



Editorial

KLIWAS - A BMVBS departmental research programme

Climate change affects global sea levels, the water balance in river catchments, river condition, and ecological processes in river water and along river banks. The extent of these effects is very unclear at the present time, and it is also uncertain whether the performance capability and management of waterways for goods transport will also be affected. As reported in the 02/2007 newsletter of the German Coastal Engineering Research Council, a review of the possible effects on waterways and inland and maritime shipping has been compiled by the Technical Authorities of the German Federal Ministry of Transport, Building and Urban Development (BMVBS) – the German National Meteorological Service (DWD), the German Federal Maritime and Hydrographic Agency (BSH), the German Federal Institute of Hydrology (BfG) and the German Federal Waterways Engineering and Research Institute (BAW).

On the basis of these findings, the climate impact research programme "KLIWAS – Effects of Climate Change on Inland Waterways and Shipping in Germany" was initiated on 18.03.2009 by Karin Roth, the parliamentary undersecretary in the BMVBS. The KLIWAS programme, with a budget of 20 million Euros, includes 31 projects dealing with "Meteorological Climate Scenarios", "Climate Change in Inland Waterways" and "Climate Change in Coastal Waters and Estuaries". It was possible to recruit 30 new members of staff in the technical authorities of the BMVBS to support the research activities of this departmental research programme. Numerous university institutes and research institutions will also participate in the research programme.

14 projects in the marine sector are included in the KLIWAS programme. Within the framework of these projects the BSH and DWD intend to generate time series of oceanographic and meteorological variables for the North Sea and Baltic Sea for the present reference climate and for different climate projections by means of long-term numerical simulations. Supplementary hydrodynamic computations will also be carried out in the coastal zone as well as in the

Ems, Weser and Elbe estuaries by the BAW and the BfG. On the basis of the latter the BAW will conduct an analysis of the vulnerability of hydraulic installations on the North Sea coast resulting from climate change and will also develop adaptation options for the utilisation of waterways, harbours and coastal protection structures. In the offshore zone the BSH will demonstrate the effects of climate change on maritime shipping and marine utilisation (such as e.g. the fishing industry). The effect of climate-related changes on the suspended material regime of the estuaries as well as the transport behaviour of polluted sediment will be investigated at the BfG as a basis for the forward projection of dredged material management. This will also include a determination of the possible changes in water quality and water hygiene. Based on hydrodynamic loading as well as the results of suspended material and sediment transport studies, the BfG will finally establish projections of possible changes in the foreshore vegetation along the Ems, Weser and Elbe estuaries due to climate change and identify foreshore management adaptation options. Besides obtaining forecasts of the significance of climate-related changes in the marine environment to be expected in the future, a comprehensive evaluation of the data material at the disposal of the Federal Waterways and Navigation Administration, e.g. tidal levels, will also be undertaken. The results of already completed KFKI projects, such as e.g. the IKÜS and AMSEL projects, are of direct relevance to the KLIWAS programme. Moreover, networking with other research collaborations, e.g. KLIMZUG, will be aimed at during the course of the research work.

Up-to-date information and interim results relating to the KLIWAS programme will be made available on the www.kliwas.de website.

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Coasts, Marine Structures and Breakwaters 2009 Conference

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The Coasts, Marine Structures and Breakwaters Conference will take place in Edinburgh (Scotland) from 16 to 18 September 2009 under the motto "Adapting to change". This conference, organised by the Institution of Civil Engineers and supported by more than 30 international institutes, will be staged for the ninth time in succession. The conference will also be supported by the German Coastal Engineering Research Council (KFKI). 300 conference participants will present 140 scientific papers dealing with regenerative energy sources, breakwaters, coastal management, coastal protection structures, harbours and marinas, coastal erosion and wave overtopping.

Owing to a multistage selection procedure, this conference is hallmarked by scientific quality at its very best. Submitted papers will be carefully reviewed and only published following approval by the reviewers. The complete papers will be made available to the conference participants in the form of a computer file prior to the conference. Following normal practice, the discussions at this conference will also be recorded and printed in the proceedings. A consequence of this is that the conference will gain a high reputation among experts.

A special premiere feature at this conference concerns so-called "fringe - papers", which may be submitted up to 30 June 2009. This concerns papers that must be presented in three minutes. These papers must bear reference to the conference themes, should not be commercial, and should deal with an aspect of coastal engineering that has already been realised or could be realised in the future. This is especially intended to provide researchers the

opportunity to present papers at short notice on current developments, projects or events. This may perhaps concern an idea that is also worthy of presentation at national conferences.

A short course prior to the conference provides participants the opportunity to adhere to the current upgraded recommendations regarding the design of coastal protection structures. This includes the EurOtop Manual, the CIRIA Concrete Manual as well as the CIRIA/CUR/CETMEF Rock Manual. As in the case of the ICCE 2008 in Hamburg, the authors are encouraged to present their papers within the framework of the short course.

Further information on the conference may also be found on the conference website:

<http://www.ice-breakwaters.com/>

European Overtopping Manual - Calculation Tool

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The EurOtop Manual was introduced with great success in 2008. This is demonstrated by the many national and international flood protection projects that make use of the EurOtop Manual as a basis for determining the crest heights of dykes, defence walls and revetments. In the meantime the EurOtop Manual is also regularly mentioned in almost all national and international publications dealing with wave run-up and wave overtopping. This is illustrated, for example, by the papers presented at the 31st International Conference on Coastal Engineering in Hamburg in September 2008 **<http://icce2008.hamburg.baw.de>**.

The Calculation Tool in particular has been significantly extended since the introduction of the Eurotop

Manual. The Calculation Tool offers design engineers three possible means of determining the governing wave overtopping parameters. For this purpose the empirical formulae were programmed and made available to users free-of-charge on a website basis. For typical constructions the mean wave overtopping rate may be estimated in relation to the geometrical boundary conditions as well as wave parameters. For complex dyke profiles additional possibilities are offered by the PC Overtopping Program, which is also available on a website. Finally, a neural network is also available in the Internet free-of-charge on the EurOtop Manual homepage <http://www.overtopping-manual.com>.

The neural network was developed on the basis of more than 10,000 model experiments within the framework of the EU Clash Project <http://www.clash-eu.org>.

The Calculation Tool software may be used free-of-charge by all Internet users. It is the responsibility of the authors to extend and update the Calculation Tool as well as the EurOtop Manual at regular intervals according to the current state of knowledge. In order to achieve this, the authors are highly reliant on comprehensive user feedback.

Interaction between sea-going vessels and shipping lanes

Interdisciplinary international discussion by experts on the navigability analysis of shipping lanes

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Motivation

In its role as a central scientific institute, the German Federal Waterways Engineering and Research

Institute (BAW) advises the German Federal Ministry of Transport, Building and Urban Development (BMVBS) as well as the Federal Waterways and Navigation Administration (WSV) on a variety of issues. This includes, for example, navigability analyses and fairway dimensioning in connection with the adaptation of navigation channels to large ships both in inland and coastal waters. Owing to the ever-increasing loading of waterways due to an increase in traffic density and the size of ships, higher demands are posed by the problems facing the Waterways and Navigation Administration.

For dimensioning purposes as well as for carrying out analyses of navigability in coastal fairways, ship navigation simulators, which were actually intended for training the nautical staff of ocean-going vessels, have been applied for a number of years in addition to classical dimensioning methods.

In ship navigation simulations the methods implemented in the mathematical model (e.g. for modelling squat or the bank effect) play an important role regarding the quality of the simulation results and the possible subsequent dimensioning of a fairway.

As a large number of international institutions responsible for seaport approaches are now faced with this scientific problem, discussions have been extended in the meantime beyond the mostly bilateral level of the past. As a consequence, Belgian institutes, who are affected among other things by the approach channel to the port of Antwerp via the Schelde Estuary, decided to stage the first international conference dealing with this topic in Antwerp.

Discussion forum

The focal point of this first international conference on the manoeuvring of vessels in confined waters was the bank effect (also known as the Bernoulli effect), which significantly influences the manoeuvring of

ships in the proximity of banks. The conference took place at the beginning of May 2009 and was jointly organised by the Flanders Hydraulics Research Institute, the University of Ghent (Belgium) and the Royal Institution of Naval Architects (Great Britain). The conference was attended by almost 60 scientists from 30 countries. This demonstrates the mounting interest in these problems and the presently limited offer of platforms for the exchange of ideas in this scientific field.

Measured data were made available by the Flanders Hydraulics Research Institute as a basis for discussion as well as to provide reference values for numerical simulations.

As it is not possible to mention all of the contributions here, attention is limited to a summary of interesting and/or relevant information. The conference proceedings are available in digital or printed form and may be ordered through the KFKI library.

Present state of knowledge

New mathematical models dealing with the bank effect were not presented at the conference. All experiments performed so far confirm that this concerns a highly nonlinear effect, which suggests that the development of a mathematical-analytical approximation for application in engineering practice is improbable. The validity of previously published regression formulae is limited to particular ship types and bank profiles, while the estimation methods already available (e.g. for squat: Barrass, 1981; ICORELS, 1997; Tuck, 1967) only roughly reproduce the underlying physical processes in a simplified manner and are therefore generally conservative in nature.

The presentations of numerical computations painted a similar picture to that already known from past as well as on-going BAW R&D projects: dependable results may only be obtained from simulations that

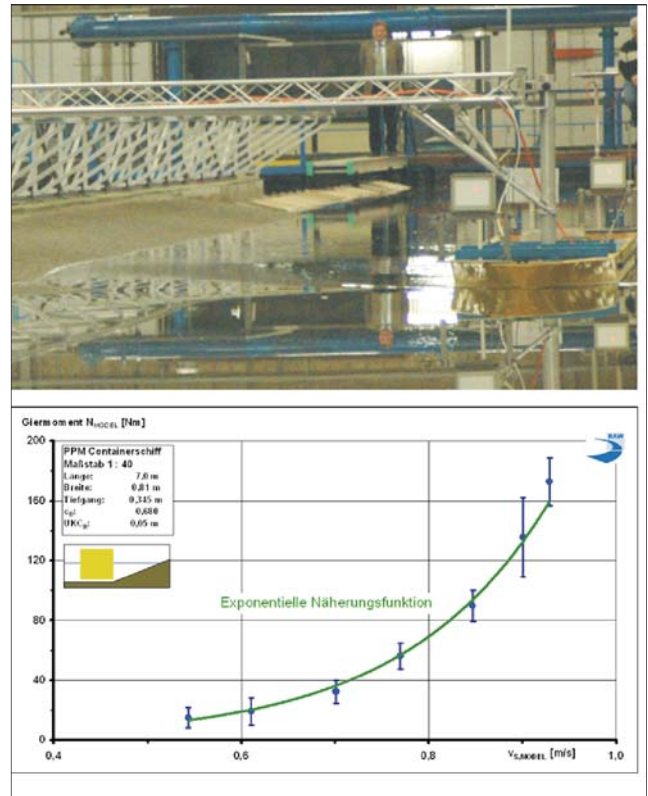


Figure 1:
Speed-dependent yaw moment during the passage of a PanMax container ship past a bank with a 1 : 6 slope (model 1 : 40)

take account of viscosity. The method based on the Reynolds-averaged Navier-Stokes equations, closed by the "shear stress" turbulence model (SST; Menter et al., 1994, 2003), appears to perform well at the present time and is therefore applied most frequently.

Contributions which presented experimental results on the bank effect (speed-dependent transverse forces and yaw moments) confirm the values measured in the new BAW testing facility to the same order of magnitude, despite different ship types and bank slopes (Figure 1; Uliczka / Kondziella, 2009). At other institutions the ship model is tethered at two points owing to the size of the occurring moments. At the BAW the forces are recorded at a single point. Provided the bending rod and the moment sensor deployed in the BAW (Hamburg Office) testing facility keep the model on course, there appears to be no reason to dispense with this elegant measurement

principle.

In the discussion it became clear once again that propulsion plays an important role in the bank effect: without propeller thrust, the drift force behaves differently with increasing speed. At a distance sufficiently close to the bank it is found that above a certain speed range (depending on the hull shape) the drift force even changes sign, i.e. becomes repellent.

This effect does not occur in the case of self-propelled ships. This information is nevertheless noteworthy, e.g. for ship conveyance under pure tug assistance.

The accompanying programme of the conference also included a guided tour of the laboratory testing facilities at the Flanders Hydraulics Research Institute in Antwerp. Here, the towing tank is equipped with a planar motion mechanism (PMM) beneath a towing carriage. The ability to steer the carriage and the PMM by computer-assisted remote control means that it is possible to realise 24/7 operation and hence perform a large number and wide variety of test runs.

Outlook

The next conference in this series will be organised by the Technical University of Trondheim (NTNU). This conference is expected to take place in Trondheim in May 2011. The proposed major theme of this conference concerns "ship interaction / ships in confined shallow waters".

Literature

Flanders Hydraulics Research, Bank Effects Project:

<http://www.bankeffects.ugent.be>

Uliczka, K., Kondziella, B.: Research on ship dynamics of large container ships in confined fairways, Proceedings 1st International Conference on Ship Manoeuvring in Shallow and Confined Water: Bank Effects, Antwerp, Belgium, May 2009

Menter, F. R.: Two-Equation Eddy-Viscosity

Turbulence Models for Engineering Applications, AIAA Journal, Vol. 32, No. 8, August 1994

Menter, F. R., Kuntz, M., and Langtry, R.: Ten Years of Industrial Experience with the SST Turbulence Model, in: Turbulence, Heat and Mass Transfer 4, ed: K. Hanjalic, Y. Nagano, and M. Tummers, Begell House, Inc., 2003

Information on the North Sea and Baltic Sea coast in the German environmental portal

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PortalU Liaison Office

In its role as the largest governmental environmental information network in Germany, the German environmental portal PortalU® **www.portalu.de** currently provides central access to about 3 million environmentally-relevant Internet sites and over 500,000 entries in data catalogues and databases. All environmental information accessed from websites, data sources or metadata sources may be jointly scanned. This concerns information provided by over 290 federal and state institutions and organisations. Besides a general search, separate access to different environmental themes, measured data, maps and service sites is also available. Via an environmental chronicle it is also possible to access historical environmental events. PortalU® thus serves as an instrument for the active dissemination of governmental environmental information in compliance with the EU environmental information directive (2003/4/EG).

The supply of information is being continuously expanded, with the long-term aim of integrating all governmental providers of environmental information in Germany and all agencies with an obligation to disclose information as far as possible in compliance

with the German Federal Environmental Information Act UIG §2. PortalU® is an initiative of the federal and state environmental resource department and is supervised by the PortalU liaison office

www.kst.portalu.de

At present a total of 27 environmentally-relevant data catalogues and databases are integrated into PortalU® via different interfaces. This concerns the federal and state environmental data catalogues (UDKs) (16 in total) as well as additional subject-specific catalogues and databases. The UDKs were made available in July 2008 via a component integrated into PortalU, namely the InGrid®Catalog. By means of the InGrid®Catalog it is possible to compile, update and publish metadata. As a follow-up system of the UDK software, over 15 years of practical experience gained in the federal and state environmental administrations are incorporated in the InGrid®-Catalog. The metadata of these catalogues may hereby be directly entered via the Internet using the InGrid®Editor. The editor is a high-performance web application which permits decentralised management of metadata via web browsers. The InGrid®-Catalog data model conforms with ISO 19115 and ISO 19119 and is currently being upgraded to match the requirements of INSPIRE. The PortalU software and hence also the InGrid®Catalog may be used free-of-charge by federal, state and municipal institutions.

As already mentioned, various subject-specific catalogues and databases from different public institutions are also included in addition to the UDKs in PortalU®. This includes, among others, the Documentation on Nature and Landscape DNL-Online (German Federal Agency for Nature Conservation), FloraWeb, which offers information on wild plants and vegetation in Germany (German Federal Agency for Nature Conservation), the Environmental Literature Databank ULIDAT (German Federal Environmental Agency) and the North Sea and Baltic Sea Coastal

Information System NOKIS (German Federal Waterways Engineering and Research Institute). Collaboration between NOKIS and PortalU® extends back over many years. NOKIS provides a standardised documentation of data and information on the coastal zone which is incorporated into PortalU® via a Data Source Client (DSC-iPlug). Via this DSC interface it is possible to link databases with an arbitrary data structure to PortalU®. The supported database types include MySQL, Oracle, MS-SQL-Server and PostgreSQL. The interlinking of NOKIS via DSC hereby has the advantage that during a PortalU® search, all the results from NOKIS together with the results from additional data sources are represented in a sorted hit list.

Digital North German climate atlas provides information on future

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The North German Climate Office with its headquarters at the GKSS Research Centre in Geesthacht has developed an innovative digital climate atlas. Decision-makers and other interested parties may use the atlas in order to quickly obtain comprehensive information on the current state of research on future climate change in North Germany. Users may gain free access to the digital climate atlas by clicking on **www.norddeutscher-klimaatlas.de**

Motivation: Direct access to climate information in North Germany

In the past, all information concerning climate change in North Germany was stored in different databases in the form of raw data. It was often necessary to tread a long and error-prone path before arriving at the

required information. The North German climate atlas offers user-friendly access to climate information in North Germany. The atlas is designed for interactive use: for individual parameters such as temperature, precipitation or wind, it is possible to specify a time span extending to the end of the century with the additional option of selecting a particular season or region. The user is presently offered the choice of North Germany, the North Sea and Baltic Sea coasts, the metropolitan region of Hamburg, and also in the near future, the metropolitan region of Bremen-Oldenburg.

Data base and method

The North German climate atlas is based on climatic computations available for North Germany, which were carried out using regional numerical climate models. These include, among others, the regional climate model COSMO-CLM (the collaborative regional climate model developed by over 30 international research institutions) and REMO (the regional climate model developed by the Max-Planck Institute of Meteorology). These raw data are mainly stored in the data archive of the German Climate Research Centre and also to some extent in the databanks of EU projects concerned with regional climate change as well as in the archive of coastal climate data CoastDat at the Institute of Coastal Research of the GKSS Research Centre in Geesthacht. Up to now, 11 different climatic computations have been introduced into the climate atlas. The integration of new climatic computations is an on-going process. The forecasts given by the North German climate atlas are therefore always based on the current state of research.

The three possible future changes in the present-day climate are each represented in charts. These result from the present uncertainty regarding future concentrations of greenhouse gases. For this reason the climatic computations were performed on the basis of different greenhouse gas concentrations.

Each greenhouse gas concentration generates a different climate in the future. This results in a spread of possible climatic changes that are equally plausible from a present-day perspective. This spread is represented in the climate atlas in three charts: the first chart shows the average change to be expected while the second and third charts show the least and greatest expected changes, respectively.

The use of data diversity to generate structured information

If changes are identified that may occur simultaneously, the variability of possible future climate changes becomes clearly evident: at the end of this century a 40 per cent reduction in summer precipitation may be accompanied by an average temperature rise of about 5 °C. Under such circumstances about 27 additional summer days (>25 °C) would occur, while at the same time, the average wind speed could drop by about 12 per cent. At best and equally plausible, the summer precipitation in North Germany would only decrease by eight per cent by the end of the century. At the same time it would then be about 2 °C warmer on average, which would result in about 5 additional summer days. In this scenario there would be no significant change in the wind speed.

Summary

Just how much the climate will change in the future in North Germany primarily depends on the future concentration of greenhouse gases. Regardless of the extent to which it is possible to reduce greenhouse gas emissions, the North German climate atlas clearly indicates that climate change in North Germany will certainly continue at an accelerated rate. For this reason it is essential to take appropriate steps immediately in order to avoid the serious consequences of climate change in North Germany. In this respect, the North German climate atlas provides direct access to basic scientific considerations.

Events

- August 9-14, 2009 **33rd IAHR Congress Vancouver**, Vancouver, Canada
info: <http://content.asce.org/conferences/iahr09/>
- September 3, 2009 **Planung, Bemessung und Ausführung von Tiefgründungen für Wasserbauwerke**, BAW, BAW Hamburg-Rissen, Germany
info: <http://www.baw.de/vip/veranstaltungen1.php.html>
- September 7-11, 2009 **Coastal Dynamics**, Tokio, Japan
<http://www.coastal.jp/cd09/>
- September 9-12, 2009 **HTG Kongress 2009 und 56. Mitgliederversammlung**, Lübeck, Germany
info: <http://www.htg-online.de/Kongress-2009.476.0.html>
- September 16-18, 2009 **Coasts, Marine Structures and Breakwaters 2009**, Edinburgh, Great Britain
info: <http://www.ice-breakwaters.com/>
- September 16, 2009 **Webservices für Geo- und Umweltinformationssysteme**, Hannover, Germany
info: <http://www.baw.de/vip/abteilungen/fit/events.php.html>
- September 21-25, 2009 **River, Coastal and Estuarine Morphodynamics - RCEM 2009**, Santa Fe, Argentina
info: <http://info.rcem.serfe.com/>
- September 21-25, 2009 **ICES Annual Science Conference**, Berlin, Germany
info: <http://www.ices.dk/iceswork/asc/2009/index.asp>
- October 27, 2009 **KFKI-Seminar**, DSM Bremerhaven, Germany
info: <http://kfki.baw.de/KFKI-Seminare.41.0.html>
- November 5, 2009 **OCEANS '09 IEEE Bremen - Balancing technology with future needs**, Bremen, Germany
info: <http://www.oceans09ieeebremen.org/>
- November 5, 2009 **Aktuelle Untersuchungen an der Ems und Ergebnisse aus Forschungsarbeiten zur Schlickdynamik und zum Klimawandel**, BAW Hamburg-Rissen, Germany
info: <http://www.baw.de/vip/veranstaltungen1.php.html>
- November 10-12, 2009 **Acqua Alta - International Conference and Exhibition on Consequences of Climate Change and Flood Protection**, CCH Congress Centre Hamburg, Germany
info: http://www.hamburg-messe.de/acquaalta/acquaalta_en/start.php
- January 7-8, 2010 **40. IWASA - Internationales Wasserbau Symposium Aachen**, Technologiezentrum AGIT (am Europaplatz), Aachen, Germany
info: <http://www.iww.rwth-aachen.de/>
- June 30 to July 5, 2010 **32nd International Conference on Coastal Engineering**, Shanghai, China
info: <http://www.icce2010.cn/About.asp>

Imprint

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