CIWEM Welsh Branch

Cardiff University Environmental Engineering Micro-Presentation Evening

Faculty Lecture Theatre, Trevithick Building, The Parade, Cardiff, CF24 3AA

Wednesday, 3rd December 2014

17:15 – 19:30

1. Cardiff IAHR Young Professionals Network

The Cardiff Young Professionals Network is a subdivision of the International Association of Hydro-environment Engineering and Research (IAHR). The network includes researchers from Cardiff University's Hydro-environmental Research Centre and young professionals from local companies who specialise in hydro-environmental engineering.

The Young Professionals Network evolved from the Cardiff University IAHR Student Chapter, which originally consisted of Ph.D Students only in the Hydro-environmental Research Centre. There are many student chapters in universities all over the world, and they were set up to encourage students to be active in the international hydro-environmental community.

In October 2013 the decision was taken to transform the Student Chapter into the IAHR Young Professionals Network, to include Research Associates and to broaden the Network to include local companies who specialise in hydro-environmental engineering, and we were delighted to welcome ARUP and CH2M Hill to the Network. Cardiff was the first to transform to a Young Professional Network, and many other Universities are beginning to follow our lead now and reform from Student Chapters.

As Ph.D students we see far more benefits to this setup in comparison to the previous incarnation of the Student Chapter, and we believe those benefits are mutual. We believe that anything we can do to strengthen the crossover between industry and academia is extremely valuable, and we are glad to have the opportunity to better understand aspects of industry. Likewise, we feel that we can offer an insight into leading edge research both from what we are carrying out here at Cardiff and also through our contacts and experiences at international conferences. We think that we can all help each other out and improve not only each other's contacts but also our understanding and knowledge of the application of hydro-environmental engineering.

The Cardiff IAHR YPN is always looking to expand and welcome new industrial partners to the network. Please feel free to get in touch if you feel your company may benefit from being part of the group, if you would like to be kept informed of the Network's activities and events, or any general enquiries about the YPN. Contact us via our social media:

- Facebook: IAHR YPN Cardiff.
- LinkedIn: IAHR – Young Professionals Network Cardiff.
- Webpage: *hrc.engineering.cf.ac.uk/iahr-young-professionals-network*

or personally to:

- President: Sam Bray (BrayS@cardiff.ac.uk)
- Vice-president: Bruño Fraga Bugallo (FragaB@cardiff.ac.uk)
- Secretary: Pablo Ouro Barba (OuroBarbaP@cardiff.ac.uk)

2. Participants of the micro-presentation

The following Cardiff IAHR YPN members will be presenting their research in the 5 minute "elevator-pitch" style. Seven of the speakers are Ph.D students, two are Research Associates and one a Visiting Research Associate from the Tottori University (Japan).

Bruño Fraga Bugallo. *RA at Cardiff University.*

"Large Eddy Simulation modelling of bubble plumes in Environmental Engineering"

Rhodri Lucas. *PhD at Cardiff University.*

"Experimental assessment of an integrated stormwater storage and stabilisation system"

Sooyoul Kim. *Visiting RA from Tottori University.*

"Development of an integrated model of surge, wave, tide and sediment transport. Evaluation of morphological change under climate change"

Pablo Ouro Barba. *PhD at Cardiff University*.

"Large-Eddy Simulation of Vertical Axis Tidal Turbines"

Sam Bray. *PhD at Cardiff University*.

"Multiscale Hydro-Environmental modelling of marine renewable energy devices"

Luis Priegue Molinos. *PhD at Cardiff University*.

"Testing the Efficiency of a Tidal Turbine in an Unblocked Natural Environment"

Athanasios Angeloudis. *RA at Cardiff University*.

"Numerical Modelling of Tidal Lagoons Off The North Wales Coast"

Fernando Alvarez. *PhD at Cardiff University*.

"Modelling the Impacts of Coastal Defence Structures on Nearshore Morphodynamics"

Amyrhul Abu Bakar. *PhD at Cardiff University*.

"Hydrodynamic model Extensions and Refinement Over Lowland Flooding Areas"

Ali Helu. *PhD at Cardiff University*.

"Integrated River Losses Evaluation: Tigris River, Iraq"

LES modelling of bubble plumes in Environmental Engineering

Bruño Fraga FragaB@cardiff.ac.uk

Supervisor:

Thorsten Stoesser

Applications

- **Industry:** boilers, chemical reactors, fermentation, nuclear reactors...
- **Destratification:** affordable technique to "break" the stratified layers of lakes and reservoirs and restore water quality (ex.: Cardiff Bay).
- **Global warming:** injection of CO_2 on sea bed.
- **Oil´s well blowout:** pipes transporting oil and gas together.

Numerical development. Hydro 3D code

- **Accuracy:**

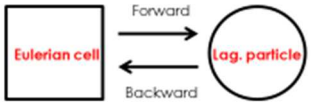
3D Large-Eddy Simulation.

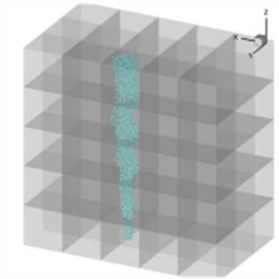
- **Originality:**

In-house code. **New approach** to Eulerian-Lagangrian modelling.

- **Optimized performance** for engineering:

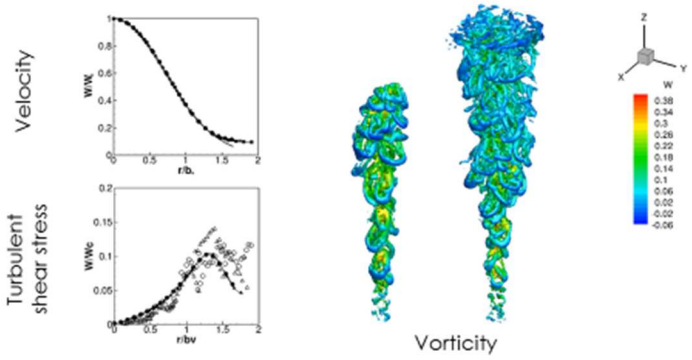
Hybrid parallelization (MPI-OpenMP).





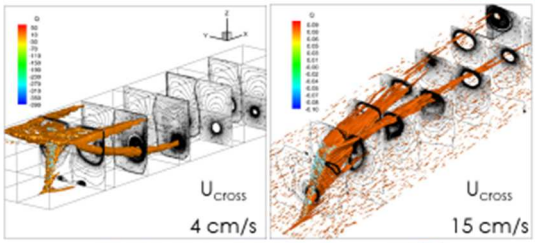
Results. Plume in stagnant flow

→ Remarkable agreement with experiments and great accuracy predicting turbulent flow properties.



Results. Plume in cross flow and future work

→ Interaction between bubble plume and lateral currents.



→ **Future work**

- Multi-plume modelling
- Sensitivity analysis
- Stratification

Personal details

Bruño Fraga Bugallo (FragaB@cardiff.ac.uk)

- **Environmental Engineer** (5 years degree: 2002-2007). Santiago de Compostela University, Spain. **National Degree Award*** and University Award.
- **MSc in Mathematical Engineering and Numerical Simulation** (2008-2009). A Coruña University, Spain.
- **PhD in Civil Engineering** (2010-2013): Numerical study of the turbulence in natural rivers and open-channel bends. A Coruña University, Spain.
- **Invited researcher** (2011): Turbulence modelling in engineering flows. Chalmers University, Sweden.
- **Research Assistant** (2013-present): LES models and simulation of multiphasic flows. Cardiff University, United Kingdom.

* given annually by the Spanish authorities to the three best students of each degree in the country.

Experimental assessment of an integrated stormwater storage and stabilisation system

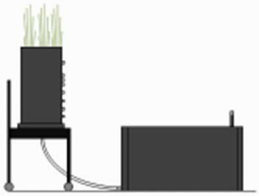
Rhodri Lucas
Supervisors: Dr A. O. Babatunde & Dr B. N. Bockelmann-Evans
Email: LucasR2@cf.ac.uk

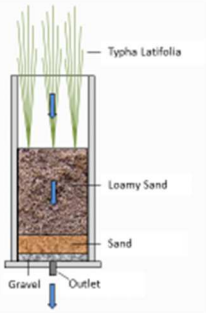
Background


- Stormwater runoff collects contaminants
- Pollutes local watercourses
- Contamination of a potentially valuable reusable resource

System design

- Constructed wetland/biofilter based system
- Contaminants removed by physical, chemical, biological processes





Experimental setup

- 8 pilot-scale stormwater treatment systems

- Variables: primary filtration media; wetting and drying patterns; wetland to watershed area ratio
- Dosed with semi-synthetic stormwater
- 3 influent doses per week, water held for 24 hours

Performance after 12 months

- Very good removal of suspended solids, heavy metals (mainly associated with solid particles)
- Good removal of phosphorus, very consistent
- Initial removal of nitrogen poor (30-40% TN removal), but has improved over time (>90%) due to increased denitrification

Future work

- Develop storage models to establish a system design that will meet demand for water reuse, e.g. toilet flushes
- Application of HYDRUS to model the system and make performance predictions

Rhodri Lucas (lucasr2@cf.ac.uk)

Academic information:

- **MEng Civil Engineering**. The University of Glasgow, Scotland (2006-2011).
- **ICE QUEST Scholarship** for undergraduate study.
- **Student Site Engineer** at BAM Nuttall Ltd (2007-2010).
- **PhD** at Cardiff University (2011-present)

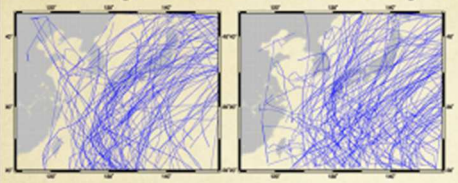
Areas of interest:

- Stormwater harvesting
- Water treatment
- Urban drainage

Development of an integrated model of surge, wave, tide and sediment transport & Evaluation of morphological change under climate change

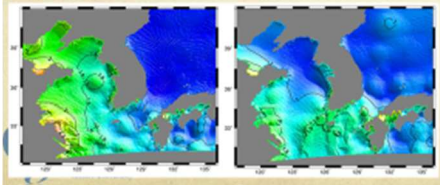
Sooyoul Kim, PhD,
Assistant Res., Tottori University, Japan
Visiting researcher, Cardiff University, UK

Recent research for risk assessment of storm surge under climate change in East Aisa



Modelled typhoon track in the present climate (1979-2008)

Modelled typhoon track in the future climate (2075-2099)



Present storm surge

Future storm surge

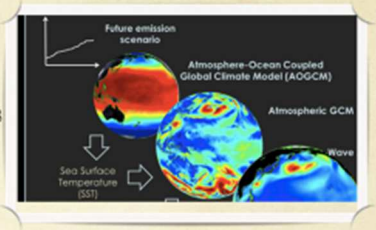
- According to our results based on process-based numerical models
- In future, the typhoon becomes more intensive but lower frequent birth.
- As a result, future storm surge is more servere compared to present one.

Morphological change under future climate

- Question:
  - Limited knowledge on Long/short terms evolution along coastlines in the future climate.
- Answer:
  - better understanding of the morphological change through the hydrodynamics and sediment supply in estuarine, coastal and offshore sedimentary systems.
- Method :
  - Process-based numerical models

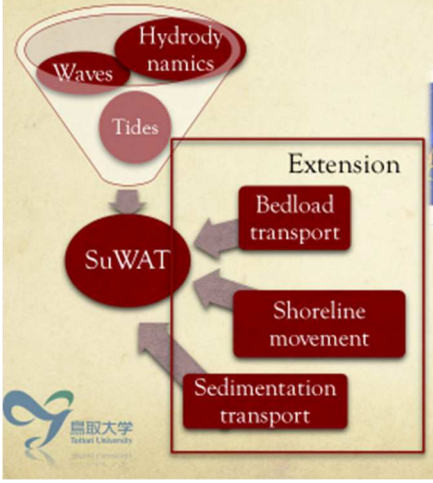
Process-based projections of morphological change directly using climate change data

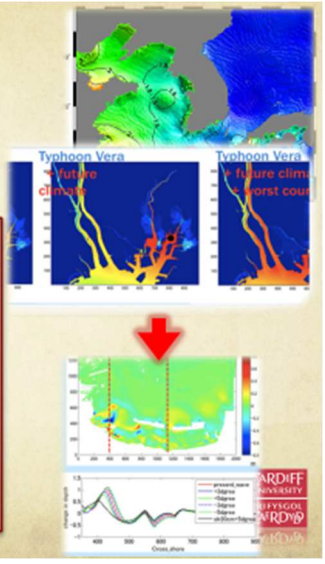
- External force : Wind and atmospheric pressure
  - A state of the art atmoshperic general circulation model
  - Every 6 hourly data for 1979-2008 and 2075-2099
  - 20km high-resolution
  - A1B scenario
  - By Japan Meteorological Agency



- Directly input them into the numerical model (SuWAT)
- Projections :
  - Long term evaluation for the whole periods
  - Short term evaluation due to the typhoon events
- Expected results :
  - Better understanding of impacts of climate change
  - Fundamental information to decision makers

On going works





- sooyoul.kim@sse.tottori-u.ac.jp,
- kims15@cardiff.ac.uk
  - 05/2007, PhD, Kyoto University
  - 04/2008, Assistant Res.,
  - Depart. of Management of social systems and Civil Eng., Graduate Schoool of Eng., Tottori University, Japan

- Recent publications
  - S., Kim, Y., Matsumi, T., Yasuda and H., Mase (2014) Storm surges along the Tottori coasts following a typhoon, *Ocean Engineering*
  - N., Mori, M., Kato, S., Kim, H., Mase, Y., Shibutani, T., Takemi, K., Tsuboki, T., Yasuda (2014) Local amplification of storm surge by super typhoon Haiyan in Leyte Bay, *Geophysical Research Letters*
  - T., Yasuda, S. Nakajo, S., Kim, H., Mase, N., Mori and K., Horsburgh (2014) Evaluation of future storm surge risk in East Asia based on state-of-the-art climate change projections, *Coastal Engineering*.

Large-Eddy Simulation of Vertical Axis Tidal Turbines

Pablo Ouro Barba

PhD Candidate
Hydro-Environmental Research Group
School of Engineering, Cardiff University, UK.

CIWEM Micro-presentation
School of Engineering, Cardiff. 3rd December 2014.

Introduction

- Huge tidal potential in the UK shore
- Severn area: 2nd largest tidal range

Opportunity to develop Tidal Turbines

Vertical Axis Tidal Turbines

- Increase efficiency
- Understand self-starting

- Technology 20 years behind HA!!

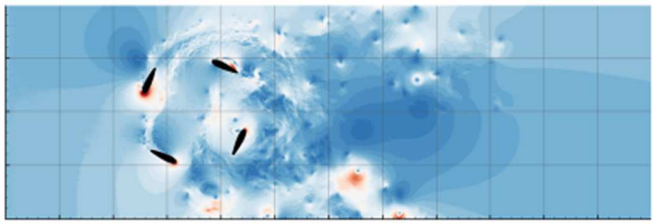
TIDAL ENERGY MATURITY CURVE

Model description

Eulerian Fluid Flow: Large-Eddy Simulation

- Accurate representation of the vortices influence
- Large computational effort→ Hybrid parallelization (MPI+OMP)

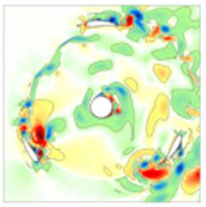
Lagrangian Turbine blades: Immersed Boundary

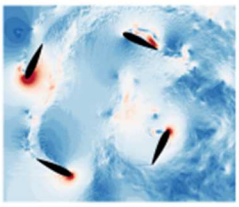


Validation

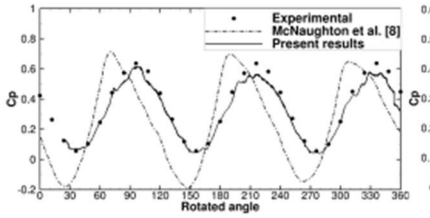
3-blade NACA 0018 Darrieus turbine. Water velocity: 2.3 m/s

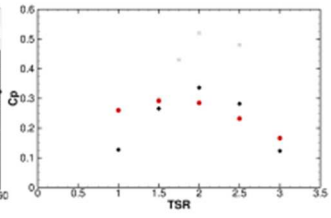
2D RANS k-ε SST LRN
McNaughton et al.





2D LES
Ouro et al.

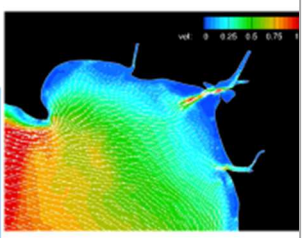




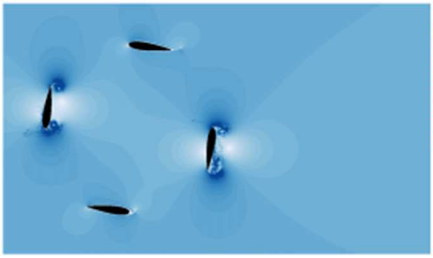
Objectives

Coupling of a far- and near-field models

- Far-field: sea/river flow study
- Near-field:
  - Turbine energy production
  - Real velocity conditions



Optimal setup of turbines farm within a region



3D Large-Eddy Simulation model

Pablo Ouro Barba (ourobarbap@cardiff.ac.uk)

Academic information:

- **Civil Engineer**. Univ. of A Coruña, Spain (MEng. 09/07-02/13). 1st class with honours
- **Erasmus grant.** Chalmers University of Technology, Sweden (08/11-06/12)
- **Structural Engineer** . Structural Mechanics Department (University of A Coruña) (02/13-07/13)
- **PhD** at Cardiff University, UK (07/13-present)

Areas of interest:

- Computational Fluids Dynamics.
- Far- and near-field simulation.
- Aerodynamic of turbines.
- Optimization analysis.

CIWEM Micro-presentation
School of Engineering, Cardiff. 3rd December 2014.

CARDIFF UNIVERSITY
PRIFYSGOL CAERDYDD

MULTISCALE HYDRO-ENVIRONMENTAL MODELLING OF MARINE RENEWABLE ENERGY DEVICES

SAM BRAY

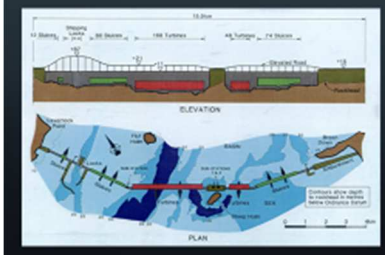
BRAYS@CF.AC.UK

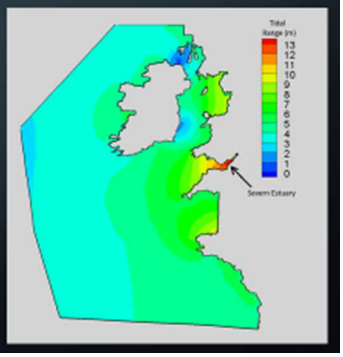
Supervisors: Dr Reza Ahmadian, Prof Roger Falconer

FUJITSU
hpc CYMRU | WALES

TIDAL RANGE GENERATION

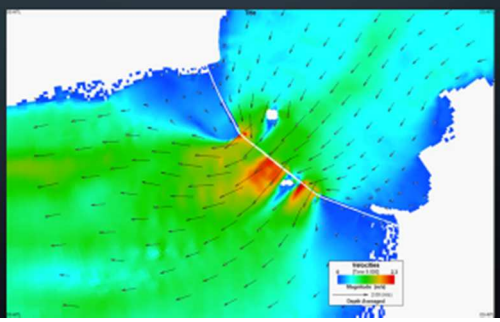
- UK currently producing just 5% energy from renewables
- Wales has potential to generate 100% from tidal sources
- Project has focused on tidal range generation in Severn Estuary
- Improve assessment of potential schemes through modelling improvements





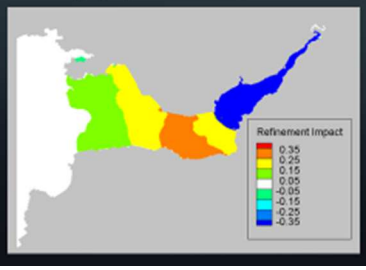
RECENT WORK

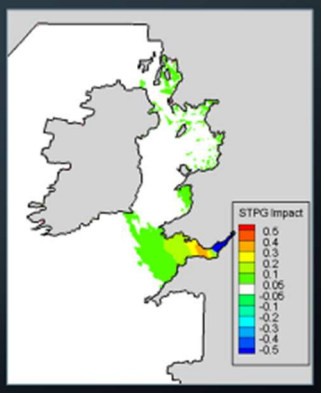
- Modelling of energy proposals including Severn Barrage and tidal lagoons
- Focus on hydrodynamic impact of schemes and power generation
- Assessment of flood risk
- Optimisation of scheme and mitigation of environmental impacts



EXAMPLE OF IMPACT OF WORK

- Refinement to hydraulic structure representation
- Modified the numerical representation of sluices and turbines in the model
- Significant changes to near- and far-field water level impacts
- CSM now more accurately predicting impacts of tidal range proposals

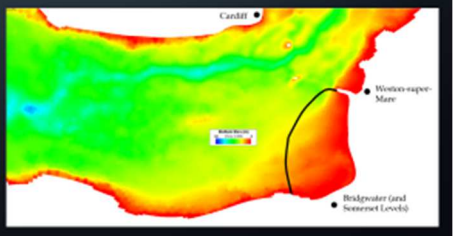




2015 AND ONWARDS....

- Further use of CSM now that it is better predicting impacts of tidal range proposals
- Water quality modelling → add novelty to Ph.D and increase skillset
- Hoping to finish Ph.D in 2015 - At which point will be seeking employment in environmental/renewable sector
- Hope to pursue career and make use of skills including:

hydrodynamic modelling
research
flood prediction
water quality
renewable energy proposals



SAM BRAY

BRAYS@CARDIFF.AC.UK

BEng Civil with Environmental Engineering, Cardiff University - 2012

Ph.D Multiscale Hydroenvironmental Modeling of Marine Renewable Energy Devices, with Particular Application to the Severn Barrage - Expected 2015

Areas of Interest

Hydrodynamic Modelling

Assessment of Impact of Marine Renewables

Water Quality/Sediment Interaction

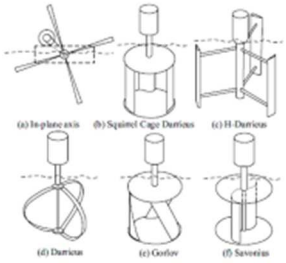
Coastal Flooding

TESTING THE EFFICIENCY OF A TIDAL TURBINE IN AN UNBLOCKED, NATURAL ENVIROMENT

LUIS PRIEGUE MOLINOS

Background

- Vertical Axis Turbine



Main Characteristics

Non-dependent flow direction

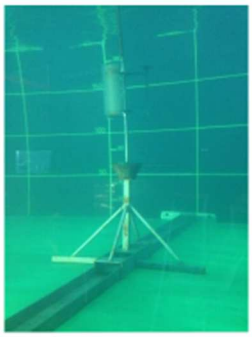
Fairly good efficiency (35-40%)

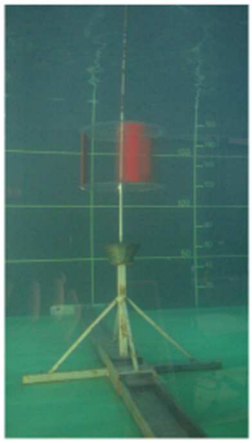
Difficulties to self-start

Facilities

- Two main energy exchange concepts
- Kinetic power to mechanical power. **Turbine**
- Mechanical power to electrical power. **Generator**

Experiments





Future work

-Small scale – medium scale

-White water center tests.
- 60cm height
-40cm diameter

-Medium scale –long scale

-Scaling up the prototype
-Aiming at an optimum location in a natural environment

Luis Priegue Molinos (priegueL@cardiff.ac.uk)

Academic information:

- Civil Engineer. A Coruña University, Spain (5-year MEng. 09/2006-02/2012)- Erasmus grant: Stuttgart University, Germany(10/2009-09/2010)
- Coastal Engineer at Hydraulic Engineering of GEAMA (University of A Coruña) (02/13-07/13)
- PhD at Cardiff University, UK (10/13-present)

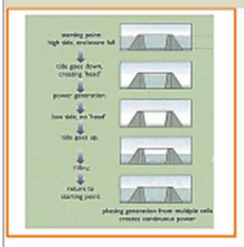
Numerical Modelling Of Tidal Lagoons Off The North Wales Coast

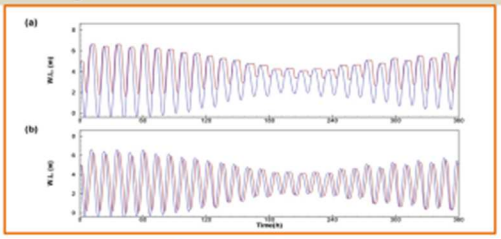
Athanasios Angeloudis

Prof Roger A. Falconer, Dr Reza Ahmadian, Dr Bettina Bockelmann-Evans

Co-financed with the support of the European Union ERDF – Atlantic Area Programme Investing in our common future

Introduction – Tidal Lagoons and North Wales Potential





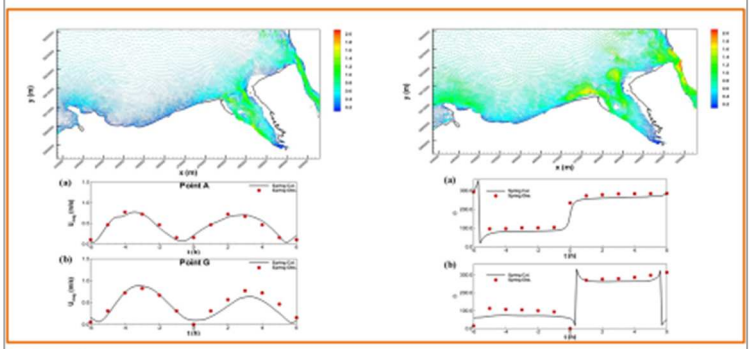
North Wales Characteristics

1. High Tidal Range
2. Flood Defence Potential
3. Electricity Grid Connection Availability

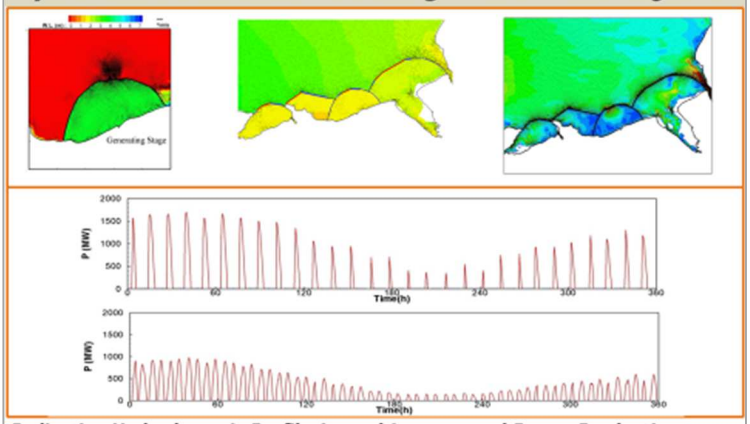
Hydro-environmental Modelling – Numerical Model

In-house Finite Volume Method to solve the 2D Shallow Water Equations

- Simulation of Established Conditions along the North Wales Coast
- Comparison of Water Level and Velocity Results against reported at Spring and Neap Tide



Hydro-environmental Modelling – North Wales Lagoons



Indicative Hydrodynamic Profile Around Lagoons and Power Production

Conclusions

- Promising performance of the hydro-environmental model to reproduce North Wales Tidal Conditions
- Ongoing work focuses on
  - a) Refinement of boundary conditions for a better representation of seaward and land boundaries
  - b) Combined potential and impact of multiple lagoons in terms of Energy Production and Flood Risk Mitigation
  - c) Modelling and Optimization of Lagoon operation in accordance with new turbine technologies

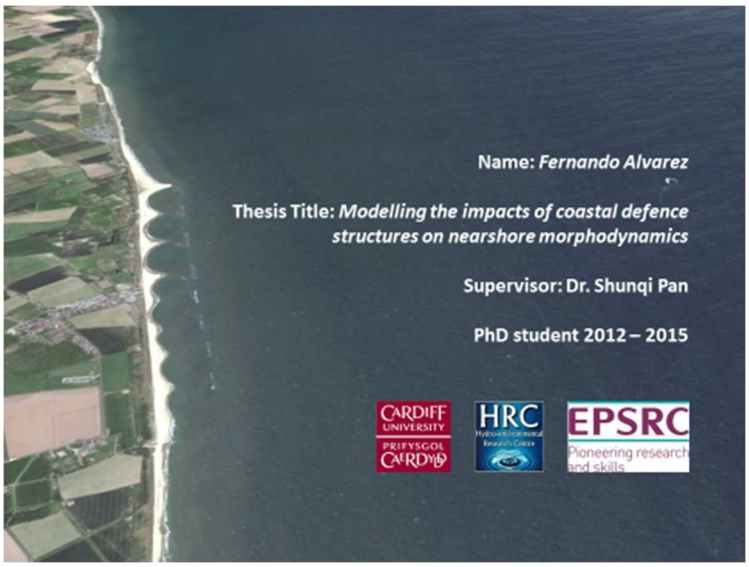
Athanasios Angeloudis

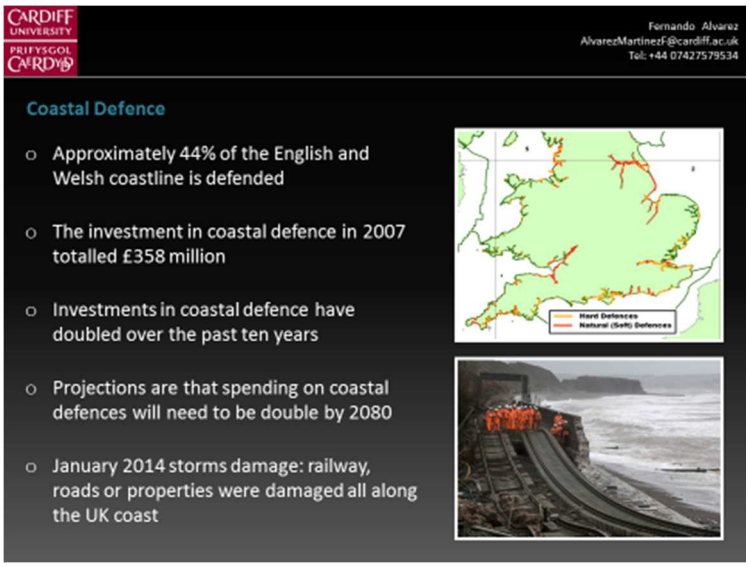
AngeloudisA@Cardiff.ac.uk

- **Research Associate, HRC**, Cardiff University (2014- *Present*)
  MAREN 2 project, Numerical Investigation on Tidal Range Schemes along the Welsh Coastline
- **PhD in Hydro-environmental Engineering**, Cardiff University (2010-2014)
  Numerical and Experimental Modelling of Flow and Kinetic Processes in Serpentine Disinfection Tanks
- **Civil Engineering MEng**, Cardiff University (2006-2010)

Areas of Interest

- Hydrodynamic Modelling
- Marine Renewable Schemes
- Water Quality Modelling
- Physical Experimentation
- Water Treatment Optimization


Name: *Fernando Alvarez*
Thesis Title: *Modelling the impacts of coastal defence structures on nearshore morphodynamics*
Supervisor: Dr. Shunqi Pan
PhD student 2012 – 2015
CARDIFF UNIVERSITY
PRIFYSGOL CAERDYDD
HRC
EPSRC
Pioneering research and skills


CARDIFF UNIVERSITY
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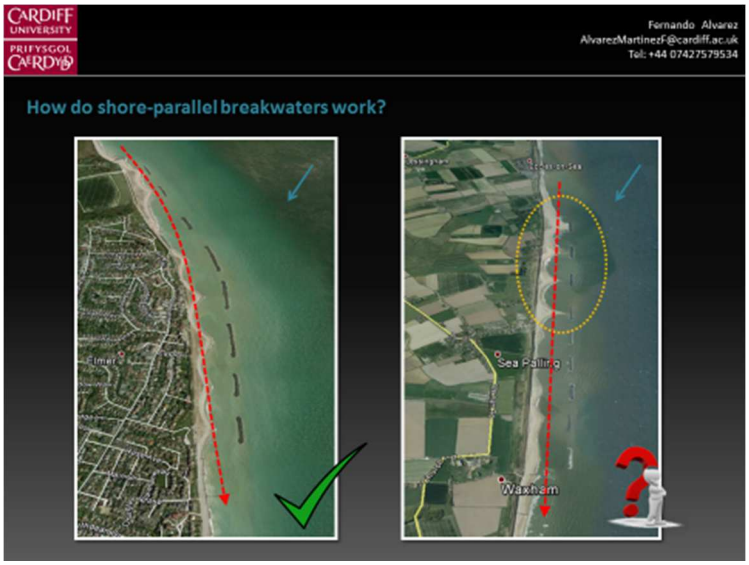
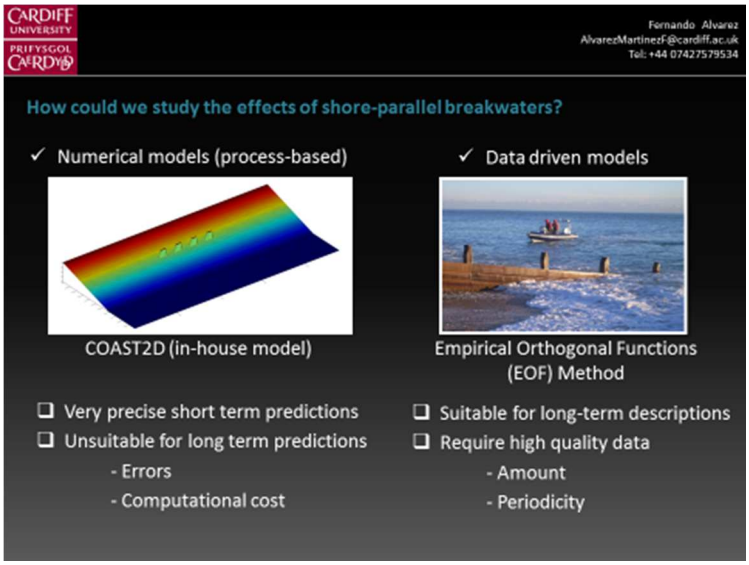
Fernando Alvarez
AlvarezMartinezF@cardiff.ac.uk
Tel: +44 07427579534
Coastal Defence
Approximately 44% of the English and Welsh coastline is defended
The investment in coastal defence in 2007 totalled £358 million
Investments in coastal defence have doubled over the past ten years
Projections are that spending on coastal defences will need to be double by 2080
January 2014 storms damage: railway, roads or properties were damaged all along the UK coast
Hard Defences
Natural (Soft) Defences


CARDIFF UNIVERSITY
PRIFYSGOL CAERDYDD
Fernando Alvarez
AlvarezMartinezF@cardiff.ac.uk
Tel: +44 07427579534
How do shore-parallel breakwaters work?
Sea Palling
Waxham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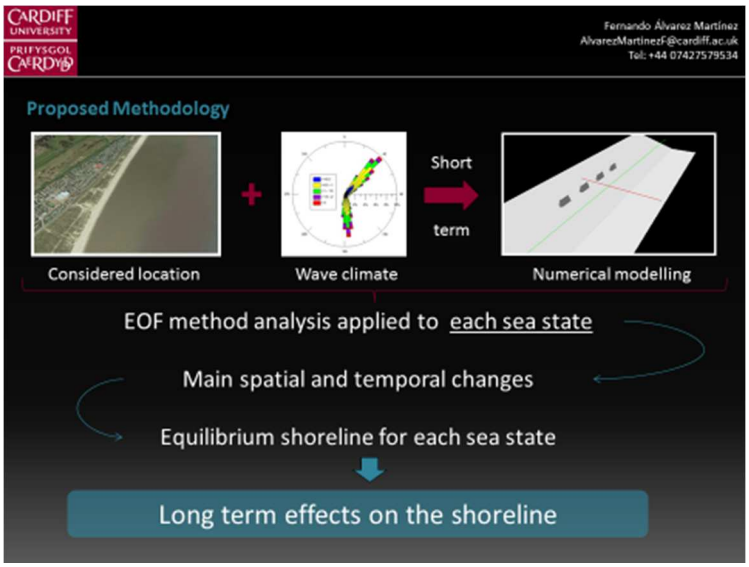
PRIFYSGOL CAERDYDD
Fernando Alvarez
AlvarezMartinezF@cardiff.ac.uk
Tel: +44 07427579534
How could we study the effects of shore-parallel breakwaters?
✓ Numerical models (process-based)
COAST2D (in-house model)
❑ Very precise short term predictions
❑ Unsuitable for long term predictions
- Errors
- Computational cost
✓ Data driven models
Empirical Orthogonal Functions (EOF) Method
❑ Suitable for long-term descriptions
❑ Require high quality data
- Amount
- Periodicity


CARDIFF UNIVERSITY
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Fernando Álvarez Martínez
AlvarezMartinezF@cardiff.ac.uk
Tel: +44 07427579534
Proposed Methodology
Short
term
Considered location
Wave climate
Numerical modelling
EOF method analysis applied to each sea state
Main spatial and temporal changes
Equilibrium shoreline for each sea state
Long term effects on the shoreline


Fernando Alvarez (AlvarezMartinezF@cardiff.ac.uk)
Academic information:
PhD student at Cardiff University. Thesis title: "*Modelling the impacts of coastal defence structures on nearshore morphodynamics*". (Sep-15, expected)
MSc Environmental Hydraulics at Granada University, Spain. (Jul-12)
MEng Civil Engineering at Granada University, Spain. (Jan-11)
Erasmus Grant: Universidade de Aveiro, Portugal. (Sep-08/Jul-09)
Areas of interest:
Coastal Management
Renewable Energies
Coastal Engineering
CARDIFF UNIVERSITY
PRIFYSGOL CAERDYDD
CIWEM - Micro-presentation evening
School of Engineering, Cardiff
3rd December 2014
CIWEM

Hydrodynamic model extensions and refinements over lowland flooding areas

presented by:

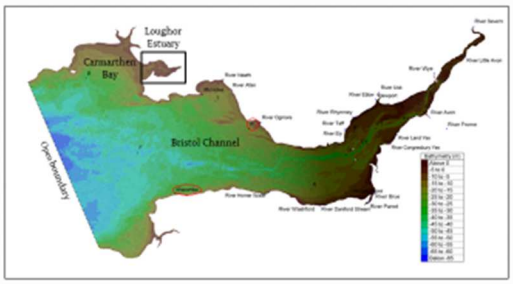
Amyrhul Abu Bakar
PhD Student

Supervised by: Prof. Roger A. Falconer; Dr. Reza Ahmadian

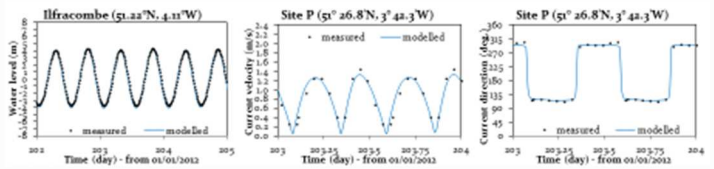
Hydro-environmental Research Centre
Cardiff University, The Parade, Cardiff CF24 3AA, United Kingdom

Issues related to lowland flooding areas

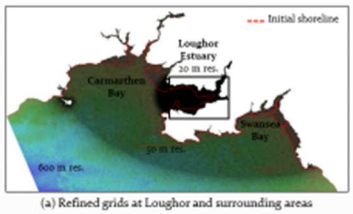
Two-dimensional general hydrodynamic model



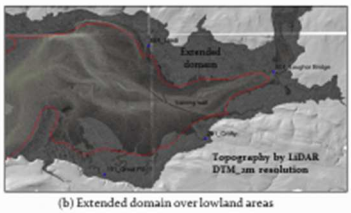
Model features:
Area = 5,793 km²
Nodes = 428,552
Max edge length = 600 m
Min edge length = 50 m
(Bathymetry referred to Ordnance Datum at Newlyn)



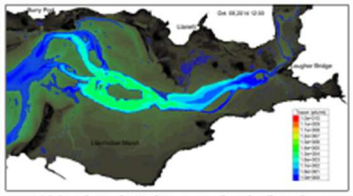
Loughor domain extensions and refinements



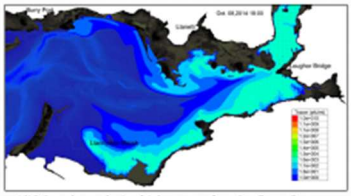
(a) Refined grids at Loughor and surrounding areas



(b) Extended domain over lowland areas



(c) Wetted area during low water referred at Burry Port



(d) Wetted area during high water referred at Burry Port

Future works

1. To simulate diffuse source of bacteria accurately
2. To model sediment transport
3. To include sediment-bacterial interaction process in the model
4. To calibrate and validate Faecal Indicator Organisms fate and transport processes from sources against measured data

Acknowledgements

The LiDAR topography data for refined domain was provided by the Natural Resources Wales and Environmental Agency. The presenter also grateful to the Smart Coasts team including Aberystwyth University, NRW and SCCC for their support.

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Academic and experience:

2011	Graduate Civil Engineer BJP Consult Sdn. Bhd. (Malaysia)
2011 - 2012	M.Eng. in Civil Engineering (Hydraulics & Hydrology) Universiti Teknologi Malaysia
2013 - present	PhD candidate in Hydro-environmental research Cardiff University, United Kingdom

Areas of interest:

1. Estuarine hydrodynamic
2. Sediment transport with bacteria/nutrients interaction
3. Rainfall-runoff
4. Coastal flooding

Integrated ET Losses Assessment

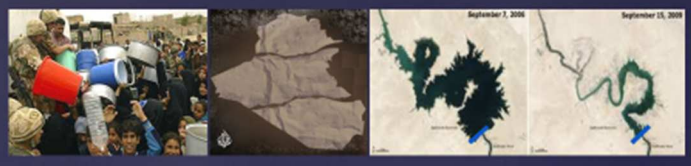
Tigris River Basin

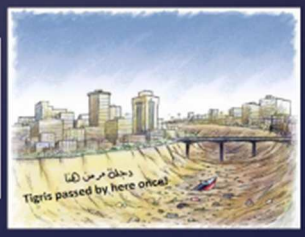
PhD Candidate: Ali Helu

AliHelu@cf.ac.uk

2014

Tigris River: The problem





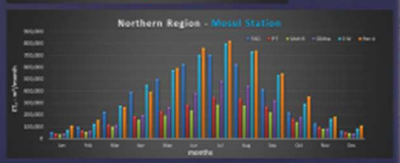
My Problems when I first Started!!!

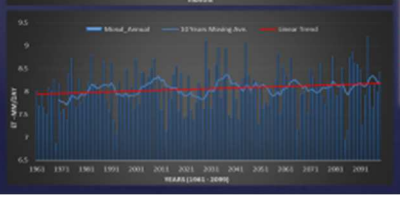
NOAA

ISIS FREE

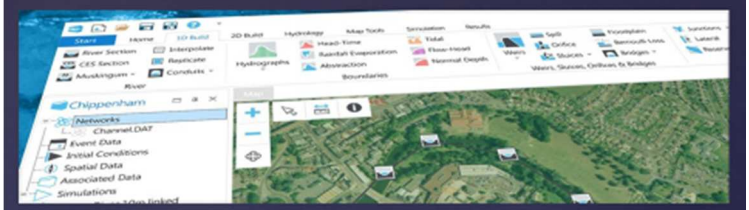
SRTM 90m Digital Elevation Database v4.1

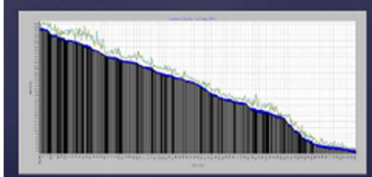
What have we got?! (1)

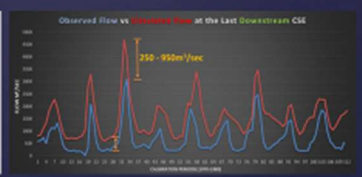




What have we got?! (2)



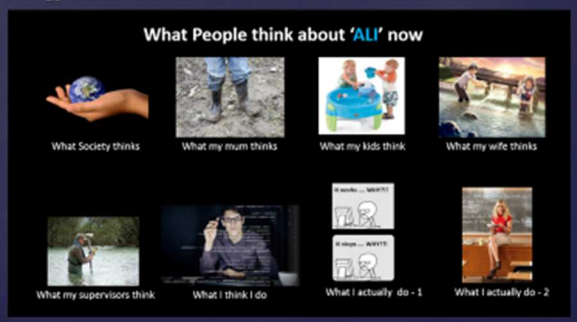




Ali Helu, BSc. MSc. Civil Engineering & Environmental Management

10 Years experience in:

- Client Services & Relations
- Construction Site Management
- Energy Conservation



Many thanks for Listening
Any Question?!

ACKNOWLEDGMENTS

Everyone from the Cardiff YPN would like to thank CIWEM, and especially Dr Robert Keirle of WRc plc, for their collaboration and support in arranging this event. It is a privilege for us to be given the opportunity to present our research to leaders in the environmental engineering field and to a prestigious and renowned Institute such as CIWEM.

The participants of this successful event and the rest of the YPN and HRC members would also like to thank the companies and institutions that make our work possible. We would like to highlight: CH2M Hill, Arup, Fujitsu, BP, Repetitive Energy, EPSRC, NERC, EU LCRI, EU MAREN, EU SMART Coast, etc. In addition we are also thankful to HPC Wales and ARCCA for providing access to the High Performance Computing resources required to continue our research.

FUTURE EVENTS

Cardiff Young Professionals Network has planned several events for 2015 with the aim of increasing its influence within the hydro-environmental engineering sector, and to attract members from companies in order to build a stronger relationship between academia and industry

Some of the highlights of the planned activities include:

- The creation of a quarterly Newsletter. It will focus on the upcoming YPN events, as well as reporting on events from the previous quarter and relevant news from YPN members regarding conference or research highlights.

- Conference attendance and presentations. Members of the YPN will be attending and presenting at several world-renowned conferences over the next year, including:
    - *2015 Gulf of Mexico*: Oil Spill & Ecosystem Science Conference. Houston, USA.
    - *36th IAHR World Congress*. The Hague, Netherlands.
    - *11th Young Coastal Scientist and Engineers Conference*, Manchester.

- A second micro-presentation evening in collaboration with CIWEM, in which the rest of the YPN will be given the opportunity to present their research in the same “elevator-pitch” style.

- Workshops. One of the main tasks of the Cardiff YPN for 2015 is the organisation of workshops to which people from industry and academia will be invited. The workshops will focus on various environmental fields, with the aim of utilising the vast experience from both industry and academia to demonstrate and teach practical skills in hydro-environmental engineering e.g. grid generation, and to discuss and debate wider issues such as tidal renewable energy in Wales.