Joint Research Projects NSFC – NWO – EPSRC: Sustainable Deltas

Grant application form 2016 **Joint Research Projects**
Please refer to Explanatory Notes when completing this form

Application no. ALWSD2016.00X

Registration form (basic details, fact sheet)

1. Project title
Natural versus anthropogenically driven behaviour of hydrodynamics and sediment dynamics in estuarine delta systems, application to the Yangtze Estuarine Delta

2. Summary
Please provide a brief summary of the application (no more than 250 words) and mention six keywords that characterise your proposal. If the application is awarded, this summary will be published on the NWO website

We propose to investigate a major problem occurring in the high turbidity zones of the Yangtze Estuarine Delta (YED), viz. the amplification of tides, seaward migration of mouth bars, coarsening of bed sediment, increased siltation in navigation channels and a potential regime shift towards a hyperturbid system resulting from engineering works.
Specific objectives are to:
(1) determine tidal amplification, spatial distribution of flow and suspended sediment in the estuary, under natural processes and in response to human interventions, focusing especially on the effects of narrowing and deepening of channels due to local engineering works and temporal variation of water and sediment supply from the watershed;
(2) quantify turbulent mixing and sediment fluxes and to establish the thresholds for the potential regime shift of the delta system towards hyperturbidity;
(3) understand the physical mechanisms that determine both the natural behaviour and the response of hydrodynamics and sediment dynamics in the estuarine channels to different types of human activities;
(4) propose methods to reduce deposition of sediment in navigation channels and to manage the flood defence, fresh water supply of the YED system.

An innovative, integrated research approach will be adopted of analysing field data, simulation with 3D models and developing and analysing new process-based (semi-) analytical models for multi-channel estuarine networks. Three research teams will closely work together. Results from each team will be combined to examine the effect of anthropogenic measures on both along-channel and across-channel patterns of hydrodynamics and sediment entrapment in the YE under varying external conditions.

Key words: hydrodynamics; sediment dynamics; regime shift; estuarine tidal network; high turbidity zone.

3. Dutch principal applicant
Please provide the full name and contact details (telephone number, e-mail and postal address) of the principal Dutch applicant. Each proposal has to be submitted by a single principal applicant in The Netherlands. The contact details of the principal applicant will be used for communication during the evaluation process.

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6. Co-applicants

You can list a maximum of two co-applicants per country under this point. These are partners from academia that co-apply for funding (i.e. they apply for NWO funding, including matching, for personnel and/or material costs). For co-applicants the same rules are applied as for principal applicants. Other consortium partners, both researchers and private and public partners, may be listed under question 14 'Composition of the research team and the participating partners'.

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Research proposal

7. Discipline code

Please state the code of the discipline group which, in your opinion, best corresponds to your application. The discipline group should be selected from NWO discipline code list. Entering a code is a compulsory part of the application. If your research is inter-disciplinary you can enter more than one code.

15.60.00, 12.70.00, 50.90.00.

8. Lay summary (in Dutch)

Please prepare a lay summary. This should be a Dutch text of no more than 100 words. In case of grant award, this text may also be used by NWO for publicity purposes.

De Yangtze delta wordt de laatste 20 jaar gekenmerkt door sterkere getijden, toenemende troebelheid en verhoogde sedimentdepositie in de diverse afvoertakken, met negatieve gevolgen voor bevaarbaarheid en waterkwaliteit. Het primaire doel van dit onderzoeksproject is om te komen tot wetenschappelijk onderbouwde methoden voor een effectief beheer van deze delta. Het daartoe benodigde onderzoek richt zich op zowel het natuurlijke gedrag van waterbeweging, zout- en sedimenttransport, alsmede op het geforceerde gedrag veroorzaakt door menselijke ingrepen. Hiertoe zullen bestaande en nieuwe velddata worden geanalyseerd, simulaties worden uitgevoerd met numerieke modellen en mechanismen worden geïdentificeerd aan de hand van semi-analytische modellen.

9. Proposed research (max. 3000 words, excluding references)

Please provide a description of the proposed research including aims and objectives, innovative aspects, approach and literature references (include full bibliographical details).

Estuarine deltas are areas where the water and suspended sediment motion are primarily driven by the joint action of input of fresh water by rivers and tide from the sea. Besides being driven by these natural forcing agents, the hydrodynamics and sediment dynamics are frequently affected by a variety of different anthropogenic measures, such as channel dredging, land reclamation, engineering works for flow and sediment controls regulations in the estuaries, and dams in the upstream parts of watersheds. These human activities may lead to strong changes of flow and suspended sediment behaviour in the estuaries. During the last decades many estuarine systems in Europe (e.g. the Elbe, Ems, Loire) have shown increases in tidal range and in turbidity, which seem to be linked to deepening[1].

Relevance:

From a societal point of view increased tidal range and high turbidity are problematic in several respects. First, many of the world's largest ports, industrial complexes and shipping lanes are located in deltas and the surrounding land is densely populated. High tidal ranges and high turbidity hamper access of ships to ports and require construction of expensive coastal defence structures. Moreover, enhanced deposition in navigation channels requires intense maintenance dredging. Furthermore, high suspended sediment concentrations have a negative effect on the ecological functioning of estuarine deltas: they reduce primary production and cause oxygen deficits. It is thus of utmost importance to have deep knowledge about the processes that result in tidal amplification and high turbidity. Only in that way science-based, effective coastal management strategies can be developed to avoid or reduce such problems.

State of the art and focus

The observed changes in estuarine deltas have stimulated the conductance of many studies that focus on explaining them [2-4]. These studies show the importance of tidal amplification and increased flood dominance resulting from deepening and drag reduction by suspended sediment and the presence of sediment sinks.

An estuarine delta system that faces similar problems as European estuaries is the Yangtze Estuary Delta (YED). Analysis of field data collected since the middle of the last century show that there are significant variations in morphology of both estuarine channels and subaqueous deltas of the YED that are naturally generated over a thousand-year period [5]. Notably, the channels within the YED are narrowing due to land reclamations (Fig.1). Amongst these channels, the North Passage of the YED has been subject to anthropogenic measures, i.e., it was deepened from 8 meters to 12.5 meters. Furthermore, the construction of dams in the upper reaches of the Yangtze River basin has changed the flow and sediment supply to the estuary [6]. In the last decades tidal range and tidal currents increased [7], siltation in the navigation channel intensified, sediment coarsened [8], subaqueous dunes occurred [9] and seaward migration of river mouth bars increased [5]. Moreover, the North Branch is facing hyperturbid conditions already (with bottom concentrations over 10 kgm^{-3}) [10], whereas the surface sediment concentration in the turbidity zones of the other branches has decreased [11]. These changes suggest that human interventions may have altered the natural behaviour of flow and sediment dynamics and probably has led to the increased waterlogging in Shanghai Municipality, dredging volume and water quality deterioration in the YED during recent years [12].

Compared to the European estuaries mentioned above, the YED is much larger in scale, experiences much stronger river discharge, and it is subject to a strong seasonal variation in fresh water and sediment supply. Moreover, it is a complex estuarine network with several branches, connecting channels

and a complex delta. The changes of the flow and sediment dynamics in the estuary may result from both local and nonlocal human activities. Despite the intense research efforts over the past two decades, it is still unclear which impact (local or nonlocal) is responsible for the changing flow and sediment characteristics in the estuary. It is also unclear whether the YED estuary is near a new equilibrium state, or still evolving. It might also be that other branches of the YED, besides the North Branch, experience a shift towards a hyperturbid state, as happened for example in the Ems. It is therefore of vital importance to establish the possible threshold for the regime shift and to unravel the associate processes. The general aim of this proposed research is to achieve a more systematic understanding of the mechanisms by which flow and sediment dynamics in YED tidal channels are affected by anthropogenic activities, and use this insight to formulate effective coastal management strategies.

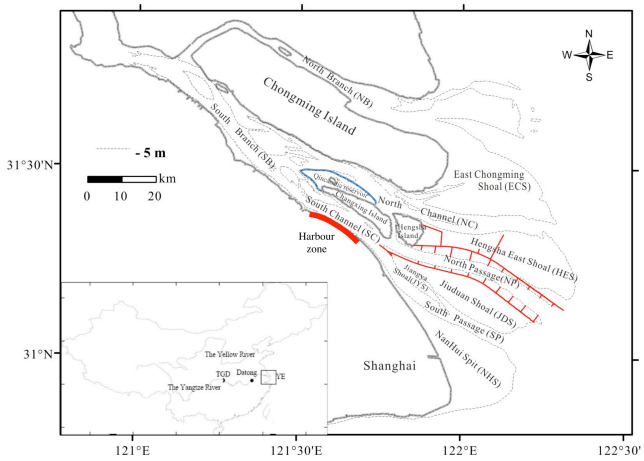

Fig.1 Map of the Yangtze Estuary Delta (YED). Red lines indicate training walls and groins; the blue line indicates the Qincaosha reservoir. The port of Shanghai is also indicated by the red polygon.

The specific objectives are as follows:

(1) To determine the tidal behaviour, spatial distribution of flow and suspended sediment in the estuary, especially within the turbidity maximum zone under natural processes and in response to human interventions, focusing especially on the effects of estuarine deformation, i.e., the narrowing and deepening of channels due to local engineering works (e.g. the Deep Waterway Project, land reclamation) and temporal variation of water and sediment supply from the watershed (e.g. the Three Gorges Dam).
(2) To quantify turbulent mixing processes and sediment fluxes and to establish the possible thresholds for regime shifts in estuarine channels of the YED in response to local and nonlocal human interventions as specified above.
(3) To understand the physical mechanisms that determine both the natural behaviour and the response of the hydrodynamics and sediment dynamics in the estuarine channels and on the subaqueous deltas to various types of human activities.
(4) To propose methods to reduce deposition of sediment in navigation channels, and to manage the flood defence and the fresh water supply of the Yangtze estuarine delta system.

Over the past decades effects of anthropogenic activities on estuarine hydrodynamics and sediment entrapment have been investigated extensively, either through field measurements, numerical modelling or analytical modelling. However, for feasibility reasons, the former methods usually focus on limited cross-sections or a number of small areas in a much larger estuary and can thus reveal only local processes [13]. Based on field data alone, it is difficult to distinguish the response of hydro- and sediment dynamics to the local and nonlocal human activities or to explain the physical mechanisms responsible for the observed changes. This led to different results about the sensitivity of the changes to the local and nonlocal activities due to different researchers with different data and information, and sometimes even resulted in opposite opinions [6, 13]. In comparison, 3D numerical models are powerful tools for detailed simulation of flow and suspended sediment behaviour under various environmental conditions [14-15]. However, these models are time-consuming and due to uncertainties in process formulations or model parameters used they yield limited insight in the key processes that cause changes in characteristics of tides, flow and net sediment transport, especially over the long term. Therefore, also process-based (semi-) analytical approaches are adopted to assess flow, salinity and sediment transport due to individual mechanisms in the YED [16-18]. These models are flexible and particularly suitable for scenario analysis and sensitivity studies. However, the current geometries considered in analytical models are 2-dimensional and thus ignore the combined effects of processes in the along-channel and the across-channel directions. Moreover, the YED is characterised as a partially to highly stratified estuary [19], and the present turbulence closure schemes do not properly account for stratification effects.

Innovative elements

In order to tackle the problems as described above, this project will adopt an integrated research approach of 1) analysing available and new field data, 2) conducting experiments with a three-dimensional numerical model and analysing the output, and 3) developing and analysing semi-analytical models, which are extended from single-channel to multi-channel estuarine deltas. As is shown in Fig.2 below, these three activities are strongly coupled (e.g. field data are used in numerical models, but model output is used to reconsider measurement locations) and together, they are directly aimed at designing science-based management strategies for estuarine delta systems.

Organisation of the project

The work is organised into four work packages (WP's): WP1: field data collection and analysis, WP2: full numerical simulations, WP3: development of process-based 3D (semi-) analytical models and WP4: design of for coastal management strategies (Fig. 2). The details of each method will be outlined in the context of the specified research questions and approaches as described in the previous section.

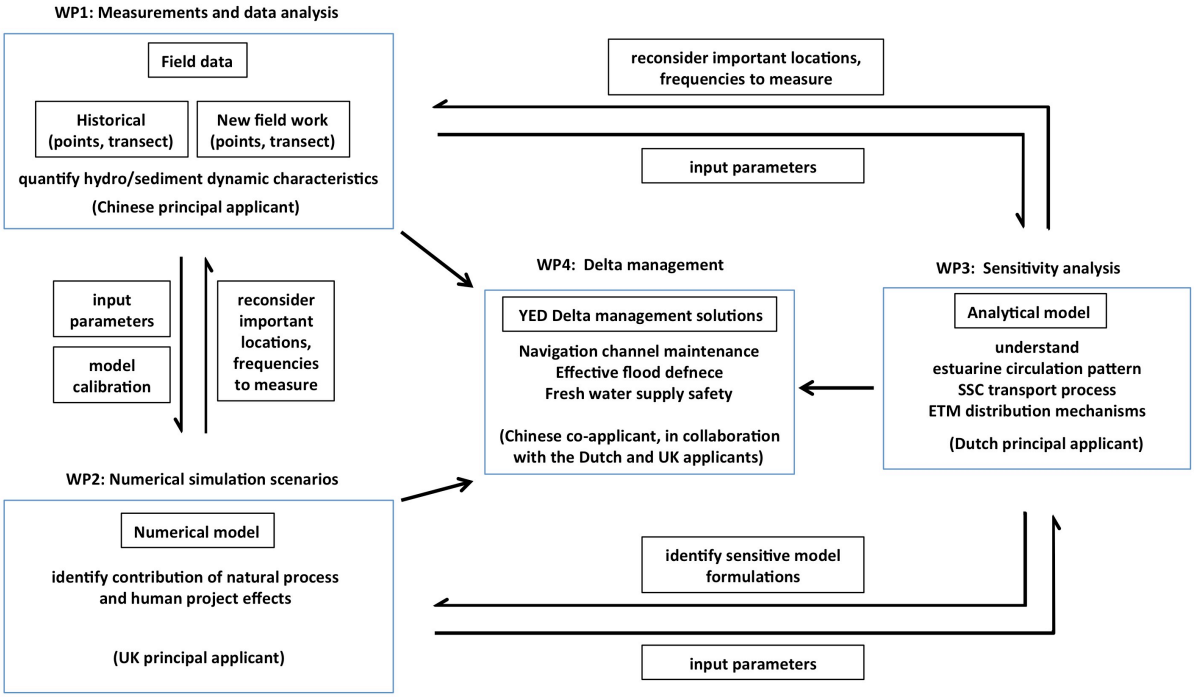

Fig.2 The flow diagram of the research project, including the four work packages (WP's). Note the feedbacks between the different activities.

Specific research questions and tools to be employed

(1) What are characteristics of the tides (phase/amplitude of main constituents both of sea level and of currents), residual flow, salinity, residual sediment transport, grain size distribution at three times: 1958, 1988, 1998/1999, 2003, 2018 (prior/after the Three Gorges Dam (TGP) and Deep Waterway projects), during the wet and dry season?

This question related to specific objective 1, will be investigated by collecting new data and analysing available and new field data (WP1):

New field data are necessary; the historical data are insufficient to clarify the problems mentioned above, because the YED network might be subject to a potential regime shift. The proposed activities are as follows.

a. Collect data of current velocity, current direction, concentration and grain size composition of suspended sediment and grain size composition and shape of bedload and shallow stratum sediment of the channels and subaqueous delta of the YED measured in the last 50 years.

Besides, collect the historical data, including bathymetric data of the channels and subaqueous delta. Collect documents describing the construction and operation of the soil reservation, 1998 and 1999 great flood, the Three Gorges Dam, the Deep Waterway Project and land reclamation from the sea since 1958 in the YED.

b. Measurements of hydrodynamics and suspended sediment concentration (SSC) at fixed stations and cross sections in estuarine channels at fixed sigma levels. Set 6 stations and 6 cross sections in the YED, use ADCP and OBS etc. to conduct simultaneous observations, both in wet and dry seasons, and take water samples. Variables to be measured include tidal current, salinity, as well as concentration and grain size composition of suspended sediment. With these field data, the new conditions of hydrodynamics and suspended sediment dynamics will be quantified.
c. Sampling of bed sediment transport and measuring topography of along-channel sections with a multi-beam sounding system, SeaBat7125_SV2, and EdgeTech Discover's X-Star 3100P sub-bottom profiler. Moreover, high-resolution profiling of 3 along-channel sections including water depth, bed surface morphology and shallow stratum sedimentary structure, will be conducted in the YED. Also, we will collect bedload sediment samples for grain size analysing.
d. Measure salinity and suspended sediment concentration of collected water samples. Use Coulter LS 13320 and Mastersizer 2000 laser particle size analyser to measure the grain size composition and distribution of suspended sediment in water and bedload samples. Measure the nuclide activity in bedload samples, by using two high purity germanium γ spectrometers, viz. BEGe coaxial P type and GMX70P, to determine the ratio of river-origin and ocean-origin sediments of main channels.

(2) To what extent can the observed changes in hydrodynamics, salinity, and sediment transport be attributed to the construction projects on the watershed and/or within the estuaries?

This question will be addressed by performing numerical simulations (WP2):

The transport processes and morphological evolution of an estuary are the result of continuous interaction between the sedimentary environment and non-linear tidal propagation. Such interactions can result in residual circulations and spatial variation in sediment flux (convergence and divergence, leading to net accretion or erosion). To address all these problems the numerical model Delft3D will be adopted, with specific modules developed and added for wave-current boundary shear stresses, cohesive sediment transport and turbulence damping by fluid mud, to simulate the flow, salinity, and sediment concentration distribution in the YED. Model results will be compared with measured data collected in WP1 as well as other available data. Once fully validated, the model will be used to carry out five scenario studies.

The first two series investigate the natural behaviour of hydro- and sediment dynamics and the third to fifth series investigate the behaviour of hydro- and sediment dynamics under controlled human activities. The details are as follows:

a. Before and after 1998 flood event: The model will be run for one year first by using river discharge of 1998 and then by using mean river discharge (50-year mean of each month data). The 1998-year morphology will be used for the estuary topography. The model will be run for one year to identify the effect of large river/sediment discharge by using observed sediment discharge of 1998 and then by using mean sediment discharge (50-year mean of each month data).
b. Before and after 2006 dry season event: Similar case studies to a. will be conducted but replacing the inputs from 1998 by those from 2006. Differences of the model results between the two cases will identify the effect of low river/sediment discharge.
c. Before and after the construction of the Three Gorges Dam: The model will run for one year first by using river/sediment discharge of 2003 and then by using mean river/sediment discharge (50-year mean of each month data). The 2003-year morphology will be used for the estuary topography. Comparing the differences of the model results between the two cases will identify the effect of large river discharge.
d. Before and after the construction of Qingcaosha Reservoir: The model will run for one year first by using tidal flow/sediment discharge of 2007 and then by using mean tidal flow/sediment discharge (7-year mean from 2009-2015) of the North Channel and South Channel of the YED. Comparing the differences of the model results between the two cases will identify the effect of the construction of Qingcaosha Reservoir.
e. Before and after the construction of Deep Water Project (DWP): The model will run for one year first by using tidal flow/sediment discharge of 1997 and then by using mean tidal flow/sediment discharge (13-year mean from 2002-2015) of the South Channel, North Passage and South

Passage of the YED. Comparing the differences of the model results between the two cases will identify the effect of the construction of the DWP on flow and sediment dynamics.

(3) What are the main mechanisms that are responsible for the behaviour of the hydrodynamics and sediment transport, as well as the response of hydrodynamics and sediment transport to the watershed and/or the constructions of estuarine projects?

This problem, related to specific objectives 2 and 3, will be dealt within WP3. An available 3D (semi-) analytical model that simulates both along- and across-channel distribution of flow and SSC in an estuary will be substantially extended, such that it accounts explicitly for tides and transport of sediment by tidal pumping and asymmetry in tidal mixing, the turbulence closure scheme will be adapted such that turbulent mixing and bottom drag depend on SSC and flocculation and hindered settling will be accounted for [20]. Adding tides is straightforward [21], regarding turbulence closure the model of Chen & de Swart [22] will be used and for flocculation/hindered settling the formulation proposed by Mehta [23] will be adopted to link setting velocity to sediment concentration will partly come from WP1 and WP2. Compared to the existing analytical models that have been applied in the YED, the new model will be formulated in sigma-coordinates, thus results can be directly compared with field data and the numerical model results that yield information at sigma-levels. Some of the data from fieldwork (WP1) and the numerical model (WP2) will be used as input for the analytical model. The new model will be used to systematically analyze the sensitivity of flow and suspended sediment concentration to channel width, channel divergence, bottom profile, width-to-depth ratio, channel-to-flat ratio, effective hydraulic drag, flocculation and hindered settling, river/sediment supply. Different scenarios will be considered, which correspond to natural and forced conditions in the system. The knowledge thus obtained will be used in WP1 to reconsider measurement locations and in WP2 to conduct additional runs.

(4) What measures would result in reduction of sediment siltation, optimization of flood defense and better management of fresh water supply of YE delta system?

This question will be dealt within WP4. The knowledge gained while addressing the previous three research questions will be used to quantify and predict the effect of engineering works on hydro- and sediment dynamics of the YED system. The Chinese team, with support from the Dutch and UK team, will propose decision scenarios of measures of stabilisation of navigation channel reduction of sediment siltation, effective improvement and overall layout design of fresh water allocation and utilisation in the YED, such as inter basin water transfer of Yangtze River from the Three Gorges, Huangpu origin and Taihu Lake. Moreover, a general planning of flood control reaction system of Shanghai city will be suggested to the departments of local government, such as the Water Authority of Shanghai, and the Changjiang Estuary Waterway Administration, Ministry of Transportation.

Management of the project

Overall coordinator: Chinese principal applicant.
WP1: Chinese principal applicant.
WP2: UK principal applicant.
WP3: Dutch principal applicant.
WP4: Chinese first co-applicants with support from Dutch and UK principle applicant.

Collaborative arrangements:

To achieve the aim of the joint research project, the following activities will be arranged:

a. each PhD or postdoc will spend at least 4 months in another team;
b. every nine months a workshop will be organised, every time at a different location;
c. the joint efforts will result in at least 2 joint papers;

Moreover, the project members of the research team will pay short visits to the counterpart institute, to perform joint work and discuss the progress of the project. Besides, they will meet at international conferences, where the results of the project will be presented. The joint efforts are aimed to at least 2 joint papers. The details about management of this project are described in 10. **Period of funding** and the contents of the cooperation arrangement are in 13. **Sino-Dutch-UK cooperation**.

References:

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10. Period of funding

Please indicate the total duration of the project and the planned start date of the research. Project duration should be at least 3 years and no more than 5 years. Funded projects must start as soon as possible, in any case not later than 6 months after the date of grant award (expected April/May 2017).

Total duration: 4.5 years
Proposed starting date: September 1, 2017

The first research year:
9/2017-2/2018
-Literature study.
-Gathering available field data of flow, sediment, fluid mud, bed load in the YED and collect these data in one data base (WP1).
-Analyse available samples and prepare detailed plan for the first field campaign.
-Sample analysis in the lab and primary data analysis (WP1).
-Three research teams meet at ECNU (in Shanghai, China), and further discuss and confirm the research plan in details.
-Joint field observation and taking samples in a spring-neap period (dry season) by three teams.
Note: One Dutch PhD/postdoc and one British PhD/postdoc will join the field campaign and lab work.

3/2018-8/2018
-Data analysis and sorting, sediment experiment in the lab (WP1).
-Construct the semi-analytical and numerical models and perform test experiments (WP2 and WP3).
-Joint field observation and taking samples in a spring-neap period (flood season) by three teams.
-Workshop at UU.

The second research year:

9/2018-2/2019
-Field observations; taking samples in a spring-neap period of the dry season.
-Sample analysis in the lab and data analysis (WP1).
-Performance of numerical simulations (WP2).
-Experiments with the 3D semi-analytical models (WP3).
-Completing the workload of WP1.
-Design the integrated management scenarios of sustainable YED (WP4).
-Attend international conference to present results and write research papers based on the phase-l.

3/2019-8/2019
-Meeting of PI's at DU to discuss initial results and synergy of the project (DU workshop).
-Long-term visit of ECNU PhD and DU postdoc to DU, to study with the numerical models.
-Experiments with the 3D numerical model (WP2).

The third research year:

9/2019-2/2020
-Long-term visit of ECNU PhD and DU postdoc to UU, to receive training on analytical modelling (WP3).
-Further studies with semi-analytical models(WP3).
-Workshop at UU.

3/2020-8/2020
-Further studies with numerical models （WP2).
-1 meeting of PI's at Dundee (DU) to discuss progress and synergy of the project of phase-2 (DU workshop).
-Three teams will meet at DU to summarise the research results. Completing the workload of WP2.

The fourth research year:

9/2020-8/2021
-Completing final model experiments and sensitivity studies (WP3).
-Continue working on the integrated management scenarios of sustainable YED (WP4)
-Workshop at UU.
-Write scientific papers.
-The PI's will meet one time to streamline and plan the details of the final stage of the project.
-Completing the workload of WP3.
-Write PhD theses by ECNU and UU PhDs.

The last phase of the research:

9/2021-2/2022
-Attend international conference to present results.
-Write scientific papers.
-Completing the workload of WP4
-The PI's will meet at ECNU to wri.te the final report of the project (workshop at ECNU).

11. Relevance to the theme of call (max. 250 words)

Please describe the relevance of the proposed research with respect to the aims and themes of this call. projects should align with the theme as stated in § 2.2 of the call text.

Our proposed project fits into theme 3 (Integrated coastal zone management), item of the NSCF-NWO-EPSRC call. The project seeks to gain more fundamental knowledge about the hydrodynamics and about erosion, transport and deposition patterns of fine sediments in estuarine delta networks. Specific focus is on quantifying the dynamics in the turbidity zones of the Yangtze Estuary Delta (YED) prior and after major engineering works, such as the Three Gorges Dam, the construction of a fresh water reservoir, deepening of navigation channels, etc. These interventions resulted in undesirable phenomena, like tidal amplification and siltation of waterways. Our project aims at identifying key reasons for the changes that were induced by the engineering works, and proposing effective management strategies to reduce negative effects of the interventions. In particular, science-based measures will be proposed to avoid that the YED turns into a hyperturbid system. The YED has been selected, because it is a large estuarine delta network, thereby posing new challenges to the models of the UK and Dutch teams. The knowledge obtained in this project is relevant on the Chinese side, but will also be extremely useful for the UK and Dutch side to improve management of estuarine delta networks in these countries. Given the economic and ecologic value of estuarine deltas, the research conducted within this project clearly is important for society. The motivation to select the area is to obtain generic knowledge about estuarine delta systems and to achieve optimum exchange of information between the Chinese, Dutch and British teams.

12. Knowledge utilisation (max. 250 words)

Please describe the potential use and relevance of the knowledge generated beyond the applicants' field(s) of research or beyond the academic world (economical, technical, societal or cultural). See call text (§ 4.2) for more details.

The following knowledge utilisation is foreseen.
•A large amount of new field data will be collected, which will be analysed within the present project, but which is also extremely valuable for future research.
•An advanced (semi-) analytical model will be available for the study of hydro- and sediment dynamics in three dimensional system.
•Add knowledge to the understanding of the response of hydro- and sediment dynamics, regime shift in delta networks by the human interventions.
•Add guidance to the management of the flood defence, fresh water supply and deep waterway in the estuarine delta networks.
• Publications in high-level, peer-reviewed research journals.
• Presentations of the research at international conferences and contributions to the proceedings of these conferences.
•Two PhD students (one at ECNU and one at UU) will graduate on the basis of the results of the project.
•Establishment of a stable long-term scientific collaboration between the three research teams.

The knowledge acquired in the project will be disseminated in two different ways. First, in each of the participating countries workshops will be organised, for which both scientists and end users are invited to discuss scientific results and potential consequencies for coastal management. In the Netherlands, the framework of the yearly 'Ems-Scheldt workshops', organised by the Ducth PI, will be used for this purpose, by extending the scope of these workshops. Second, the PI's will write one joint paper for a target group of end users about the project results and the proposed management strategies that are based on these results.

13. Sino-Dutch-UK cooperation (max. 500 words)

Please provide a detailed description of how the proposed research will contribute to capacity development in China, the Netherlands and the UK. Please mention concrete actions, deliverables and relevant stakeholders. See call text (§ 4.2) for more details.

The Chinese research team has ample expertise in field work in the Yangtze Estuary, as well as in the identification and interpretation of hydrodynamic and morphodynamic phenomena that occur in this estuary. The Dutch team is specialised in the development and analysis of analytical and numerical models to quantify feedbacks between water motion and fine sediments in estuaries. The British team is specialised in civil engineering, sediment transport and probabilistic coastal engineering design methods. Three teams share a common drive to broaden their views and to integrate their expertise, leading to new and innovative research.

The Chinese team and the Dutch team have concrete joint work since 2009, when two PhDs of ECNU (Dr. C. Jiang and Dr. Z. Yang) worked at UU. Prof. Cheng (PI of the Chinese team) has visited UU in 2013. From the Dutch side, a PhD (Dr. N. Alebregtse) of UU visited ECNU and joined field study and laboratory work in 2012. Prof. de Swart (PI of the Dutch team) has visited ECNU several times and works as an advisory professor at this university. A PhD student at UU (W. Chen), funded by a grant of the Chinese Scholarship Council, is developing a model for hydrodynamics and sediment dynamics that accounts for both along- and across channel processes. Concrete joint work between the Chinese and British team started in 2008, when a PhD of ECNU (Dr. W. Li) started his research on the subaqueous dunes to the variation of riverine sediment supply in an estuary, which is supervised by Prof. Dong (the British PI).

Within the proposed project, the Chinese side will take charge of the collection of historic data, on-site measurement and lab analysis. Meanwhile, one PhD (Dutch side) and a postdoc (British side) will visit ECNU several times, for periods varying from 2 weeks to 4 months, to take part in field work and laboratory work. Moreover, the visitors will work with the members of the Chinese team on analysing data and testing the models. The British side will focus on conducting the numerical simulations. The PhDs from the Chinese and Dutch side will visit DU for at least 4 months to be closely involved in designing, analyzing the numerical model and comparing results with the data that collected in field work. The Dutch side will focus on developing the 3D (semi-) analytical model. The PhD/postdoc from the other teams will work at UU together with the Dutch team, to receive training on analytical modelling and to apply this knowledge to the YE.

Besides, members of the research team will pay short visits to the counterpart institute, to perform joint work and discuss the progress of the project. Such visits will be combined with the organisation of workshops, during which the progress of the project will be discussed.

The present project aims at further intensifying the collaboration between the Chinese, Dutch and British teams, and setting up a long-term inter-institutional cooperation for a joint PhD programme and regular academic exchange.

14. Composition of the research team and the participating partners

Please indicate the composition of the consortium and the research team per country in enclosed tabular form:

a) the principal applicant;
b) the co-applicant(s) from academia (optional);
c) the partners from academia and private and public sector;
d) the scientific and non-scientific staff who will carry out the research; if the names are not yet known, you can suffice by mentioning their positions.

Note: a principal and/or co-applicant cannot be the person carrying out the research.
Note: also indicate the persons whose contribution is intended as in kind matching.

Indicate, for all persons involved: their name, affiliation (university, institution, company, organisation, etc.), expertise and their role in the project. For the staff who will carry out the research, please indicate the duration (in months) and intensity/scope (FTE) of the requested appointment as well. In case of postdoc research you should indicate who will be the supervisor. In case of a PhD position the name of the promotor should be included.

Consortium NL	**Name & title**	**Affiliation**	**Expertise**	**Role in project**
Applicants				
1. Principal applicant	Prof. dr. H.E de Swart	UU	coastal and estuarine physics	coordinator, core team member
2. Co-applicant from academia 1				
3. Co-applicant from academia 2				
Consortium partners from academia and private and public sector				
4. Consortium partner	Dr. G.P. Schramkowski	FHI Antwerp	senior consultant	advisor
5. Consortium partner				

Temporary staff	**Affiliation**	**Expertise**	**Duration**	**Intensity**	**Supervisor and/or**

requested			(months)	(FTE)	**promotor**
Scientific staff					
PhD 1	UU	Coastal dynamics	48	1	H.E. de Swart
Postdoc 1					
Non-scientific staff					

Consortium China	**Name & title**	**Affiliation**	**Expertise**	**Role in project**
Applicants				
1. Principal applicant	Prof. Cheng H.Q.	ECNU	Sediment dynamics and morphodynamics	coordinator, core team member
2. Co-applicant from academia 1	Prof. Li J.F.	ECNU	Sediment dynamics	Co-promotor
3. Co-applicant from academia 2	Associate Prof. Dr. Li Z.H.	ECNU	Hydrodynamics and sediment dynamics	advisor, co-promotor
Consortium partners from academia and private and public sector				
5. Consortium partner	Zhang E.F.	ECNU	Hydrodynamics	co-promotor
6.Consortium partner	Jiang C.	Yangzhou U.	Sediment dynamics	co-promotor
7. Consortium partner	Wu H.	ECSRC	Management	Advisor

Temporary staff requested	**Affiliation**	**Expertise**	**Duration** (months)	**Intensity** (FTE)	**Supervisor and/or promotor**
Scientific staff					
PhD 1	ECNU	hydrodynamics	48	1.0	Prof. Cheng, Prof. Li J.F.
Postdoc 1					
Non-scientific staff					

Consortium UK	**Name & title**	**Affiliation**	**Expertise**	**Role in project**
Applicants				
1. Principal applicant	Prof. Ping Dong	DU	Sediment dynamics and morphodynamics	coordinator, core team member
2. Co-applicant from academia 1	Prof. dr. Peter Davies	DU	Coastal flow circulation and mixing	Advisor
3. Co-applicant from academia 2				
Consortium partners from academia and private and public sector				

4. Consortium partner				
5. Consortium partner				

Temporary staff requested	**Affiliation**	**Expertise**	**Duration** (months)	**Intensity** (FTE)	**Supervisor and/or promotor**
Scientific staff					
PhD 1					
Postdoc 1	DU	Computational hydrodynamics	36	1.0	Prof. Ping Dong
Non-scientific staff					
Technician	DU	ICT	36	0.1	Prof. Ping Dong

15. Summary of requested funding within the total budget

In case of exchange visit of scientists, the visiting scientist will cover the costs of the international flights and the host will provide the local accommodation along with a daily allowance and domestic travel costs.

Budget applied for by the Dutch Principal Investigator:

Project costs			
Scientific Staff	FTE	No. of months	**STAFF COSTS (k€):**
Postdoc … x pd-3yr			
PhD student 1 x PhD	1	48	209.2
TOTAL STAFF COSTS (k€):			
Description of research costs:			**RESEARCH COSTS (k€):**
Give a description of the research costs (visiting and organising workshops, 2x3 months visits, conferences)			
coordinator			20 k€
PhD			30 k€
(max k€ 75) **TOTAL RESEARCH COSTS (k€):**			50 k€
(max k€ 280) **TOTAL APPLIED (STAFF + RESEARCH) (k€):**			259.2k€

***Estimation of the maximum amount including a fixed bench fee (VSNU tariffs).*

Budget applied for by the Chinese Principal Investigator:

Project costs		
Scientific Staff	FTE	No. of months
PhD student 1 x PhD	1	48
(For Chinese researchers, personnel costs are covered by the universities, and hence are not displayed here)		
Description of research costs:		**RESEARCH COSTS (RMB):**
Give a description of the research costs (vessel, transportation, instruments, assisting worker and daily allowance for the researchers during the field survey, flight tickets for Chinese partners to the Dutch and British, workshops and conferences)		
Vessel and fuel power		1 M RMB

Equipment/Instruments	250 K RMB
Daily allowance for the researchers and assisting worker	250 K RMB
Transportation	300 K RMB
Seminar/Workshop	400 K RMB
International cost for Chinese partner	600 K RMB
Others	130 K RMB
Administration	150 K RMB
(max 3 M RMB) **TOTAL RESEARCH COSTS (RMB):**	2.98 M RMB

Budget applied for by the UK Principal Investigator:

Project costs			
Scientific Staff	FTE	No. of months	**STAFF COSTS (k£):**
PhD student … x PhD			
Postdoc 1 x pd-3yr	1	36	148
TOTAL STAFF COSTS (k£):			148
Description of research costs:			**RESEARCH COSTS (k£):**
Give a description of the research costs (e.g. for exchange visits, equipment, consumables etc.), as detailed as possible			
Travel and subsistence (Project meetings, visits to partners' institutions and attending conferences)			34
Consumables			2
Equipment			5
PI and Co-I time cost (6hrs/wk)			50
Infrastructure technician			4
Estates			60
Indirect costs			148
TOTAL RESEARCH COSTS (k£):			303
TOTAL APPLIED (STAFF + RESEARCH) (k£):			451

16. Brief curriculum vitae of the three principal applicants in the Netherlands, China, and the UK, respectively.

Please provide a brief (max. three A4 pages per CV) curriculum vitae of the three main applicants from the three participating countries, including main publications of the applicant(s) of the past ten years, maximum 15; restrict the CVs to elements relevant to the assessment of this application.

Dutch PI

Name: Huibert Eduard de Swart

Address: Utrecht University
Institute for Marine and Atmsopheric Research
Princetonplein 5, 3584 CC Utrecht
The Netherlands

Phone: +31 30 2533275
E-mail: h.e.deswart@uu.nl
Home page: http://www.staff.science.uu.nl/~swart104/

Date and place of birth: January 31, 1960, Doetinchem, The Netherlands

Education
Bachelor degree physics, Utrecht Univ.: April, 1981
Master degree meteorology and phys. oceanography: Utrecht Univ., September, 1983
PhD degree, Faculty of Physics & Astronomy, Utrecht Univ., 'Vacillation and predictability properties of low-order atmospheric spectral models': April, 1988, publ. by Centre of Math. & Computer Sci., Amsterdam.

Positions:
1983-1987: junior scientist, Centre for Mathematics and Computer Science, Amsterdam.
1987-1997: researcher/lecturer, Institute for Marine and Atmospheric Research, Utrecht University (I.M.A.U.)
1997-2005: senior researcher/lecturer at IMAU & Faculty of Physics and Astronomy, Utrecht University.
2005- : professor in Physical Oceanography of the Coastal Zone, Faculty of Science, Dpt. Physics and Astronomy, Utrecht University.
2006-2013 advisor at Centre for Mathematics and Computer Science, Amsterdam (1 day/wk).

PhD students and projects (1992-present)

19, of which 13 are completed, 5 are ongoing.

Postdocs and projects (1992-present)

10, all completed.

Prizes

* Excellence in refereeing, American Geophys. Union, Journal of Geophysical Research F, 2011.
* Advisory professor at East China Normal University, since October 2013.
* Teacher of the year 2013/14 (first year Bachelor Physics)' of the Dpt. Physics & Astronomy.
* Teacher of the year 2014/15 (master Physics) of the Dpt. Physics & Astronomy.
* Teacher of the year 2015/16 (first year Bachelor Physics) of the Dpt. Physics & Astronomy.

Selected publications (for full list see my homepage; here only publications that are not in references of item 9)

De Swart, H.E. and J.T.F. Zimmerman, 2009. Morphodynamics of tidal inlet systems. Ann. Rev. Fluid Mech. 41, 203-229, doi: 10.1146/annurev.fluid.010908.165159.

Cheng, P., H. E. de Swart, and A. Valle-Levinson, 2013. Role of asymmetric tidal mixing in the subtidal dynamics of narrow estuaries. J. Geophys. Res. Oceans, 118, 2623-2639, doi:10.1002/jgrc.20189.

Jiang, C., J. Li and H.E. de Swart, 2012. Effects of navigational works on the morphological change in the bar area of the Yangtze estuary. Geomorphology 139-140, 205-219, doi:10.1016/j.geomorph.2011.10.020.

Huijts, K.M.H., H.M. Schuttelaars, H.E. de Swart and C.T. Friedrichs, 2009. Analytical study of the transverse distribution of along-channel and transverse residual flows in tidal estuaries. Cont. Shelf Res. 29, 89-100, doi:10.1016/j.csr.2007.09.007.

Wang, Z.B., P. Hoekstra, H. Burchard, H. Ridderinkhof, H.E. de Swart and M.J.F. Stive, 2012. Morphodynamics of the Wadden Sea and its barrier island system. Ocean & Coastal Management 68, 39-57, doi:10.1016/j.ocecoaman.2011.12.022.

Alebregtse, N.C., H.E. de Swart and H.M. Schuttelaars, 2013. Resonance characteristics of tides in branching channels. J. Fluid Mech. 728, R3, R3-1-11, doi:10.1017/jfm.2013.319.

Ribas, F. A. Falqués, H.E. de Swart, N. Dodd, R. Garnier and D. Calvete, 2015. Understanding coastal morphodynamic patterns from depth-averaged sediment concentration. Rev. Geophys. 53, doi: 10.1002/2014RG000457.

Ridderinkhof, W., H. E. de Swart, M. van der Vegt and P. Hoekstra, 2016. Modeling the growth and migration of sandy shoals on ebb-tidal deltas. J. Geophys. Res. F, doi: 10.1002/2016JF003823e.

Blondeaux, P., H.E. de Swart and G. Vittori, 2009. Long bed waves in tidal seas: an idealized model. J. Fluid Mech. 636, 485-495, doi: 10.1017/S0022112009990887.

Talke, S.A., H.E. de Swart and V.N. de Jonge, 2009. An idealized model and systematic process study of oxygen depletion in highly turbid estuaries. Estuaries and Coasts 32, 602–620, doi: 10.1007/s12237-009-9171-y.

De Swart, H.E. and N.D. Volp, 2012. Effects of hypsometry on the morphodynamic stability of single and double tidal inlet systems. J. Sea Res. 74, 35-44, doi:10.1016/j.seares.2012.05.008.

Díez-Minguito, M., A. Baquerizo, H.E. de Swart and M.A. Losada, 2014. Structure of the turbidity field in the Guadalquivir estuary: Analysis of observations and a box model approach. J. Geophys. Res. Oceans, 10.1002/2014JC010210.

Ensing, E., H.E. de Swart and H.M. Schuttelaars, 2015. Sensitivity of tidal motion in well-mixed estuaries to cross-sectional shape, deepening, and sea level rise. Ocean Dyn. 65, 933-950, doi: 10.1007/s10236-015-0844-8.

Nnafie, A., H.E. de Swart, R. Garnier and D. Calvete, 2015. Dynamics of shoreface-connected and inactive sand ridges on a shelf, Part 2: The role of sea level rise and associated changes in shelf geometry. Cont. Shelf Res. 104, 63-75, http://dx.doi.org/10.1016/j.csr.2015.05.009.

Liu, B. and H.E. de Swart, 2015. Impact of river discharge on phytoplankton bloom dynamics in eutrophic estuaries: A model study. J. Mar. Sys. 152, 64-74.

Selected presentations

* Effects of tidal basins on the stability of tidal inlets and the spatial structure of ebb-tidal deltas. Key-note presentation, Coastal Dynamics Conference, Arcachon, June 2013.
* Three-dimensional dynamics of sediment trapping in tide-dominated estuaries, an exploratory model. CERF Conference November 2013.
* Invited lecture series at East China Normal University, Shanghai: Tides and turbidity in estuarine systems, 2014-2015.
* Ebb-tidal deltas: Observations and modelling. Yangzhou University, December 2014.
* Effect of human interventions and climate change on estuarine tides and turbidity. Xiamen University, December 2014.
* Effect of river discharge and geometry on tides and net water transport in the Yangtze Estuary, a simple model. EGU, Vienna, April 2015.
* Vertical structure of tidal current profiles in estuaries and bays, role of space-dependent eddy viscosity. Granada, May 2015.
* Transverse distribution and transport of suspended sediment in tidal estuaries, a process analysis (with W. Chen). CERF, Portland, 2015.
* Sensitivity of phytoplankton distribution on large-scale deepening in turbid estuaries (with B. Liu and V.N. de Jonge). ECSA 56 Coastal systems in transition: From a 'natural' to an 'anthropogenically-modified' state, Bremen, 2016.
* Formation and migration of sandy shoals on ebb-tidal deltas, observations and modelling. PECS Conference, The Hague, 2016.

Scientific coordination 2010-present

* Co-organizer Int. workshop 'Use of LSA in coastal morphodynamics', Barcelona, January 2010.
* Co-convenor of 'Open session on coastal and shelf seas', EGU Conference, Vienna, 2010-present
* Organiser (with L.R.M. Maas) of symposium on behalf of J.T.F. Zimmerman, October 2011.
* Guest editor special issue J. Sea Research, tribute to J.T.F. Zimmerman.
* Co-convenor of mini-symposium 'Patterns in sand', EUROMECH, Rome, September 2012.
* Organiser of yearly Ems workshops: 2011-present
* Co-organiser Course 'Morphodynamic pattern formation', Coastal Dynamics, Arcachon 2013.
* Co-organiser International Summer Course 'Hydro and morphodynamics of coastal seas and estuaries', Skallingen (Denmark), June/July 2014.

Management

* Programme Committee Netherlands Centre for Coastal Research, 2000-2006.
* Board of Education, Faculty of Physics & Astronomy, Utrecht University, 1999-2001.
* Policy/advisory committee, Neth. Foundation of Sci. Res., Earth & Life Sciences. 2004-2006.
* Management team, IMAU, 2001-2005, and 2013-present.
* Board of Buys Ballot Research School, 2006-2011.
* Member of Advisory Committee, Rivers Coast and Estuarine Morphodynamics, 2009-present
* Committee 'Helderheid Waddenzee', Min. LNV, 2010.
* Board of Studies, Graduate School Natural Sciences, 2010.
* Chairman Sub Board of Examiners, Physics & Astronomy, Utrecht Univ., August 2010-2013.
* Chairman Board of Studies, Graduate School Natural Sciences, January 2011-February 2014.
* Chairman project team 'teaching load', Fac. of Science, Utrecht Univ., 2012
* Director of Education, Dpt. of Physics & Astronomy, Utrecht Univ., February 2014-present.
* Advisor Flanders Hydraulic Institute, Antwerp, Belgium.

UK PI

Name: Ping Dong
Current position: Professor of Coastal Engineering

Work address Division of Civil Engineering
School of Engineering, Physics and Mathematics
University of Dundee, Dundee DD1 4HN, UK

Higher Education

1/1984 - 6/1988 Ph.D in Coastal Engineering, Imperial College, University of London. Title of the Thesis: The Computation of Wave-induced Circulations with Wave-Current Interaction and Refined Turbulence Modelling.

1988 Diploma of Imperial College in Civil Engineering, Imperial College

2/1978 - 2/1982 B.Eng in Maritime Engineering (1st Class), Dalian University of Science and Technology, China

Work Experience

1987 - 1989 Research Assistant, Imperial College, London
1989 - 1990 Post Doctoral Research Associate University College, London
1990 - 1994 Senior Engineer/Mathematical Modeller, Babtie Group Ltd, UK
1994 - 1996 Principal Engineer/ Mathematical Modeller, Babtie Group Ltd, UK
1996 - 2002 Lecturer, University of Dundee
2002 - 2006 Senior Lecturer, University of Dundee
2006 - 2007 Reader, University of Dundee
2007 – Date Professor in Coastal Engineering, University of Dundee
2008- 2012 Head of Civil Engineering Division

2012 - Adjunct Professor, China Ocean University, Qingdao, China
2008 - Advisory Professor, East China Normal University, Shanghai, China

Research

Current Research Areas:
- Ocean currents and sediment fluxes
- Sediment transport and its implication to ecosystem dynamics
- Coastal and estuarine morphodynamics
- SPH methods in environmental flow modelling
- Soil liquefaction and particle flows
- Wave-structure-soil bed interactions

Research Grants since 2006

GRANTS PERIOD	PROJECT NAMES	FUNDING BODY	VALUES
2012-2016 **PI**	Interactions of flow, tidal stream turbines and local sediment bed under combined waves and tidal conditions (INSTRON)	EPSRC	£854,683
2012-2014 **PI**	Montrose Bay environmental development – Phase III	Angus Council	£50,000
2009-2011 **PI**	Montrose Bay environmental development – Phase I, II	Scottish Executive and Angus Council	£169,000
2009-2012 CI with Prof Dong-Sheng Jeng	Integrated prediction of 3D wave-induced liquefaction around breakwater heads	EPSRC	£472,505
2006-2009 **PI** with Prof. P. A. Davies	Morphodynamics of sand-mud beaches	EPSRC	£329,000

PhD students (since 1996)

8 (7 completed, 1 ongoing)

PDRA (since 1996)

10 (all completed)

Recent publications relevant to the proposal

Dong, P, 2007, A two-fraction formulation of critical shear stresses for sand and silt mixtures, J. of Coastal, Port, Harbour and Waterway Eng., 133(3): 238-241

Shi, L.Q, Li, J.F., Dong, P, Ying, M, Li, W.H. and Chen, S.L., 2007. An experiment study of erosion characteristics of sediment bed at the Yellow River Delta, Coastal Engineering Journal, 49(1):25-43

Dong, P, 2008, A The long-term equilibrium beach profile based on the Maximum Information Entropy concept, J. of Coastal, Port, Harbour and Waterway Eng., ASCE, 134(3): 160-165

Cuthbertson A, Dong, P., King, S and Davies, P.A. 2008. Hindered settling velocity of cohesive / non-cohesive sediment mixtures, Coastal Engineering, 55(12):1197-1208

Li W. H., Cheng H.Q., Li J.F. and Dong P., 2008. Temporal and spatial changes of dunes in the Changjiang (Yangtze) estuary, China, Estuarine, Coastal and Shelf Science, 77(1):169-174

Peng, Jun; Chen, Shenliang; Dong, Ping, 2010. Temporal variation of sediment load in the Yellow River basin, China, and its impacts on the lower reaches and the river delta. Catena 83(2-3):135-147

Cuthbertson, Alan J. S.; Dong, Ping; Davies, Peter A, 2010. Non-equilibrium flocculation characteristics of fine-grained sediments in grid-generated turbulent flow

Xu, Haixia; Dong, Ping, 2011. A probabilistic analysis of random wave-induced liquefaction .Ocean Engineering, 38(7): 860-867

Wang, Y-X. , Ren, X-Z. , Dong, P. & Wang, G-Y. 2011. Three-dimensional numerical simulation of wave interaction with perforated quasi-ellipse caisson, Water Science and Engineering. 4, 1, p. 46-60

Zhou, Chunyan; Li, Guangxue; Dong, Ping; et al, 2011. An experimental study of seabed responses around a marine pipeline under wave and current conditions. Ocean Engineering, 38(1):226-234

Milne, F. D.; Dong, P.; Davidson, M., 2012. Natural Variability and Anthropogenic Effects on the Morphodynamics of a Beach-Dune System at Montrose Bay, Scotland, Journal of Coastal Research, 28(2): 375-388

Ren, Renxizi; Chen, Shenliang; Dong, Ping, 2012. Spatial and Temporal Variations in Grain Size of Surface Sediments in the Littoral Area of Yellow River Delta, Journal of Coastal Research, 28(1A): 44-53, 2012

Milne, F. D.; Dong, P.; Davidson, M. 2012. Natural Variability and Anthropogenic Effects on the Morphodynamics of a Beach-Dune System at Montrose Bay, Scotland, JOURNAL OF COASTAL RESEARCH, 28(2): 375-388

Wang, Yonghong; Dong, Ping; Oguchi, Takashi; 2013. Long-term (1842-2006) morphological change and equilibrium state of the Changjiang (Yangtze) Estuary, China,CONTINENTAL SHELF RESEARCH, 56: 71-81

Wang, Yonghong; Li, Guangxue; Zhang, Weiguo; 2014. Sedimentary environment and formation mechanism of the mud deposit in the central South Yellow Sea during the past 40 kyr, MARINE GEOLOGY, 347: 123-135

Zhou, Chunyan, P Dong, Guangxue Li. 2015. Hydrodynamic processes and their impacts on the mud deposit in the Southern Yellow Sea, Marine Geology, 360:1-84

Dong, P, Yiqiang Chen and Shenliang Chen. 2015. Sediment size effects on rip channel dynamics, Coastal Engineering, 99:124-135

Jianchao Li, Guangxue Li, Jishang Xu, Ping Dong, Lulu Qiao, Shidong Liu, Pingkuo Sun, Zhisong Fan. 2016. Seasonal evolution of the Yellow Sea Cold Water Mass and its interactions with ambient hydrodynamic system. Journal of Geophysical Research: Oceans. 121, doi:10.1002/2016JC012186.

Guangxue Li, Lulu Qiao, Ping Dong, Yanyan Ma, Jishang Xu, Shidong Liu, Yong Liu, Jianchao Li, Pin Li, Dong Ding, Nan Wang, Dada Olusegun A., Ling Liu. 2016. Hydrodynamic condition and suspended sediment diffusion in the Yellow Sea and East China Sea. Journal of Geophysical Research: Oceans. 121, doi: 10.1002/2015JC011442.

Chinese PI

Name: Heqin Cheng

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State Key Laboratory of Estuarine and Coastal Research
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Date and place of birth: October 06, 1962, Jixi county, Anhui province, China

Education:
Bachelor degree/ Petrology and Mineralogy: China University of Geosciences., September, 1979 – July, 1983
Master degree/ Sedimentary petrology, Sedimentary environment evolution of Triassic carbonate in Huaying Mountains, Sichuan Province: China University of Geosciences., September, 1985 – July, 1988
PhD degree/ Marine Geology, Short abrupt climatic events and sequence stratigraphy during the late Quaternary in the Changjiang Estuary/ Marine Sedimentology: Tongji University., September, 1988 – June, 1992

Positions:
1983 -1985: assistant engineer, Geological Research Institute of Anhui Province
1992 -1994: post-doctoral research fellow, State Key Laboratory of Estuarine and Coastal Research, East China Normal University
1994 -2002: associate Professor, State Key Laboratory of Estuarine and Coastal Research, East China Normal University
2002 - : professor, State Key Laboratory of Estuarine and Coastal Research, East China Normal University

Master students (1999-present)
34, of which 27 are completed, 7 are ongoing.

PhD students and projects (2002-present):
6, of which 3 are completed, 3 are ongoing.

Postdocs (2008-present):
2, all completed.

Projects (PI, 1994-present):
20, 17 are completed, 3 are ongoing.

Prizes:
* Visiting Professor, Second Institute of Oceanography, SOA, 2014
* Dawn scholar, Shanghai City, 1999.
* Outstanding dawn scholar, Shanghai City, 2004.
* Venus scholar, Shanghai City, 1997.
* Teacher of the year 1999/2013 (master and PhD Estuarine and Coastal Sediment Dynamics) of the State Key Laboratory of Estuarine and Coastal Research.

Selected publications (for full list see my homepage; here only publications that are not in references of item 9)

Cheng H.Q., 2010. Human intervention and control in the coastal system (in Chinese with focus on the fisheries). Science Press, Beijing, China, 295pp. (in Chinese)
Zheng S.W., Cheng H.Q., Wu S.H., Liu G.W., Lu X.J. & Xu W.X, 2015. Discovery and implications of catenary-bead subaqueous dunes. Sci. China, Earth Sciences, doi: 10.1007/s11430-015 -5194-3.
Yang Z.Y., Cheng H.Q., Li J.F, 2015. Nonlinear advection, Coriolis force, and frictional influence in the South Channel of the Yangtze Estuary, China. Sci. China, Earth Sciences, 58(3):429-435, doi:10.1007/s11430-014-4946-9.
Wu J.X., Wang Y.H., Cheng H.Q, 2009. Bedforms and bed material transport pathways in the Changjiang (Yangtze) Estuary. Geomorphology 104:175-184, doi: 10.1016/j.geomorph.2008.08.011.
Wu, S., Cheng, H., Xu, Y., Li, J., Zheng, S.., 2016. Decadal changes in bathymetry of the Yangtze River Estuary: Human impacts and potential saltwater intrusion. Estuar. Coast. Shelf Sci., doi: 10.1016/j.ecss.2016.10.002.
Jiang H., Cheng H.Q., Xu H.G., Wu J., Ding H., Le Quesne W.F., Francisco A. S., 2008. Examination of fishery and ecosystem trade-offs from marine protected areas in the East China Sea. Enviro. Conserv. 35(2): 137-

146, doi: 10.1017/S0376892908004852.
Jiang H., Cheng H.Q., Xu H.G., Francisco Arreguín-Sánchez, Manuel J. Zetina-Rejon, Pablo Del Monte Luna, Will J.F. Le QUESNE., 2008. Trophic controls of jellyfish blooms and links with fisheries in the East China Sea. Ecol. Modell. 211(3/4): 492-503, doi: 10.1016/j.ecolmodel.2007.10.048.
Li W.H., Cheng H.Q., Li J.F., Dong P., 2008. Temporal and spatial changes of dunes in the Changjiang (Yangtze) estuary, China. Estuarine, Coastal. Shelf Sci. 77(1): 169-174, doi: 10.1016/j.ecss.2007.09.006.
Chen J.Y., Cheng H.Q., Dai Zh.J., Doeke E., 2008. Harmonious development of utilization and protection of tidal flats and wetlands - A case study in Shanghai area. China Ocean Eng. 22(4):649-662.
Cheng H.Q., Li J. F., Yin D. W., Li M.T, Wang B.C., 2008. Nearshore bedforms and their stability evaluation in east entrance to the Qiongzhou Strait, South China Sea. Frontiers of Earth Science in China, 2(3): 283-291, doi: 10.1007/s11707-008-0047-4.
Cheng H.Q., R. Kostaschuk, and Z. Shi., 2004. Tidal currents, bed sediments, and bedforms at the South Branch and the South Channel of the Changjiang (Yangtze) Estuary, China: implications for the ripple-dune transition. Estuaries, 27(5): 861-866, doi: 10.1007/BF02912047.
Cheng H.Q., 1999. Sediment Flux from the Changjiang River into the East China Sea[M]. Biogeochemistry of Rivers in Tropical South and Southeast Asia. SCOPE 82: 165-17.
Cheng H.Q., Song B., Xue Y.Z., 1998. Bedform and episodic resuspension of silt and very fine sand in the Changjiang Estuary, China. Transactions of EOS, 1998 Spring Meeting, AGU: S122.
Cheng H.Q., Wang B.C., 1996. Modern sandy bedforms and their stability on the continental shelf of the East China Sea. Proceedings of International Symposium on Petroleum Geology in the East China Sea. Press of Tongji University, 199: 328-333
Cheng H.Q., Wang B.C., 1994. Impacts of floods on sediment supplies and sedimentation around the Changjiang Estuary. In: Wang yin & David Hopley (Eds.), PACON'93 China Symposium Proceedings. Townsville, Australia: 77-85.

Selected presentations

* Risk assessment and adaptation of fresh water supply in the Changjiang Estuary impacted by sea level rise in the Shanghai City. The fourth Earth System Science Conference, Shanghai, July 2016.
* High-resolution detection and application of nearshore bedform movement in fine sediments. The 2nd Seafloor Observation Symposium, Xiamen, November 2014.
* Study on pier scour of bridge. The 3rd Seafloor Observation Symposium, Qingdao, October 2016.
* Study on the influence of sea level rise in the Yangtze estuary on urban security and key technologies, The third Earth System Science Conference, Shanghai, July 2014.
* Impacts of sea level rise on the Changjiang (Yangzte) estuary (invited), The 13th Five-year Plan Development Strategy Seminar of Hubei Province, Wuhan, September 2015.
* The research progress of flood hazard warning in estuarine delta based on GNSS. Fourth Surveying Science Frontier Technology Forum, Lanzhou, September 2012.
* The impacts and responses of the third driven force in estuary (invited keynote speaker). The Third International Yellow River Forum (IYRF) on Sustainable Water Resources Management and Delta Ecosystem Maintenance, Dongying, 2007.
* Bedload transport rate estimation using the dune's scale measured at the South Channel of Changjiang (Yangtze) Estuary, China. The Sixth Chinese Colloquium on Basic Theoretical Research in Sediment Dynamics, Zhengzhou, 2004.
* Impact of human activities on dissolved silicate flux from the Changjiang River into the East China Sea. SCOPE Workshop on Land-Ocean Nutrient Fluxes: The Silica Cycle, Nha Trang, Vietnam, September 2000.
* Bedform and episodic resuspension of silt and very fine sand in the Changjiang Estuary, China. AGU, AGU, Boston, May 1998.
* Impacts of floods on sediment supplies and sedimentation around the Changjiang Estuary. PACON'93 China Symposium, Beijing, September 1994.

Scientific coordination 2008-present

* Co-organizer 4th workshop of WP4 Ecosystem Modelling of FP6 Project Incofish, Shanghai, January 2008.
* Co-organizer the Int. Conference of Ecosystem Approach Fisheries (EAF) 2010 (received technical support from FAO), Shanghai, January 2008
* Co-convenor of 'Marine sediment process and submarine topography', The 2nd Seafloor Observation Symposium, Xiamen, November 2014.
* Co-convenor of 'Observation of seabed dynamic change and response of geological hazards and engineering environment, The 3rd Seafloor Observation Symposium, Qingdao, October 2016.

Management :

* Board of Marine Surveying and Mapping Committee, 2001-present.
* Board of Marine Geology, Chinese Society for Oceanology and Limnolog, 2002-present.
* Board of Shanghai Geophysical Society, 2014-present.

Statements by the applicants

YES/NO I endorse and follow the Code Openness Animal Experiments (if applicable).

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YES/NO By submitting this document I declare that I satisfy the nationally and internationally accepted standards for scientific conduct as stated in the Netherlands Code of Conduct for Scientific Practice 2012 (Association of Universities in the Netherlands (VSNU)).

YES/NO I have completed this form truthfully.

Dutch PI

Name: H.E. de Swart
Place: Utrecht, the Netherlands
Date: 20 October 2016

Chinese PI

Name: Heqin Cheng
Place: Shanghai, China
Date: 20 October 2016

UK PI

Name: Ping Dong
Place: Dundee, UK
Date: 20 October 2016

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