiding acid digestion is appropriate for field screening for most metals. The objectives of this study were to determine the detection limits, accuracy of analytical data and efficiency of a XRF by using soil standard in comparison with the traditional analytical methods, AAS and ICP-MS in determining of major and trace elements simultaneously of contaminated soils.

Keywords: Soil Standard, ICP-MS, XRF, Matrix Effect, Trace Metals

