

Report on 15th EMSAGG meeting

EMSAGG held its 15th meeting at BGR's offices in Hanover on 29 April. The group discussed various options for European funding and presented its conference activities. Current and future research was discussed and a presentation was given by BGR entitled "BGR North Sea Mapping Project – an overview".

All tired out – using tyre bales at Pevensey beach

Discarded car tyres have been used for decades to form artificial reefs at sea. While monitoring such a reef in Poole Bay, Dr Ken Collins from the School of Ocean and Earth Science at the University of Southampton concluded that the marine environment was one of the least vulnerable places where discarded tyres could be re-used. Since the advent of tyre baling where over 100 tyres can be crushed into a block of 1.3 cu.m, not only can individual tyres be secured but they can also be built into larger structures.

Few shingle beaches on the English Channel coast are self-supporting. Many need to be replenished either by periodic capital schemes or by small, annual recharges. Equally, the supply of aggregate on the channel sea bed is a finite resource. Shingle embankment beaches, such as Pevensey, consist of large quantities of gravel, much of which does not act as a sea defence material, but supports the material above that does. By replacing some of the beach core with alternative aggregates, additional quantities of shingle can be made available to bolster weakening defences without increasing dredging activity. This technique is on trial at Pevensey.

Pevensey is the site of the first and only PFI sea defence scheme in the country, – if not the world. It is therefore the contractor who is undertaking these trials. Contracting to provide a specific service, not the means by which it is achieved, has allowed the private sector greater scope in approaching the increasing challenges posed by sea defence management. Having a 25 year contract means that whole life

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costs are an imperative rather than a luxury and there is sufficient time and incentive to trial a variety of innovative and alternative management techniques.

In November 2002, 350 tyre bales (containing 40 000 tyres) were buried in the beach with sampling wells so that any resulting environmental affects could be detected. At the same time a DTI funded scheme to examine the "Sustainable re-use of tyres in port, fluvial and coastal engineering" was begun. Led by HR Wallingford, the Pevensey trial became the leading field experiment undertaken during the study. Details of the scheme can be found at <http://www.tyresinwater.net>



Tyre bales being buried at Pevensey beach (photo: Pevensey Coastal Defence)

Sandbite...

If you have suggestions for interesting and brief articles to be included in this newsletter please contact emsagg@ciria.org

The greatest benefit of burying a volume of tyre bales in a beach is that it releases a similar amount of shingle for use elsewhere. However to be deemed “successful” other criteria need to be considered, which are broadly divided into two categories; technical and financial.

Technical issues

- ensuring tyres can not break free if the structure becomes subject to wave attack.

The incidence of tyres escaping from early tyre reefs in America resulted in their use being prohibited, a ban some individual states still enforce today.

- making the tyre structures strong enough to act as a backstop in the beach to prevent defences being breached in a severe storm.

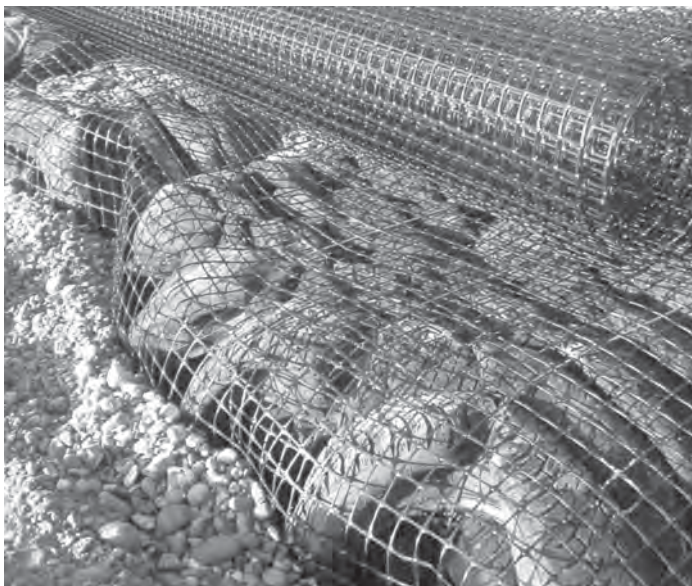
The primary concern at Pevensey is to prevent flooding of the low-lying hinterland. A structure that might fulfil this function could be extremely valuable.

- making sure the bales effect do not adversely influence the porosity of the beach and its performance. Shingle beaches are effective because they absorb wave energy through shingle movement, allowing water to penetrate into the beach.

Tests carried out by HR Wallingford suggest that tyre bale porosity is similar to that of a shingle beach, so their use should not unduly affect the hydrodynamic performance of the beach.

- tyre leachates are monitored by Dr Collins from sampling wells sited within the structure, using Zinc as the main indicator.

Evidence to date shows that the initial surge was short-lived and quickly reduced to low levels, well below recommended amounts.



Secured tyre bales (photo: Pevensey Coastal Defence)

Financial issues

- long term usage in terms of landownership and residual risk should they need to be removed at some point in the future.

In the case of Pevensey this is a complex subject, as most of the sea defences are in private ownership and the works are being completed under Environment Agency's permissive powers.

- how do you value a structure that would prevent the diminishing of sea defences?

Dealing with each technical and financial element adds to the overall expense of a project. Despite the cost of tyre bales being minimal at the point of production, total expenditure for their use would surpass that of supplying new sea dredged aggregate. For Pevensey questions of landownership and residual risk remain largely unanswered, with unknown cost implications. On a positive note, while beaches are being maintained, core shingle will be retained, so that if the use of tyres is not currently a cost effective strategy it will remain an option in the future. On the other hand if protection can be increased in specific “at risk” areas, then the economics may well allow tyre bales to be used to reinforce less robust defences in the near future.

For further information please contact Ian Thomas at Pevensey Coastal Defence.

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TNO analyses the dynamics of sand waves on the North Sea bed

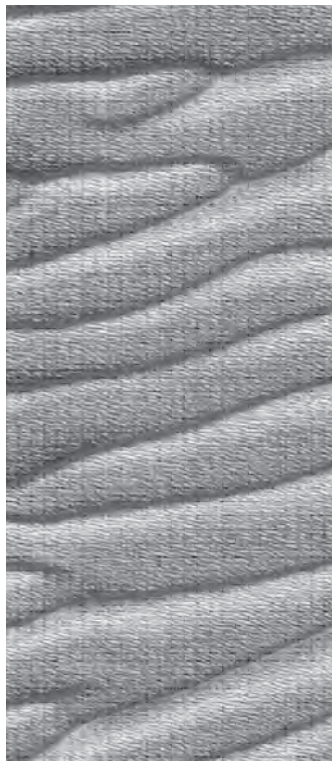
Large parts of the North Sea bed are covered with sand waves whose dynamics vary strongly in different areas. The migration of sand waves can cause horizontal displacements in the order of tens to hundreds of metres and vertical height differences in the order of metres. Knowledge of the morphodynamics of sand waves is important to the decision makers of strategic use of the North Sea, shipping lane maintenance and risk assessments for offshore constructions, such as wind farms and pipelines. In addition, sand wave distribution maps and their wave heights are vital for executive sand mining, namely, the larger the sand waves, the larger the extractable sand volumes.

TNO is developing an automated method for efficient analyses of the morphology and dynamics of sand waves, enabling the digital mapping, description and determination of sand wave mobility in the North Sea.

TNO has access to extensive digital data sets of both single beam and

multibeam bathymetric measurements that are required to determine the mobility of sand waves. Data sets cover time spans of decades, which is in the same order as the lifetime of offshore constructions and activities.

Digital bathymetric data is gridded and compiled into digital morphology maps and profiles. With these, bathymetry maps of two points in time can be analysed and compared with change over time. With cross correlations in Matlab, the distance and direction of maximal displacement is determined for the entire area and with Fourier analyses in Matlab, the dimensions and migration is calculated for individual sand waves. Results of both analyses



Multibeam image of sand waves 50 km offshore of the Dutch coast near Egmond aan Zee.

(distance and direction of migration) correspond well. As a result TNO can produce both morphologic and morphodynamic (vector) seafloor maps of digital bathymetry data of various regions in the North Sea.

Preliminary results show large contrasts in the migration rates of sand waves in different areas of the North Sea, where migration rates may vary from 0 to 200 m per decade. The general trend is migration towards the north-east, although migration rates may vary over seasons and years. This method, determining the dynamics and mobility of bedforms, may be used for estimates on effective sediment transport directions over these timescales.

For further information, contact:

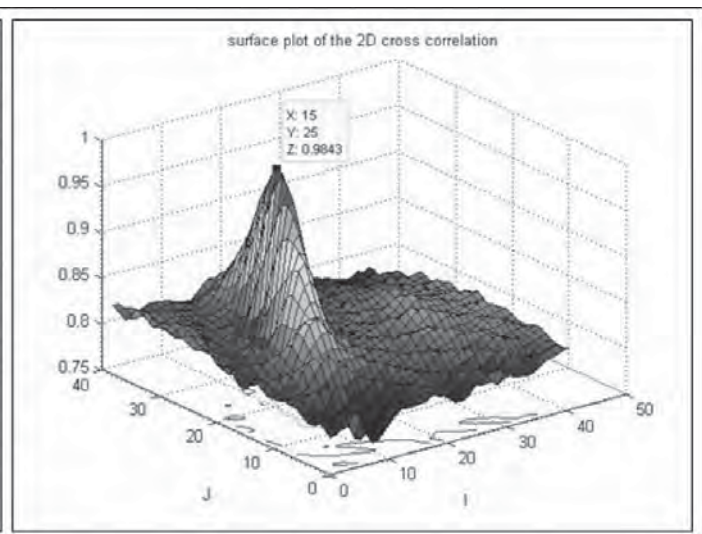
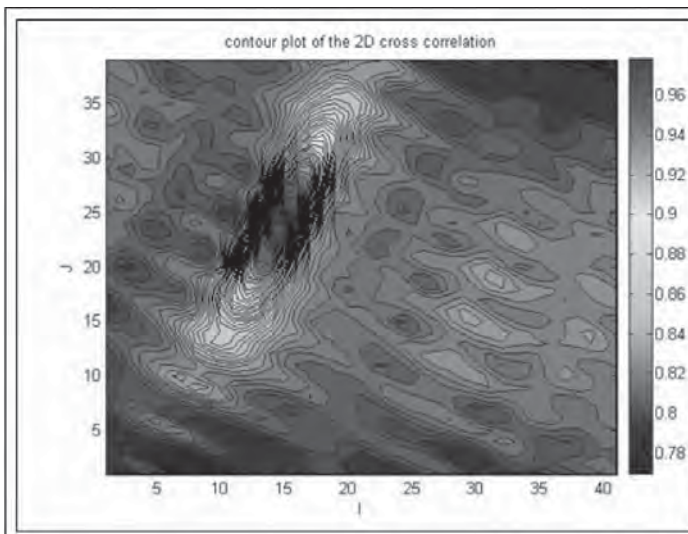
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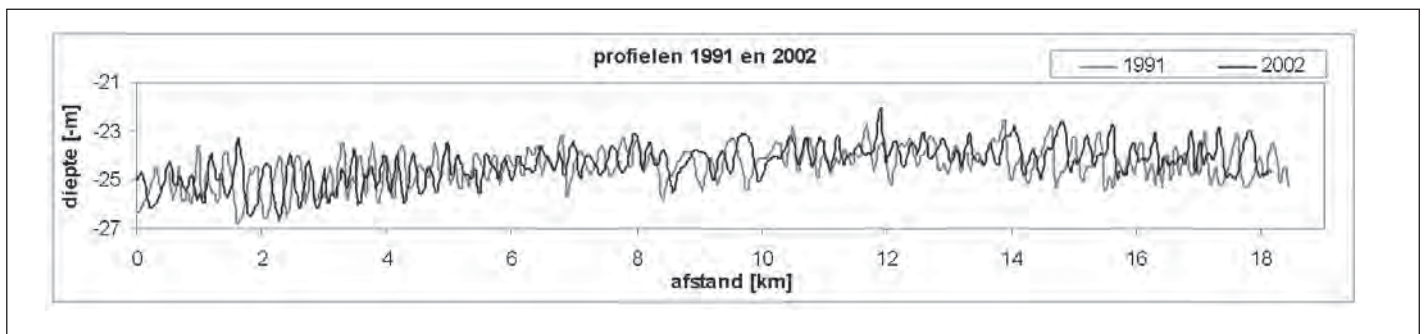
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Sandbite...

Why not check out EMSAGG's website for updates on latest news, events and publications at www.ciria.org/emsagg



Matlab cross correlation results of sand waves near Texel, providing an x,y-displacement in magnitude and direction.



Profiles of 1991 and 2002 show the migration of sand waves near Texel, of which migration rates are determined in Matlab.

Forthcoming event

On 10 October 2005, the Federal Public Service Economy will hold a study day on the sustainable management of marine aggregates on the Belgian Continental Shelf. This study day will be held in the Thermal Palace in Ostend (Belgium) with simultaneous translation between Dutch and French.

For more information, please contact Helga Vandenreyken at:

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EMSAGG Conference 2006

Following the overwhelming success of the last EMSAGG conference, held in Delft in 2003, the next EMSAGG conference is set to be equally beneficial to all those involved with the aggregate industry. The Delft conference attracted over 150 pan European and worldwide delegates from 13 countries and included key note speeches from the Netherlands North Sea Directorate and leading authorities in the aggregate industry.

The 2006 EMSAGG conference will be held in February in London and will provide delegates with the opportunity to gain an understanding of the latest issues and technologies for marine sand and gravel extraction in Europe and around the globe. Delegates will also be able to network and share knowledge with international peers from the industry while getting the latest news concerning policy, planning and research.

The conference will include presentations on:

- markets
- regulators – legislative and environmental
- research and monitoring of seabed and impact on users
- technology
- materials
- data management
- resource exploration and development
- future issues.

An optional site visit is also planned for the second day of the conference programme.

For more information and to register please email victoria.cole@ciria.org or telephone 0207 549 3300



Delegates on a site visit at EMSAGG 2003

Offshore development — new frontiers of opportunity

A CoastNET conference

15 September English Heritage Lecture Theatre, 23, Savile Row, London W1S 2ET

The aim of the conference is to explore how new technology from Europe and around the world is enabling new uses for the marine environment and how its impacts are managed.

To register and book your place visit http://www.ciria.org/conferences_150905.htm or telephone CIRIA on 020 7549 3300

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