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2014. No.1

Maanan, Mehdi; Ruiz-Fernandez, Ana Carolina ; Maanan, Mohamed ; Fattal, Paul ; Zourarah, Bendahhou; Sahabi, Mohamed. 2014, A long-term record of land use change impacts on sediments in Oualidia lagoon, Morocco. International Journal of Sediment Research, Vol. 29, No. 1, pp. 1-10.

Abstract: An integrated approach, involving land use patterns and heavy metal contents of the surficial and coped sediment, was proposed to detect the characteristic spatial and temporal scale of point and non-point source human disturbances on the Oualidia lagoon in Morocco. Identification and description of the temporal and spatial distributions of the main contamination sources of heavy metals are analyzed using statisfics and GIS methods. The results show that surficial sediments are highly enriched in heavy metals compared to their preindustrial background levels. Land-use types affected lagoon sediment pollution in different ways: 1) agricultural areas bast the highest potential for sediment contamination by heavy-metals, particularly Pb, Cu and Hg, 2) Ni and Cr are the main pollutants originating from urban sewage and 3) oyster farming and traditional:land uses such as salt flats, pastures showed low levels of others metals. The enrichment factors (normalized by Al) obtained from the sediment cores indicated that the lagoon is (strongly/moderately) polluted by all metals which were attributed to agricultural activities and wastewater discharges from urbanized areas.

Veerasingam, Subramanian; Venkatachalapathy, Ramdoss; Ramkumar, Thirunavukkarasu. 2014, Distribution of clay minerals in marine sediments off Chennai, Bay of Bengal, India: Indicators of sediment sources and transport processes. International Journal of Sediment Research, Vol. 29, No. 1, pp.11-23.

Abstract: Clay mineralogy, texture size and statistical analyses were carried out on surface sediments from the continental shelf of Chennai, Bay of Bengal, India. The purpose of this study is to characterize the clay mineral distribution and its relation to the hydrodynamics off Chennai to identify the sources and transport pathways of the marine sediments. Characterization of clay minerals in coastal sediments by Fourier Transform Infrared (FTIR) spectroscopy has provided the association of quartz, feldspar, kaolinite, chlorite, illite and iron oxides (magnetite and hematite) derived from river catchments and coastal erosion. Kaolinite, chlorite, illite, iron oxides, and organic matter are the dominant minerals in Cooum, and Adayar region. High quartz and feldspar zones were identified in Marina, which are being confined the sand zone and paralleling the coast. The strong relationships among the wave energy density, sand, quartz and carbonate revealed that wave induced littoral drift system play a dominant role in transportation and deposition of sediments in the Chennai coast. The sediment texture and minerals data are in agreement well with the previous results of hydrodynamics and littoral drift models in this region. Multivariate statistical analyses (correlation, cluster and factor analyses) were carried out and obtained results suggested that clay minerals and organic matter are trapped in silt and clay particles, whereas quartz, feldspar and carbonate are associated with sand particles. Results of sediment sources and transport processes from this study will be useful to predict the fate of the pollutants released from land or the potential change in sediment delivery to coastal areas.

Yu, Bang-yi ; Wu, Peng ; Sui, Jue-yi ; Yang, Xing-ju; Ni, Jin. 2014, Fluvial geomorphology of the Middle Reach of the Huai River. International Journal of Sediment Research, Vol. 29, No. 1, pp. 24–33.

Abstract: The Middle Reach of the Huai River (MRHR) flows northeast into the Hongzehu Lake.

Before entering the Hongzehu Lake, the Huai River has a braided channel which is shallow and wide, and the riverbed has a negative slope. Based on the characteristics of the MRHR, this river reach can be divided into the following sections: a quasi-straight (or mildly curved) section, a bend section, and a braided section. The majority of the MRHR is quasi-straight. In this paper, several parameters are used to assess the geomorphology of the MRHR. Statistical analyses are performed to establish a relationship between the span length "L" and channel width "B" for different channel patterns. The relationship between the meandering length "S" and bankfull channel width "B" is also derived. Results indicate that the bankfull channel width "B", the bankfull cross sectional area "A" and the average flow depth "H" are mainly dependent on the dominant discharge in the channel. A relationship is derived that describes the dependency of the curvature radius "R" on the dominant discharge "Q", water surface slope "J" and the turning angle "alpha".

Andredaki, M.; Georgoulas, A.; Hrissanthou, V.; Kotsovinos, N. 2014, Assessment of reservoir sedimentation effect on coastal erosion in the case of Nestos River, Greece. International Journal of Sediment Research, Vol. 29, No. 1, pp.34-48.

Abstract: Coastal erosion that is generated by the reduction of the annual sediment yield at river outlets, due to the construction of reservoirs, constitutes one of the main environmental problems in many parts of the world. Nestos is one of the most important boundary rivers, flowing through Bulgaria and Greece, characterized by its great biodiversity. In the Greek part of the river, two reservoirs, the Thisavros Reservoir and the Platanovrysi Reservoir, have already been constructed and started operating in 1997 and 1999, respectively. The present paper constitutes the first attempt where the assessment of reservoir sedimentation effect on the coastal erosion for the case of the Nestos River delta and the adjacent shorelines is addressed in detail, through mathematical modeling, modern remote sensing techniques and field surveying. It is found that the construction and operation of the considered reservoirs have caused a dramatic decrease (about 83%) in the sediments supplied directly to the basin outlet and indirectly to the neighbouring coast and that this fact has almost inversed the erosion/accretion balance in the deltaic as well as the adjacent shorelines. Before the construction of the reservoirs, accretion predominated erosion by 25.36%, while just within five years after the construction of the reservoirs, erosion predominates accretion by 21.26%.

Ji, Sheng-cheng; Ouahsine, Abdellatif ; Smaoui, Hassan; Sergent, Philippe. 2014, 3D Modeling of sediment movement by ships-generated wakes in confined shipping channel. International Journal of Sediment Research, Vol. 29, No. 1, pp.49-58.

Abstract: Ship-generated waves and return currents are capable of re-suspending significant quantities of,bottom and bank sediments. However, most of the previous studies done on the subject do not show how and where sediment is re-suspended by the wakes and the directions of net transport. In this paper, a 3D numerical model based on hydro-sedimentary coupling is presented to search the relationship between the sediment movement, and the pattern of ship-generated waves around and far away from the vessel and the return currents around the ships. The hydrodynamic model is based on 3D Navier-Stokes equations including the standard k-epsilon model for turbulence processes, and the sediment transport model is based on a 3D equation for the re-suspended sediment transport. The computation results show that the areas of sediment concentration and transport (whether by resuspension or by the bedload) depend mainly on the position, the speed of the ship in the waterways, the kinematics of ship-generated waves and on the return flows. Thus, a map of sediment distribution and the modes of sediment transport

generated by the passage of the ship are presented.

Sibaja-Cordero, Jeffrey A.; Troncoso, Jesus S.; Gomez-Ramirez, Eddy. 2014, Recent surface marine sediments of Cocos Island in Costa Rica. International Journal of Sediment Research, Vol. 29, No. 1, pp.59-72.

Abstract: Subtidal sediments of Isla del Coco (Cocos Island), Costa Rica were described in their grain size, sorting, organic matter, and carbonates from 27 dredge samples (3-75 m), collected in April 2010. The organic matter range between 1.37-3.31% and carbonates presented a mean of 74+17%. The sorting was moderately or poorly. The grain size ranged between 0.1-1.1mm. The pattern is that sediment change from inner to mouth of bays. Carbonates and gravel fractions increased offshore and organic matter have high values inner the bays. Input of vegetal debris and mud was from the rivers of this island covered with rain and cloud forest.

Yang, Hong-juan; Wei, Fang-qiang ; Hu, Kai-heng; Wang, Chuan-chang. 2014, Determination of the suspension competence of debris flows based on particle size analysis. International Journal of Sediment Research, Vol. 29, No. 1, pp.73-81.

Abstract: The determination of the critical particle size between solid and fluid phases, i.e., the suspension competence, is fundamental for debris flow. A method for determining suspension competence based on particle size analysis is presented in this paper. Suspension competence of static experimental water-debris mixtures prepared with the sediment of Jiangjia Gully is 0.025 mm if the bulk density is less than 1,800 kg m-3 and it increases with bulk density of more concentrated mixtures. Suspension competence of natural debris flows in Jiangjia Gully increases exponentially with the bulk density. These two data sets are compared in order to understand the suspension mechanism It is concluded that turbulence may play a leading role in particle suspension in non-viscous and sub-viscous debris flows, while in viscous debris flows both matrix strength and excess pore water pressure play important roles.

Zhao, Zhen-yu; Guo, Yan-ru; Wang, Yan; Liu, Hong; Zhang, Qing. 2014, Growth patterns and dynamics of mud cracks at different diagenetic stages and its geological significance. International Journal of Sediment Research, Vol. 29, No. 1, pp.82-98.

Abstract: This paper discusses the growth stages, spatial structures, quantitative fitting relationships among various parameters, growth patterns and influencing factors of mud cracks by field survey, core observation and SEM analysis. The study shows that: (1) Mud crack growth can go through three stages, i.e. the syndiagenetic stage, the burial diagenetic stage (including early diagenetic stage, middle-late diagenetic stage) and the epidiagenetic stage. (2) Quantitative fitting relationships among various parameters allow a great significance to describe the spatial structure, the regional distribution and the growth environment of mud cracks. (3) Mud crack growth has three models, such as the unilateral growth model including the linear growth pattern, the curvilinear growth pattern and the bifurcation growth pattern, the multilateral growth model including the intersectional growth pattern, the join growth pattern and the dispersed growth pattern, and the mixed growth model including the combination of any patterns listed above. (4) Modern mud crack growth usually undergoes four stages. Sand beds in sand-mud rhythmic strata can play a lubricative role on crack growth and provide enough sandy deposits for filling cracks. (5) Mud crack growth usually produces bifurcation and bifurcation angles which are mostly 1200

or 90 that are related to sediment heterogeneity and released energy. (6) Factors affecting mud crack growth cover many aspects: clay content and salinity can control the number of mud cracks in different areas; terrain can control mud crack morphology; and different sedimentary cycles can control the growth riatterns and filling models of mud cracks.

Prizomwala, S.P.; Bhatt, Nilesh; Basavaiah, N. 2014, Provenance discrimination and Source-to-Sink studies from a dryland fluvial regime: An example from Kachchh, western India. International Journal of Sediment Research, Vol. 29, No. 1, pp.99-109.

Abstract: Tracing the sediment delivery from fts source terrain to its ultimate sink envisage multiple factors that play a vital role in understanding present day erosional engine. To accomplish this, it is significant to distinguish the variable end-members contributing to the basin. The findings from the study of dryland coastal fluvial regime in Kachchh (Western India), which is one of the end members contributing to the Gulf of Kachchh coast (partial sink) and filially to the Arabian Sea (ultimate sink) have been presented here. Multi-proxy sediment provenance proxies such as grain-size, clay minerals, geochemistry and magnetic minerals have been employed to evaluate the provenance discriminating characteristics of the Kachchh dryland fluvial system and factors influencing them. The results of different proxies indicate that the provenance signatures of uplands are quite characteristic with magnetic susceptibility (x) values of <20 x 10-7 m3 kg-1 and smectite (S)/kaolinite (K) ratio between 0.26 and 0.49. The middle reaches show marked increase in magnetic mineral concentration with x values (140 x 10-7 1113 kg) and S/K ratio (4.92), while the estuarine tract shows x values (80 X 10-7m3 kg-1), S/K ratio (1.90) and, characteristic heavy minerals (i.e. mica minerals), probably reflect the interplay between land and sea oscillations. Major sources of sediments within catchment scale were identified, viz., upland sedimentary rocks (Juran and Bhuj Formation sandstone-shale) and middle reaches volcanic (Deccan Trap Formation basalt) rocks. The present study draw cautions in provenance of sediment discrimination in areas influenced by Deccan basalt that has the overwhelming sediment delivery and a comparatively subdued effects of other provenance signatures. The studied proxies of mineralogy of clays, magnetic minerals and geochemistry of heavy and major elements serve as the potential for fmgerprint of sediment source regions and hence behold a strong position in source to sink studies globally.

Harb, Gabriele; Haun, Stefan ; Schneider, Josef; Olsen, Nils Reidar B. 2014, Numerical analysis of synthetic granulate deposition in a physical model study. International Journal of Sediment Research, Vol. 29, No. 1, pp.110-117.

Abstract: The current study focuses on the application of a three-dimensional numerical model for the prediction of morphological bed changes. The sediment deposition in a reservoir during a 10-year-flood was investigated and the results of the simulation were validated with data derived from a physical model study. Because of the small grain sizes in the prototype, synthetic granulate was used in the physical model. The numerical computation domain was a reproduction of the physical model, including the grain sizes and thd density of the particles, in order to ensure comparability. The CFD code SSIIM, which solves the RANS-equations in three-dimensions, was used for the simulations. The sediment transport in SSIIM is divided into suspended sediment transport, computed by solving the convection-diffusion equation, and bed-load transport, calculated by an empirical formula. The results of the numerical simulation correspond well to the

results of the physical model study. The simulated location and the pattern of the sediment deposition in the reservoir are an accurate representation of the observed distribution in the physical model.

Parsakhoo, Aidin; Lotfalian, Majid; Kavian, Ataollah; Hosseini, Seyed Ataollah. 2014, Prediction of the soil erosion in a forest and sediment yield from road network through GIS and SEDMODL. International Journal of Sediment Research, Vol. 29, No. 1, pp.118-125.

Abstract: This study was conducted to classify water erosion risk for a deciduous forest and to predict the amount of sediment yield from forest road network. GIS in combination with AHP was used for determining the soil erosion risk degrees of forest. Beside, sediment yield from forest roads with gravel and asphalted surfacing was estimated using SEDMODL. Rainfall simulator was used in calibration and validation process of model. Results showed that 47.9% of forest soil is classified from moderate to very high vulnerability. 32.3% of roads were located in soil erosion risk class of very high. This class is generally found in the eastern region of forest, while areas with very low risk are found in the south western part. 14.6% of the forest roads were ranked as having very low sediment yield. Only 61 segments out of 339 segments of forest road network delivered sediment to the ravine network. The estimated annual sediment yield for all of road sections by SEDMODL and rainfall simulator were 10,935.45 and 10,509.29 g m(-2), respectively. Results of the calibration and validation process showed that the variation accounted for in the predicted values by SEDMODL with the observed values under rainfall simulation was 3.90%. Best management practices (BMP) must be considered for the areas with high degrees of erosion risk.

Wang, Wen C.; Dawdy, David R. 2014, Flow resistance of gravel bed channels. International Journal of Sediment Research, Vol. 29, No. 1, pp.126-132.

Abstract: Existing resistance formulas produce a wide range of friction-factor estimates for gravel bed streams. The purpose of this paper is to develop a reliable resistance formula in terms of the Darcy-Weisbach friction factor I Published data were screened and used to establish the formula. The existing formulas have considered that f is a function of relative roughness D-84/R only, where R is the hydraulic radius and D-84 is the particle size referred to the intermediate diameter that equals or exceeds that of 84 percent of bed sediments. In this paper, f is considered as a function of Froude number in addition to the relative roughness. f for D-84/R>1 displays a different trend than that for D-84/R<1 perhaps due to the invalid assumption of a logarithmic velocity distribution for D-84/R>1. Anf formula for D-84/R<1 has been established.

2014. No.2

Haimann, Marlene; Liedermann, Marcel; Lalk, Petra; Habersack, Helmut. 2014, An integrated suspended sediment transport monitoring and analysis concept. International Journal of Sediment Research, Vol. 29, No. 2, pp. 135-148.

Abstract: A new integrated suspended sediment monitoring strategy applying direct and indirect technologies is presented. Optical sensors continuously record the turbidity at one point in the channel cross section close to the river bank and are calibrated by water samples taken close to the sensor. Additionally measurements are performed to establish the distribution of suspended sediment in a cross section (bottle samples combined with acoustic devices). Using correction

factors (probe and cross-sectional factor) these monitoring methods are combined and it is, thus, possible to fully document the temporal and spatial variability of the suspended sediment transport and to estimate the suspended sediment load for certain time periods. This monitoring strategy was implemented at various measurement sites in Austria as well as at the Hainburg Road Bridge site on the Danube River. It has already been successfully applied for three years at this measurement site and suspended sediment loads during high discharges up to a 15 year flood event have been monitored. To evaluate the new monitoring methods the results were compared with load estimation methods found in the literature including averaging and ratio estimators as well as rating curves. The results prove that with the new methodology, the temporal variability of the suspended sediment transport can be detected more accurately compared with the other methods. They also demonstrate that the additional consideration of the spatial distribution of the suspended sediment concentration in the cross section is crucial as the mean concentration in the cross section can significantly exceed the concentration near the banks, especially at large rivers like the Danube River.

Shi, Xian-Zhong; Aspandiar, Mehrooz; Oldmeadow, David. 2014, Reflectance spectral characterization and mineralogy of acid sulphate soil in subsurface using hyperspectral data. International Journal of Sediment Research, Vol. 29, No. 2, pp. 149-158.

Abstract: Acid sulphate soil (ASS) is a kind of soil which is harmful to the environment. ASS is hard to efficiently assess efficiently in the subsurface, although it is detectable on the surface by remote sensing. This paper aims to explore a new way to rapidly assess ASS in the subsurface by introducing a proximal hyperspectral instrument, namely the Hylogger (TM) system which can rapidly scan soil cores and provide high resolution hyperspectral data. Some minerals in ASS, which usually act as indicators of the severity of ASS, such as iron oxides, hydroxides, and sulphates, as well as some clay minerals, such as kaolinite, have diagnostic spectral absorption features in the reflectance spectral range (400-2500 nm). Soil cores were collected from a study area and hyperspectral data were acquired by Hylogger (TM) scanning. The main minerals related to ASS were characterized spectrally, and were subsequently identified and mapped in the soil cores based on their reflectance spectral characteristics. Traditional X-ray diffraction (XRD) and scanning electron microscope (SEM) were also applied to verify the results of the mineral identification. The main results of this study include the spectral characterisation of ASS and its main compositional minerals, as well as the distribution of these relevant minerals in different depth of cores.

Ghadimi, Feridon. 2014, Assessment of the sources of chemical elements in sediment from Arak Mighan Lake. International Journal of Sediment Research, Vol. 29, No. 2, pp. 159-170.

Abstract: Five sediment zones (20 samples) were collected in Mighan Lake, near Arak city in Markazi province, and were analyzed to reveal element sources and assess the quality of metal contamination. Both anthropogenic and natural origins were identified by correlation, factor, and cluster analyse. According to the enrichment factors (EF) of trace metals (Ba, Co, Cr, Cu, Ni, Pb, Rb, Sr, Zr, and Zn), three groups were identified. Enriched trace elements included: Ni, Zn, and Sr. Comparisons with contamination degree and benchmark sediment quality criteria and guidelines showed that Mighan Lake has potential for adverse effects on aquatic biota because of Ni, Zn, and Cr.

Pu, Jaan Hui; Hussain, Khalid; Shao, Song-dong; Huang, Yue-fei. 2014, Shallow sediment transport flow computation using time-varying sediment adaptation length. International Journal of Sediment Research, Vol. 29, No. 2, pp. 171-183.

Abstract: Based on the common approach, the adaptation length in sediment transport is normally estimated astemporally independent. However, this approach might not be theoretically justified as the process of reaching the sediment transport equilibrium stage is affected by the flow conditions in time, especially for fast moving flows, such as scour-hole developing flows. In this study, the two-dimensional (2D) shallow water formulation together with a sediment continuity-concentration (SCC) model were applied to flow with mobile sediment boundary. A time-varying approach was proposed to determine the sediment transport adaptation length to simulate the sediment erosion-deposition rate. The proposed computational model was based on the Finite Volume (FV) method. The Monotone Upwind Scheme of Conservative Laws (MUSCL)-Hancock scheme was used with the Harten Lax van Leer-contact (HLLC) approximate Riemann solver to discretize the FV model. In the flow applications of this paper, a highly discontinuous dam-break, fast sediment transport flow was used to calibrate the proposed time-varying sediment adaptation length model. Then the calibrated model was further applied to two separate experimental sediment transport flow applications documented in the literature, i. e. a highly concentrated sediment transport flow in a wide alluvial channel and a sediment aggradation flow. Good agreement with the experimental data were obtained with the proposed model simulations. The tests prove that the proposed model, which was calibrated by the discontinuous dam-break bed scouring flow, also performed well to represent rapid bed change and steady sediment mobility conditions.

Ghoshal, Koeli ; Pal, Debasish. 2014, Grain-size distribution in suspension over a sand-gravel bed in open channel flow. International Journal of Sediment Research, Vol. 29, No. 2, pp. 184-194.

Abstract: Grain-size distributions of suspended load over a sand-gravel bed at two different flow velocities were studied in a laboratory flume. The experiments had been performed to study the influence of flow velocity and suspension height on grain-size distribution in suspension over a sand-gravel bed. The experimental findings show that with an increase of flow velocity, the grain-size distribution of suspended load changed from a skewed form to a bimodal one at higher suspension heights. This study focuses on the determination of the parameter beta(n) which is the ratio of the sediment diffusion coefficient to the momentum diffusion coefficient of n th grain-size. A new relationship has been proposed involving beta(n), the normalizing settling velocity of sediment particles and suspension height, which is applicable for widest range of normalizing settling velocity available in literature so far. A similar parameter beta for calculating total suspension concentration is also developed. The classical Rouse equation is modified with beta(n) and beta and used to compute grain-size distribution and total concentration in suspension, respectively. The computed values have shown good agreement with the measured values of experimental data.

Tsai, Christina W.; Man, Chuanjian; Oh, Jungsu. 2014, Stochastic particle based models for suspended particle movement in surface flows. International Journal of Sediment Research, Vol. 29, No. 2, pp. 195-207.

Abstract: Modeling of suspended sediment particle movement in surface water can be achieved by stochastic particle tracking model approaches. In this paper, different mathematical forms of particle tracking models are introduced to describe particle movement under various flow conditions, i.e., the stochastic diffusion process, stochastic jump process, and stochastic jump diffusion process. While the stochastic diffusion process can be used to represent the stochastic movement of suspended particles in turbulent flows, the stochastic jump and the stochastic jump diffusion processes can be used to describe suspended particle movement in the occurrences of a sequence of extreme flows. An extreme flow herein is defined as a hydrologic flow event or a hydrodynamic flow phenomenon with a low probability of occurrence and a high impact on its ambient flow environment. In this paper, the suspended sediment particle is assumed to immediately follow the extreme flows in the jump process (i.e. the time lag between the flow particle and the sediment particle in extreme flows is considered negligible). In the proposed particle tracking models, a random term mainly caused by fluid eddy motions is modeled as a Wiener process, while the random occurrences of a sequence of extreme flows can be modeled as a Poisson process. The frequency of occurrence of the extreme flows in the proposed particle tracking model can be explicitly accounted for by the Poisson process when evaluating particle movement. The ensemble mean and variance of particle trajectory can be obtained from the proposed stochastic models via simulations. The ensemble mean and variance of particle velocity are verified with available data. Applicability of the proposed stochastic particle tracking models for sediment transport modeling is also discussed.

Behrangi, Farhang; Banihashemi, Mohammad Ali; Mahani, Shayesteh; Rahmanian, Mohammad Reza. 2014, Sediment settling in the Latian Dam in Iran. International Journal of Sediment Research, Vol. 29, No. 2, pp. 208-217.

Abstract: Among the difficulties that influence future dam operations, reservoir sedimentation is the most problematic for engineers. This study predicted the amount and pattern of sedimentation for use in estimation of the useful lifespan of reservoirs and identification of optimal locations for outlets and intakes at the initial stages of dam design. Hydrographic surveys of different dams can provide better insight into this phenomenon. Latian Dam in Iran has conducted hydrographic surveys during 7 time periods. The amount and process of sedimentation in this reservoir were determined, and predictions of distribution of sediments were validated by well-known, common methods. The formation of a delta in the reservoir was investigated for different time periods after operation. Future problems due to the impacts of sedimentation on dam operation and the useful lifespan of the reservoir were predicted. In addition, the study results may be used for developing empirical methods to predict sedimentation patterns in other reservoirs.

Dora, G. Udhaba ; Kumar, V. Sanil ; Vinayaraj, P.; Philip, C. S. ; Johnson, G. 2014, Quantitative estimation of sediment erosion and accretion processes in a micro-tidal coast. International Journal of Sediment Research, Vol. 29, No. 2, pp. 218-231.

Abstract: Spatio-temporal cross-shore profiles and textural characteristics are the key parameters for understanding dynamics of the inter-tidal sedimentary environment. This study describes short-term dynamics of the inter-tidal sedimentary environment at beaches along the micro-tidal coast. Further a correlation is estimated in cross-shore morphodynamics and textural characteristics of surface sediments. The sedimentary environment is examined for a complete

annual cycle using monthly collected cross-shore profiles and sediment samples. The Devbag beach (northern side) and Ravindranath Tagore beach (southern side) at the Kali river mouth, Karwar, west coast of India are characterized from extremely gentle to average slope, and broadly composed of unimodal sands. The sedimentary environment is significantly composed of textures having fine to medium sand, well to moderately sorted, fine to coarse skewed, and platykurtic to leptokurtic in nature. During the annual cycle a reversal pattern is observed between the two adjacent beaches, where a slower rate of sediment accretion is observed at Devbag beach while Ravindranath Tagore beach exhibited erosion. The beach dynamics along with the propagation of south-west (SW) and south-west-west (SWW) waves towards the coast significantly exhibit a dominance of northward sediment transport with the existence of a northerly alongshore current. In addition, the study reveals that an eroded beach may not be significantly identified composed of coarse grains. The poor correlation in morpho-sedimentary characteristics reveals the prediction of grain characteristics based on beach profile and vice-versa is unrealistic.

Liu, Gao-feng; Wu, Jia-xue; Wang, Yuan-ye. 2014, Near-bed sediment transport in a heavily modified coastal plain estuary. International Journal of Sediment Research, Vol. 29, No. 2, pp. 232-245.

Abstract: Numerous estuaries of the world have been strongly modified by human activities. These interferences can make great adjustments of not only sediment transport processes, but also the collective behavior of the estuary. This paper provides a typical case of a heavily modified coastal plain estuary of Sheyang on the China coast, where a sluice barrage was built in 1956 to stop the intrusions of storm surges and saline water. Four sets of instrumented tripods were simultaneously deployed along a cross-shore transect to continuously observe near-bed flow currents and sediment transport. The in-situ surveys lasted over a spring and neap tide cycle when a strong wind event occurred in the neap tide. Comparisons of flows and sediment transport between tide-dominated and wind-dominated conditions demonstrated the important role of episodic wind events in flows and sediment transport. The wind-induced currents, bottom stresses, and sediment transport rates were significantly greater when wind was present than corresponding quantities induced by the tides. The long-shore sediment transport induced by winds exceeds the cross-shore component, especially near the river mouth bar. These results indicate the noticeable importance of wave-dominated coastal processes in shaping topographic features. A regime shift of estuarine evolution under highly intense human forcing occurs from fluvial to marine processes. This finding suggests that the management strategy of the estuarine system should focus on the restoration of estuarine processes, rather than the present focus on inhibition of marine dynamics.

Ni, Wen-fei; Wang, Ya-ping; Zou, Xin-qing; Zhang, Ji-cai; Gao, Jian-hua. 2014, Sediment dynamics in an offshore tidal channel in the southern Yellow Sea. International Journal of Sediment Research, Vol. 29, No. 2, pp. 246-259.

Abstract: The geomorphology of the southern Yellow Sea (SYS) is characterized by offshore radial sand ridges (RSR). An offshore tidal channel (KSY Channel) is located perpendicular to the coast, comprised of a main and a tributary channel separated by a submarine sand ridge (KSY Sand Ridge) extending seaward. In order to investigate the interactions among water flow, sediment transport, and topography, current velocity and suspended sediment concentration (SSC) were observed at 11 anchor stations along KSY Channel in RSR during a spring tide cycle. High

resolution bottom topography was also surveyed. Residual currents and tidally averaged suspended sediment fluxes were calculated and analyzed by using the decomposition method. Results suggested that the water currents became stronger landward but with asymmetrical current speed and temporal duration of flood and ebb tides. Residual currents showed landward water transport in the nearshore channel and a clockwise circulation around the KSY Sand Ridge. Tidally-averaged SSC also increased landward along the channel. The main mechanisms controlling SSC variations were resuspension and horizontal advection, with spatial and temporal variations in the channel, which also contributed to sediment redistribution between channels and sand ridges. Residual flow transport and the tidal pumping effect dominated the suspended sediment flux in the KSY Channel. The KSY Sand Ridge had a potential southward migration due to the interaction between water flow, sediment transport, and topography.

Psomiadis, David; Albanakis, Konstantinos; Zisi, Nikoleta; Ghilardi, Matthieu; Dotsika, Elissavet. 2014, Clastic sedimentary features of beachrocks and their palaeo-environmental significance: comparison of past and modern coastal regimes. International Journal of Sediment Research, Vol. 29, No. 2, pp. 260-268.

Abstract: Clastic sedimentary features of beachrocks and unconsolidated deposits of parent beaches were investigated along the northern Aegean coastline (Greece) to assess their suitability in palaeo-environmental reconstruction. Twelve paired datasets were collected in the Thermaikos, Toroneos, Siggitikos and Ierissos gulfs of the Chalkidiki Peninsula, the adjoining Kavala Gulf and Thassos Island, comprising beachrock cores and companion beach subsurface sediments. Particle size analyses based on univariate and bivariate statistics suggest that, during the time period of beachrock formation, depositional conditions differed distinctly from those of the modern parent beaches. The results imply difference of maturity level of beach evolution from the time of cementation (coarser materials-early stage of beach formation) to modern situation (finer materials-reworked and 'mature' beach sediments). Furthermore, the findings indicate increasing coastal protection due to beachrock exposure in the modern swash zone. In conclusion, it is suggested that textural analysis of beachrocks in comparison with unconsolidated sediments of the parent beach might provide information regarding differences of coastal depositional regimes and future research could focus on specific-layer analysis and comparison.

Chang, Wen-Yi ; Lai, Jihn-Sung ; Yu, Teng-Yi ; Lin, Franco; Lee, Lung-Cheng; Tsai, Whey-Fone; Loh, Chin-Hsiung, 2014, Pier scour monitoring system by bed-level image tracking. International Journal of Sediment Research, Vol. 29, No. 2, pp. 269-277.

Abstract: A scour monitoring system with a micro camera tracking the bed-level images is proposed in this study. Two image recognition algorithms have been developed to support the bed-level image tracking approach. Through the laboratory experiments of pier scour, this study demonstrates that the proposed system is able to accurately monitor the scour-depth evolution in real time. In addition, five commonly-used temporal scour models are employed to simulate scour-depth evolution and their results are compared with monitoring data. In general, the results indicate that the proposed scour monitoring system has the potential for further applications in the field.

Cong, Min; Jiang, Tao; Qi, Yu-zao; Dong, Hong-po; Teng, De-qiang ; Lu, Song-hui. 2014,

Phosphorus forms and distribution in Zhejiang coastal sediment in the East China Sea. International Journal of Sediment Research, Vol. 29, No. 2, pp. 278-284.

Abstract: Surface and core sediment samples were collected from Zhejiang coastal waters of the East China Sea to study phosphorus (P) forms and understand the potential release of P as well as adsorption. The sediments were extracted sequentially to determine four phosphorus fractions, and non-sequentially for total phosphorus (TP). The total concentration of phosphorus in the surface sediments ranged from 527.2 to 680.5 mg kg(-1). Inorganic P was the major form and accounted for 84-94% of TP. Among the four forms, P-Detrital was dominant (58.6-73.2%), followed by P-CDB (10.5-20.9%), P-Organic (6.1-15.9%), and P-CFA (5.9-16.3%). The distribution pattern of TP in the surface sediments was similar to that of P-Detrital and P-Organic, but different from P-CDB and P-CFA. A relatively high level of phosphorus was observed in estuarine sediments, reflecting the influence from terrestrial input. Phosphorus in all forms in core sediments at each station decreased with depth. In addition, potentially bio-available phosphorus accounted for 20-34% of TP.

2014. No.3

Bai, Yu-chuan; Wang, Zhao-yin. 2014, Theory and application of nonlinear river dynamics. International Journal of Sediment Research, Vol. 29, No. 3, pp. 285-303.

Abstract: A theoretical model for river evolution including riverbed formation and meandering pattern formation is presented in this paper. Based on nonlinear mathematic theory, the nonlinear river dynamic theory is set up for river dynamic process. Its core content includes the stability and tropism characteristics of flow motion in river and river selves' evolution. The stability of river dynamic process depends on the response of river selves to the external disturbance, if the disturbance and the resulting response will eventually attenuate, and the river dynamics process can be restored to new equilibrium state, the river dynamic process is known as stable; otherwise, the river dynamic process is unstable. The river dynamic process tropism refers to that the evolution tendency of river morphology after the disturbance. As an application of this theory, the dynamical stability of the constant curvature river bend is calculated for its coherent vortex disturbance and response. In addition, this paper discusses the nonlinear evolution of the river peristaltic process under a large-scale disturbance, showing the nonlinear tendency of river dynamic processes, such as river filtering and butterfly effect.

Samaras, Achilleas G.; Koutitas, Christopher G. 2014, Modeling the impact of climate change on sediment transport and morphology in coupled watershed-coast systems: A case study using an integrated approach. International Journal of Sediment Research, Vol. 29, No. 3, pp. 304-315.

Abstract: Climate change is an issue of major concern nowadays. Its impact on the natural and human environment is studied intensively, as the expected shift in climate will be significant in the next few decades. Recent experience shows that the effects will be critical in coastal areas, resulting in erosion and inundation phenomena worldwide. In addition to that, coastal areas are subject to "pressures" from upstream watersheds in terms of water quality and sediment transport. The present paper studies the impact of climate change on sediment transport and morphology in the aforementioned coupled system. The study regards a sandy coast and its upstream watershed in Chalkidiki, North Greece; it is based on: (a) an integrated approach for the quantitative correlation of the two through numerical modeling, developed by the authors, and (b) a calibrated application of the relevant models Soil and Water Assessment Tool (SWAT) and PELNCON-M,

applied to the watershed and the coastal zone, respectively. The examined climate change scenarios focus on a shift of the rainfall distribution towards fewer and more extreme rainfall events, and an increased frequency of occurrence of extreme wave events. Results indicate the significance of climatic pressures in wide-scale sediment dynamics, and are deemed to provide a useful perspective for researchers and policy planners involved in the study of coastal morphology evolution in a changing climate.

Ali, Yasir S. A.; Crosato, Alessandra; Mohamed, Yasir A.; Abdalla, Seifeldin H.; Wright, Nigel G. 2014, Sediment balances in the Blue Nile River Basin. International Journal of Sediment Research, Vol. 29, No. 3, pp. 316-328.

Abstract: Rapid population growth in the upper Blue Nile basin has led to fast land-use changes from natural forest to agricultural land. This resulted in speeding up the soil erosion process in the highlands and increasing sedimentation further downstream in reservoirs and irrigation canals. At present, several dams are planned across the Blue Nile River in Ethiopia and the Grand Ethiopian Renaissance Dam is currently under construction near the border with Sudan. This will be the largest hydroelectric power plant in Africa.The objective of this paper is to quantify the river flows and sediment loads along the Blue Nile River network. The Soil and Water Assessment Tool was used to estimate the water flows from un-gauged sub-basins. To assess model performance, the estimated sediment loads were compared to the measured ones at selected locations. For the gauged sub-basins, water flows and sediment loads were derived from the available flow and sediment data. To fill in knowledge gaps, this study included a field survey in which new data on suspended solids and flow discharge were collected along the Blue Nile and on a number of tributaries. The comparison between the results of this study and previous estimates of the sediment load of the Blue Nile River at El Deim, near the Ethiopian Sudanese border, show that the sediment budgets have the right order of magnitude, although some uncertainties remain. This gives confidence in the results of this study providing the first sediment balance of the entire Blue Nile catchment at the sub-basin scale.

Hu, Peng; Cao, Zhi-xian ; Pender, Gareth; Liu, Huai-han. 2014, Numerical modelling of riverbed grain size stratigraphic evolution. International Journal of Sediment Research, Vol. 29, No. 3, pp. 329-343.

Abstract: For several decades, quantification of riverbed grain size stratigraphic evolution has been based upon the active layer formulation (ALF), which unfortunately involves considerable uncertainty. While it is the sediment exchange across the bed surface that directly affects the riverbed stratigraphy, it has been assumed in the ALF that the sediment fraction at the lower interface of the active layer is a linear function of the sediment fraction in the flow. Here it is proposed that the sediment fraction of the sediment exchange flux is used directly in estimating the sediment fraction at the lower surface of the active layer. Together with the size-specific mass conservation for riverbed sediment, the modified approach is referred to as the surface-based formulation (SBF). When incorporated into a coupled non-capacity modelling framework for fluvial processes, the SBF leads to results that agree as well or better than those using ALF with laboratory and field observations. This is illustrated for typical cases featuring bed aggradation and degradation due to graded bed-load sediment transport. Systematic experiments on graded sediment transport by unsteady flows are warranted for further testing the modified formulation.

Razavitoosi, Seyedeh Leila; Ayyoubzadeh, Seyed Ali; Valizadeh, Alireza. 2014, Two-phase SPH modelling of waves caused by dam break over a movable bed. International Journal of Sediment Research, Vol. 29, No. 3, pp. 344-356.

Abstract: This paper describes the application of the Smoothed Particle Hydrodynamics (SPH) method for modeling two dimensional waves caused by dam break over a movable bed in two dimensions. The two phase SPH method is developed to solve the Navier-Stokes equations. Both fluid and sediment phases are described by particles as weakly compressible fluids and the incompressibility is achieved by the equation of state. The sediment phase is modeled as a non-Newtonian fluid using three alternative approaches of artificial viscosity and Bingham Model. In this paper, the new formulations for two-phase flows are proposed. The numerical results obtained from the developed SPH model show acceptable accuracy with comparison to experimental data.

Vemic, Mirjana; Rousseau, Diederik; Du Laing, Gijs ; Lens, Piet. 2014, Distribution and fate of metals in the Montenegrin part of Lake Skadar. International Journal of Sediment Research, Vol. 29, No. 3, pp. 357-367.

Abstract: Skadar Lake, the largest lake on the Balkan Peninsula, is famous for a wide range of endemic and rare, or even endangered plant and animal species. Different anthropogenic pressures have, however, influenced the fragile equilibria of the lake ecosystem, with metal pollution as one of the primary concerns. Therefore, this study investigated spatial distribution of metal pollutants in the water and sediment phase of Skadar Lake, and anthropogenic and environmental factors affecting this distribution. A sieving analysis showed that sediment in Skadar Lake is mainly distributed in the three smallest fractions (colloid, clay and silt). Eleven metals were analyzed in the lake surface and bottom water, and only six of them were detected: potassium, magnesium, calcium, nickel, aluminum and manganese. They were all present at low concentrations. In contrast, sediments contained elevated levels of some metals with concentrations between 28.1-126.8 mg kg(-1) for Ni, 23.6-79.2 mg kg(-1) for Cr, 9.2-36.9 mg kg(-1) for Cu, 199-878 mg kg(-1) for Mn and 9.6-23.1 g kg(-1) for Fe. Nickel exceeded consensus-based guidelines for safety towards freshwater dwelling organisms. The organic matter content of the sediment fluctuated between 4.7 and 21.5 %. No correlations were found between metal concentrations, organic matter and sediment particle size fractions, suggesting that the latter are not the main factors controlling metal accumulation in Skadar Lake.

Shafie, Nur Aliaa; Aris, Ahmad Zaharin; Haris, Hazzeman. 2014, Geoaccumulation and distribution of heavy metals in the urban river sediment. International Journal of Sediment Research, Vol. 29, No. 3, pp. 368-377.

Abstract: Current study presents the application of chemometric techniques to comprehend the interrelations among sediment variables whilst identifying the possible pollution source at Langat River, Malaysia. Surface sediment samples (0-10 cm) were collected at 22 sampling stations and analyzed for total metals (Cd-48, Cu-29, Zn-30, Pb-82), pH, redox potential (Eh), salinity, electrical conductivity (EC), loss on ignition (LOI) and cation exchange capacity (CEC). The principal component analysis (PCA) scrutinized the origin of environmental pollution by various anthropogenic and natural activities: four principal components were obtained with 86.34% (5 cm)

and 88.34% (10 cm). Standard, forward and backward stepwise discriminant analysis effectively discriminate 2 variables (84.06%) indicating high variation of heavy metals accumulation at both depth. The cluster analysis accounted for high input of Zn and Pb at LA8, LA 10, LA 11 and LA 12 that mergers three (5 cm) and four (10 cm) into clusters. This is consistent with the contamination factor (C-f) that shows high Cd (LA 1) and Pb (LA 7, LA 8, LA 10, LA 11 and LA 12) contaminations at 5cm. These indicate that Pb and Zn are the most bioavailable metals in the sediment with significant positive linear relationship at both sediment depths. Therefore, this approach is a good indication of environmental pollution status that transfers new findings on the assessment of heavy metals by interpreting large complex datasets and predicting the fate of heavy metals in the sediment.

Trento, Alfredo; Vinzon, Susana. 2014, Experimental modelling of flocculation processes-the case of Paraiba do Sul Estuary. International Journal of Sediment Research, Vol. 29, No. 3, pp. 378-390.

Abstract：The aggregation dynamics of fine sediments was analysed through laboratory tests using Couette and disk flocculators. It was shown that floc sizes tend to increase as concentrations grow both in fresh and salt water, in agreement with the aggregation theory, and that equilibrium diameters are slightly greater in salt environments for flocs developed either under shear stress or by differential sedimentation. Their transport and the aggregation processes were preliminarily studied in the estuary of the Paraiba do Sul River using a particle tracking model and field data. The floc breakup process by shear stress was included in the model. Yield stresses, which were determined by fractal dimensions and differential density, were accounted for. After the calibration of the collision efficiency coefficients, the numerical model was able to predict floc sizes comparable with those measured at the Paraiba do Sul estuary, which, in turn, were similar to those obtained during the laboratory experiments in the Couette flocculator.

Ali, Imen Bel Hadj; Lafhaj, Zoubeir; Bouassida, Mounir; Said, Imen. 2014, Characterization of Tunisian marine sediments in Rades and Gabes harbors. International Journal of Sediment Research, Vol. 29, No. 3, pp. 391-401.

Abstract: The objective of this article is to study the geotechnical and environmental characteristics of sediments dredged from two Tunisian harbors: Rades and Gabes. The first harbor represents the main facility place in the national transport chain. The second one is selected as its sediments present a serious ecological constraint caused by the discharge of wastes into the marine environment. These sediments are either discarded at sea or landfilled despite their harmful effects on the environment. The article is divided into three main sections. The first one presents the material that was carried for Rades and Gabes harbors. The conservation conditions and the used experimental tests are detailed. Geotechnical characterization includes the determination of the grain size distribution, the water content, the Atterberg limits, the methylene blue value, the specific area, the bulk density, the specific unit weight, the organic and carbonate contents. Environmental characterization is assessed by the determination of metals concentrations in a leaching solution. The second section deals with the description and analysis of geotechnical properties of Rades and Gabes harbors' sediments. The results obtained show that Rades harbor sediments are slightly sandy clayey silts whereas Gabes harbor sediments are silty sands characterized by a highly plastic clay fraction. Both of the two sediments don't exhibit a high

organic content. Finally, chemical, mineralogical and environmental properties are presented and then analysed. The experimental results obtained show that Rades and Gabes sediments could be used as a sand substitute in the formulation of a new construction material. Gabes harbor sediments are more polluted than Rades harbor sediments.

Chempalayil, Sajiv Philip; Kumar, V. Sanil; Dora, G.Udhaba; Johnson, Glejin. 2014, Near shore waves, long-shore currents and sediment transport along micro-tidal beaches, central west coast of India. International Journal of Sediment Research, Vol. 29, No. 3, pp. 402-413.

Abstract: Coastlines are undergoing constant geomorphologic changes with respect to the incident wave climate. Based on waves measured at 9 m water depth, simulation of near shore wave transformation is done using REFDIF-1 numerical model and the near shore breaker parameters are estimated at two micro-tidal beaches along central west coast of India. Model results are validated with measured values. From the breaker parameters, long-shore current and long-shore sediment transport rates (LSTR) are computed by using semi-empirical equations. Estimated long-shore current and LSTR are showing dramatic variations with respect to seasons. Predominant direction of LSTR is observed towards north since the approach waves are from south-west direction during pre-monsoon and post monsoon. During monsoon season, waves are from west south-west and resulted in southerly transport. The estimated annual net and gross LSTR by Cambridge Environmental Research Consultants (CERC) at two locations are in the same order whereas LSTR estimated by Walton & Bruno and Kamphuis equations are showing different estimations because of difference in surf-zone width and foreshore slope between the two locations. For micro-tidal beaches with length less than 6 km, Kamphuis equation is giving agreeable estimation of LSTR. Sensitivity analysis of LSTR estimate shows that coastal inclination is the prominent factor in determining LSTR than incident wave angle.

Chen, Hua-Yong; Cui, Peng; Zhou, Gordon; Zhu, Xing-Hua ; Tang, Jin-Bo. 2014, Experimental study of debris flow caused by domino failures of landslide dams. International Journal of Sediment Research, Vol. 29, No. 3, pp. 414-422.

Abstract: The formation of landslide dams is often induced by earthquakes in mountainous areas. The failure of a landslide dam typically results in catastrophic flash floods or debris flows downstream. Significant attention has been given to the processes and mechanisms involved in the failure of individual landslide dams. However, the processes leading to domino failures of multiple landslide dams remain unclear. In this study, experimental tests were carried out to investigate the domino failure of landslide dams and the consequent enlargement of downstream debris flows. Different blockage conditions were considered, including complete blockage, partial blockage and erodible bed (no blockage). The mean velocity of the flow front was estimated by videos. Total stress transducers (TSTs) and Laser range finders (LRFs) were employed to measure the total stress and the depth of the flow front, respectively. Under a complete blockage pattern, a portion of the debris flow was trapped in front of each retained landslide dam before the latter collapsed completely. This was accompanied by a dramatic decrease in the mean velocity of the flow front. Conversely, under both partial blockage and erodible bed conditions, the mean velocity of the flow front increased gradually downward along the sloping channel. Domino failures of the landslide dams were triggered when a series of dams (complete blockage and partial blockage) were distributed along the flume. However, not all of these domino failures led to enlarged debris

flows. The modes of dam failures have significant impacts on the enlargement of debris flows. Therefore, further research is necessary to understand the mechanisms of domino failures of landslide dams and their effects on the enlargement of debris flows.

Malvandi, Amir; Ganji, Davood Domairry; Malvandi, Ali. 2014, Analytical study on accelerating falling of non-spherical particle in viscous fluid. International Journal of Sediment Research, Vol. 29, No. 3, pp. 423-430.

Abstract: Unsteady motion of a vertically falling non-spherical particle has attracted considerable attention due to its frequent applications in nature and industry. A series of semi-analytical methods have been used to raise the results' accuracy as well as widening the region of convergence. The current study pursued a new analytical solution for the unsteady motion of a rigid non-spherical particle in a quiescent Newtonian fluid, based on the Optimal Homotopy Analysis Method. With a view towards obtaining the highest level of accuracy and ensuring the convergence of the analytical results, the averaged residual errors were obtained and minimized. In addition to flexibility, it was also proven that the proposed method can lead to completely reliable and precisely accurate results. Based on the series solution, the effects of physical parameters on the terminal settling velocity (i.e. the greatest velocity that a falling body may reach) and the acceleration time (i.e. the time that a particle reaches the settling velocity) are investigated.

Sahu, S. K.; Bhangare, R. C.; Tiwari, M.; Ajmal, P. Y.; Pandit, G. G. 2014, Depth profiles of lithogenic and anthropogenic mercury in the sediments from Thane Creek, Mumbai, India. International Journal of Sediment Research, Vol. 29, No. 3, pp. 431-439.

Abstract: Mercury (Hg) is well known as one of the most toxic elements to man. The coastal environments adjacent to industrial areas are reported to often be contaminated with mercury. Mercury becomes more toxic in the form of methylmercury (Me-Hg) which is converted from inorganic mercury in aqueous systems by microbial activity and can bio-magnify through the food chain. A simple method for the determination of total mercury and methylmercury in sediments was optimized by slightly modifying an old method using the direct mercury analyzer technique. Core sediment samples from Thane Creek, Mumbai, India were collected and analysed for total mercury and methylmercury. The Hg concentration in the creek varied between 0.54 to 16.03 mu g g(-1) while Me-Hg concentrations ranged between 0.04 to 1.07 mu g g(-1). In surface sediment, mercury concentrations ranged from 4.33 mu g g(-1) to 12.16 mu g g(-1). Total organic carbon content was found to be around 2 percent in different layers of the sediments. The enrichment factors, which indicate the extent of pollution in sediments, were estimated to range from 26 to 50 at different locations in the creek. Lithogenic and anthropogenic concentrations of mercury in the creek were also determined to compare the impact of anthropogenic and natural sources. Anthropogenic inventories were about 5-70 times more in concentration than the lithogenic in the different core sediments.

2014.No.4

Huang, Jianchun; Greimann, Blair P; Randle, Timothy J. 2014, Modelling of meander migration in an incised channel, International Journal of Sediment Research, Vol. 29, No. 4, pp. 441–453.

Abstract: An updated linear computer model for meandering rivers with incision has been developed. The model simulates the bed topography, flow field, and bank erosion rate in an

incised meandering channel. In a scenario where the upstream sediment load decreases (e.g., after dam closure or soil conservation), alluvial river experiences cross section deepening and slope flattening. The channel migration rate might be affected in two ways: decreased channel slope and steeped bank height. The proposed numerical model combines the traditional one-dimensional (1D) sediment transport model in simulating the channel erosion and the linear model for channel meandering. A non-equilibrium sediment transport model is used to update the channel bed elevation and gradations. A linear meandering model was used to calculate the channel alignment and bank erosion/ accretion, which in turn was used by the 1D sediment transport model. In the 1D sediment transport model, the channel bed elevation and gradations are represented in each channel cross section. In the meandering model, the bed elevation and gradations are stored in two dimensional (2D) cells to represent the channel and terrain properties (elevation and gradation). A new method is proposed to exchange information regarding bed elevations and bed material fractions between 1D river geometry and 2D channel and terrain. The ability of the model is demonstrated using the simulation of the laboratory channel migration of Friedkin in which channel incision occurs at the upstream end.

Yang, Wen-yu ; Yu, Guo-liang ; Tan, Soon Keat; Wang, Hua-kun. 2014, Rheological properties of dense natural cohesive sediments subject to shear loadings. International Journal of Sediment Research, Vol. 29, No. 4, pp. 454–470.

Abstract: Cohesive sediments exhibit complex rheological behaviors that are non-Newtonian and time-dependent when subjected to external loading. This paper presents the results of an investigation on the rheological properties of three types of dense cohesive sediments, collected from the mouth of the Yangtze River, the shoal of the Hangzhou Bay, and the Yangcheng Lake in China. A set of rheological parameters (including viscosity, yield stress, etc.) was studied based on experiments that were conducted with a RheolabQC rheometer. Measurements of the flow curves, shear stress-time responses, and yield stresses were made. The solid-liquid transition of the dense cohesive sediments occurred both in the shear rate ramp tests and the shear stress ramp tests. This transition was not direct, but it was mediated by a transitional deformation regime or stress plateau. Both the Herschel-Bulkley model and Carreau model were able to describe the rheological behavior of dense cohesive sediments, and the empirical expressions for calculating the parameters in these models were obtained by a dimensional and regression analysis. The yield stresses determined by the shear stress ramp test and by the vane method were compared and discussed. The influence of the water content on the rheological properties of dense cohesive sediments was considered.

Shang, Qian-qian; Fang, Hong-wei; Zhao, Hui-ming; He, Guo-jian; Cui, Zheng-hui. 2014, Biofilm effects on size gradation, drag coefficient and settling velocity of sediment particles. International Journal of Sediment Research, Vol. 29, No. 4, pp. 471–480.

Abstract: Sediment particles are often colonized by biofilm in a natural aquatic ecological system, especially in eutrophic water body. A series of laboratory experiments on particle size gradation, drag coefficient and settling velocity were conducted after natural sediment was colonized by biofilm for 5, 10, 15 and 20 days. Particle image acquisition, particle tracking techniques of Particle Image Velocimetry and Particle Tracking Velocimetry were utilized to analyze the changes of these properties. The experimental results indicate that the size gradation, the drag

force exerted on bio-particles, and the settling velocity of bio-particles underwent significant change due to the growth of biofilm onto the sediment surface. The study proposes a characteristic particle size formula and a bio-particle settling velocity formula based on the regression of experiment results, that the settling velocity is only 50% to 60% as the single particle which has the same diameter and density. However, biofilm growth causes large particle which the settling velocities are approximately 10 times larger than that of primary particles. These results may be specifically used in the low energy reservoir or lake environment.

Sirdari, Zahra Zangeneh; Ab Ghani, Aminuddin; Abu Hassan, Zorkeflee. 2014, Bedload transport of small rivers in Malaysia. International Journal of Sediment Research, Vol. 29, No. 4, pp. 481–490.

Abstract: Numerous time-consuming equations, based on the relationship between the reliability and representativeness of the data utilized in defining variables and constants, require complex parameters to estimate bedload transport. In this study the easily accessible data including flow discharge, water depth, water surface slope, and surface grain diameter (d(50)) from small rivers in Malaysia were used to estimate bedload transport. Genetic programming (GP) and artificial neural network (ANN) models are applied as complementary tools to estimate bed load transport based on a balance between simplicity and accuracy in small rivers. The developed models demonstrate higher performance with an overall accuracy of 97% and 93% for ANN and GP, respectively compared with other traditional methods and empirical equations.

Bu, Chong-feng; Wu, Shu-fang; Yang, Kai-bao. 2014, Effects of physical soil crusts on infiltration and splash erosion in three typical Chinese soils. International Journal of Sediment Research, Vol. 29, No. 4, pp. 491–500.

Abstract: Physical soil crusts likely have significant effects on infiltration and soil erosion, however, little is known on whether the effects of the crusts change during a rainfall event. Further, there is a lack of discussions on the differences among the crusting effects of different soil types. The objectives of this study are as follows: (i) to study the effects of soil crusts on infiltration, runoff, and splash erosion using three typical soils in China, (ii) to distinguish the different effects on hydrology and erosion of the three soils and discuss the primary reasons for these differences, and (iii) to understand the variations in real soil shear strength of the three soils during rainfall events and mathematically model the effects of the crusts on soil erosion. This study showed that the soil crusts delayed the onset of infiltration by 5 to 15 min and reduced the total amount of infiltration by 42.9 to 53.4% during rainfall events. For a purple soil and a loess soil, the initial crust increased the runoff by 2.8% and 3.4%, respectively, and reduced the splash erosion by 3.1% and 8.9%, respectively. For a black soil, the soil crust increased the runoff by 42.9% and unexpectedly increased the splash erosion by 95.2%. In general, the effects of crusts on the purple and loess soils were similar and negligible, but the effects were significant for the black soil. The soil shear strength decreased dynamically and gradually during the rainfall events, and the values of crusted soils were higher than those of incrusted soils, especially during the early stage of the rainfall. Mathematical models were developed to describe the effects of soil crusts on the splash erosion for the three soils as follows: purple soil, $F_c = 0.002t - 0.384$; black soil, $F_c = -0.022t + 3.060$; and loess soil, $F_c = 0.233\ln t - 1.239$. Combined with the equation $R_c = F_c \cdot (R_{uc} - 1)$, the splash

erosion of the crusted soil can be predicted over time.

Khullar, N. K.; Singh, Jaspal. 2014, Study on changes in bed characteristics and friction factor in the presence of wash load in suspension. International Journal of Sediment Research, Vol. 29, No. 4, pp. 501–508.

Abstract: Results of an experimental study on the effects of different concentrations of wash load on the size of bed features and resistance to flow in a laboratory flume are presented. The experiments were carried out under different hydraulic conditions in a 30 m long, 0.204 m wide and 0.5 m deep tilting flume under clear water condition and in the presence of different concentration of wash load in the flow. The bed material used consisted of uniform sediment of size 0.96 mm. Analysis of the data indicates that the characteristics of the bed features change and friction factor increases in the presence of different concentration of wash load in the flow. The reasons for changes in the characteristics of the bed features and increase in friction factor in the presence of wash load are identified and a relationship for predicting friction factor in the presence of wash load has been established

Pang, Chong-guang; Liu, Li-qian ; Li, Kun. 2014, Numerical prediction on the scour burial of cylinder object freely resting on the sandy seabed in the East China Sea using the DRAMBUIE model. International Journal of Sediment Research, Vol. 29, No. 4, pp. 509–517.

Abstract: After experiencing 8-day combined tidal current, circulation and wave actions, scour depth surrounding cylinder object freely resting on sandy seabed in the East China Sea (ECS) in January is numerically predicted using the DRAMBUIE model designed for scour burial, which has been widely used and verified by in-situ experiments. During the period of numerical integration, the value of time t is generally variable at every time step via the special time-stepped approach developed by this paper to eliminate the time error. The tidal current velocity, wave orbital velocity and the depth-averaged circulation in the ECS have been obtained by numerical simulations with Estuarine Coastal and Ocean Model (ECOM), Simulating Waves Nearshore (SWAN) model and Regional Ocean Modeling System (ROMS) model respectively. The control experiment and several idealized test cases on influential factors in scour depth reveal that the dominant hydrodynamic factor is tidal current in the ECS under normal weather conditions, and the impacts of shelf circulation and wave motion on local scour almost can be ignored with an exception of the Kuroshio area where the high-speed mainstream of Kuroshio flows. It is also indicated that in sandy sediments, the distribution of scour depth nearly follows the pattern of tidal currents, while the secondary influencing factor on scour depth appears to be grain size of sandy sediment in the ECS. Numerical tests on sediment grain size further testify that much finer sand is more easily scoured, and an increasing trend for scour depth with reduction of grain size is displayed due to imposed resistance of larger sized particles. Three aspects explored by this paper, including the empirical equations in the Defense Research Agency Mine Burial Environment (DRAMBUIE) model, the accuracy of inputs and infill process can severely affect the prediction of scour depth surrounding cylinder objects freely resting on sandy seabed in the ECS.

Poudeh, Hasan Torabi; Emamgholizadeh, Samad; Fathi-Moghadam, Manoocher. 2014, Experimental study of the velocity of density currents in convergent and divergent channels. International Journal of Sediment Research, Vol. 29, No. 4, pp. 518–523.

Abstract: The head velocity of the density current in the convergent and divergent channel is a key parameter for evaluating the extent to which suspended material travels, and for determining the type and distribution of sediment in the water body. This study experimentally evaluated the

effects of the reach degree of convergence and divergence on the head velocity of the density current. Experiments were conducted in the flume with 6.0 m long, 0.72 m width and 0.6 m height. The head velocity was measured at three convergent degrees (-8 degrees; -12 degrees; -26 degrees), at three divergent degrees (8 degrees; 12 degrees; 26 degrees) and two slopes (0.009, 0.016) for various discharges. The measured head velocity of the density current is compared with the head velocity of the density current in the constant cross section channel. Based on non-dimensional and statistical analysis, relations as linear multiple regression are offered for predicting head velocity of the density current in the convergent, divergent and constant cross section channel. Also the results of this research show that for the same slope and discharge, the head velocity of the density current in the convergent and divergent channel are greater and less than the head velocity of the constant cross section, respectively.