WEEG NEWSLETTER October 2018

The newsletter is published monthly by the University of Southampton's Water and Environmental Engineering Group WEEG, and reports things of interest in this field worldwide, as well as ongoing undergraduate student and research work in WEEG itself.

We believe that water and energy are the most important topics worldwide for the next decades. Our work covers river and coastal engineering, water and wastewater and energy related to water.

Editorial: when we think of Tsunamis, we usually think of Japan, Chile, Indonesia – in other words, far away countries. However, tsunamis have occurred and do occur in Europe as well. Avid readers of our laboratory Facebook page will of course remember the meteorological Tsunami in the Netherlands in June 2017, or the landslide Tsunami in Greenland. However, much, MUCH larger events have occurred as well…

Hydraulic Engineering International: *Tsunamis in Europe*

Many tsunamis have been recorded in Europe, in both ancient and recent history. Here we want to focus on two events which occurred – geologically speaking – just a blink of an eye ago: the Lisbon event 1755 and the Messina earthquake and Tsunami of 1908.

Lisbon: On 1 November 1755, a severe earthquake occurred in the Atlantic seabed, 200 km west of Cape Vicente, Portugal.

Fig. 1: Tsunami and Fire in Lisbon, 1st Nov 1755

In the City of Lisbon, many thousands were killed by collapsing buildings. Important buildings such as the Royal Ribiera Palace and the Royal Archives were destroyed. And around 45 minutes after the last tremor, three waves of more than 6 m in height struck the town, flooding the lower areas and killing around 10,000 survivors. In all, it is estimated that 40-50,000 people died out of Lisbon's population of 200,000. The Tsunami waves also caused significant damage in other areas of Portugal, in Morocco and even on the islands of Madeira, where a wave height of 15 m was recorded. Fig. 2 shows the travel times and wave heights of the Tsunami, and you can see the widespread effect it had.

Messina: on 28 December 1908, a magnitude 7.1 earthquake with an intensity of XI occurred in the straits of Messina, almost completely destroying the cities of Messina and Reggio Calabria. An estimated 75,000 to 200,000 people lost their lives.

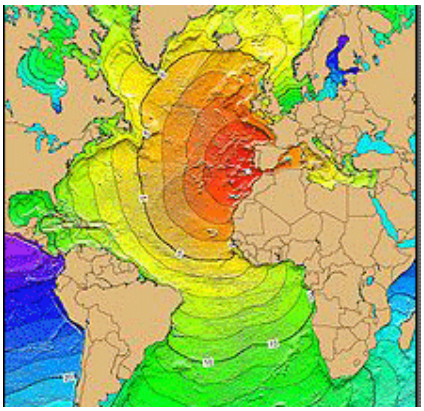

Fig. 2: Travel times / wave heights, 1st Nov 1755

10 minutes after the earth tremors had subsided, the sea receded by around 70 m before a 12 m high wave struck the shore. A second, even higher wave broke the seawall in Messina and flooded the seafront, killing thousands of inhabitants who had fled their houses to the perceived safety of the shoreline.

Fig. 3: Messina Seafront after the Tsunami

Current situation: Scientists know that more Tsunamis will occur, but very little is being done to defend against them. Mario Lopes, Professor at *Instituto Superior Técnico* (Technical University) Lisbon, said: "*Politicians know about the seismic risk and they know it can be reduced, but they do nothing.*"

There is a need to protect the Southern Atlantic seashore as well as the Mediterranean Coastline. The comparatively low frequency of

events gives us a sense of security, which may be misplaced.

WEEG: *Open Days Sept 2018*

On 9 September 2018, the University held an Open Day. The WEEG displays and demos were very well frequented. One of our best recollections is of two school leavers, who came to see the Large Flume Facility. When asked whether they were interested in Civil Engineering, one of them said "*I don't know, but I was told that this here is really cool*!"

Fig. 4: Open Day visitors at the Large Flume

New WEEG Module: '*River Engineering*'

From academic year 2018-19 semester 2 onwards, WEEG will offer a new 4th year module in River Engineering. This is an excellent opportunity to learn about estuary and river engineering, and river re-naturalisation. The module includes a combination of lectures, seminars and laboratory modelling.

Fig. 4: River engineering in LA / California

The complexity of river engineering often requires the use of laboratory or physical models, Fig. 5. Now, the content: rivers and estuaries provide around 40% of the world's population with food, water, energy, communication and ports. They can also cause major damage, however, e.g. through flooding. Understanding and engineering rivers is thus a very important topic that involves many aspects of knowledge. To give just one example: rivers carry sand and fine sediment with their flow. They can erode their bed to take sediment up, or deposit it, leading to channel blockage and flooding.

Fig. 5: Physical model of Oroville Dam Spillway

This effect needs to be evaluated, and structures, harbours, bridges have to be designed taking this into account. The module covers key aspects of the topic that allow you to design a variety of river engineering works. It includes a laboratory component to make you familiar with physical modelling concepts and their interpretation for design.

If you have any questions about the module, please contact Dr Sergio Maldonado, S.Maldonado@soton.ac.uk

Jobs in water engineering:

This section gives you an idea of the type of work you can do when working in industry.

Advert: There are opportunities right across the sector from clean to dirty water and design to construction: here's an interesting one

Hydraulic / Wastewater modeller

https://www.newcivilengineercareers.com/job/2626390/hydrauilc-wastewater-modeller/?LinkSource=TopJob

Civil and Environmental Engineering at Southampton University:

WEEG: the Civil and Environmental Engineering pathway offers the chance to deepen your knowledge in water-related areas, and gives you a better preparation for environmental engineering projects.

Contact: Dr Sonia Heaven, s.heaven@soton.ac.uk, Bldg. 7, Room 5004

Further information:

We have two Facebook pages, which provide a logbook of our laboratory activities:

www.facebook.com/Hydraulicslaboratory/

www.facebook.com/environmental.lab.university.of.southampton/

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