

INTERNATIONAL SCHOOL FOR GEOSCIENCE RESOURCES (IS-Geo)  
KOREA INSTITUTE OF GEOSCIENCE AND MINERAL RESOURCES (KIGAM)

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## TRAINING COURSE ON *Coastal Geology and Geohazards* (GeoCoast)

The International School for Geoscience Resources of KIGAM presents an intensive training course on ***Coastal Geology and Geohazards (GeoCoast)***. The course will take place at the Ara room of International School for Geoscience Resources of KIGAM in Daejeon (Korea) in **Sep. 2 to 13, 2013** and will include the following modules:

Title	Date	Instructor
Module 1. Tide-dominated Coasts and Human Impacts	Sep. 2-3. 2013	Prof. Dr. Burg W. Flemming ( Senckenberg Institute)
Field trip to Western Korean Coast (Tide-dominated)	Sep. 4-6. 2013	Prof. Dr. Burg W. Flemming (Senckenberg Institute) & Dr. Tae Soo Chang (KIGAM)
Module 2. Wave-dominated Coasts and Coastal Geohazards	Sep. 9-10. 2013	Dr. Mitchell Harley (Univ. of Ferrara)
Field trip to Eastern Korean Coast (Wave-dominated)	Sep. 11-13. 2013	Dr. Mitchell Harley (Univ. of Ferrara) & Dr. Sung Pil Kim (KIGAM)

## Module 1 - Tide-dominated Coasts and Human Impacts

### Summary of course content and learning objectives

This module gives an introduction to tide-dominated coasts and human impacts on the meso- to macrotidal Wadden Sea depositional system located along the southwest coast of the North Sea in Europe. On day one, the first lecture aims at refreshing basic knowledge of tidal processes and their sedimentological effects. The second lecture deals with the geological evolution of the North Sea with special emphasis of the Wadden Sea depositional system and how this has been affected by human interventions in historical times. The third lecture focuses on the morphology and sedimentology of the East Frisian Wadden Sea at tidal basin scale. The fourth lecture tackles the issue of global warming and what implications an accelerating rise in sea level will have on the Wadden Sea.

On day two, the first lecture aims at refreshing basic knowledge of coastal processes, in particular morphodynamics, hydrodynamics, meteorology, scale effects, and single events. The second lecture introduces sophisticated modern remote sensing tools for data acquisition and monitoring, in particular the integrated use of multibeam echosounders, digital side-scan sonars, parametric subbottom profilers, ADCPs, and in situ particle size analyzers such as LISST, both within the context of basic science and national/international monitoring programs, e.g. the EU Water Frame Directive. The third lecture focuses on coastal protection, in particular against storm surges and associated coastal erosion. Finally, the fourth lecture discusses the impacts of major coastal construction projects, especially the new deep-water ports in Wilhelmshaven and Bremerhaven (Germany) and how integrated coastal zone management concepts can contribute to the mitigation of harmful effects.

### Content of Module 1

#### Day 1. Tide-dominated Coasts and Human Impacts

- 09:00 – 10:30: Tidal processes and products
- 11:00 – 12:30: Evolution of the North Sea and the Wadden Sea coast
- 12:30 – 14:00: *Lunch break*
- 14:00 – 15:30: The mesotidal East Frisian barrier-island depositional systems:  
morphological and sedimentological characteristics

- 16:00 – 17:30: Impacts of global warming on the Wadden Sea

## **Day 2. Tide-dominated Coasts and Human Impacts**

- 09:00 – 10:30: Coastal processes and dynamics
- 11:00 – 12:30: Modern tools for coastal data acquisition and monitoring
- 12:30 – 14:00: *Lunch break*
- 14:00 – 15:30: Coastal protection – past, present, future
- 16:00 – 17:30: Constructional impacts

## **Day 3-5. Field to Western Korean Coast (Tide-dominated)**

- Field trip to the Saemangeum estuary, Gomso Bay, Dongho tidal flat, and Hampyeong Bay (Korean west coast)
- 08:00 4<sup>th</sup> (Wed.) September: Departure from IS-Geo of KIGAM
- 18:00 6<sup>th</sup> (Fri.) September: Return to IS-Geo of KIGAM

## **Module 2 - Wave-dominated Coasts and Coastal Geohazards**

### **Summary of course content and learning objectives**

The coastal zone represents the main buffer between large waves and coastal populations/ infrastructure. It is also an area of high economic, environmental and recreational value. In this module, the overall concepts of wave-dominated coastlines are covered, from wave generation and breaking, currents and sediment transport processes in the surf zone as well as the various types of wave-dominated coastlines found throughout the world. A number of case studies are presented as well as the latest research in this area.

Wave-dominated coastlines are some of the most dynamic landforms on the earth's surface, with processes occurring at many different spatial and temporal scales. Understanding how these regions vary is therefore of utmost importance for coastal managers in order to plan for the future and minimize the risk of coastal hazards. This is usually achieved through a combination of coastal monitoring programs as well as numerical simulations (modelling). This module explains the different ways of monitoring the coastal zone, from traditional methods to the latest state-of-the-art technology. It then

provides an introduction into the field of coastal modelling as well as the developing area of forecasting coastal change and early warning systems.

## **Content of Module 2**

### **Day 1. Coastal processes and morphodynamics of wave-dominated coastlines**

- 10:00 – 11:00: Introduction to wave-dominated coastlines
- 11:10 – 12:10: Waves: from generation to wave breaking
- 12:10 – 13:10: *Lunch break*
- 13:10 – 14:00: Surf-zone currents and sediment transport processes
- 14:10 – 15:00: Classification of wave-dominated beaches
- 15:10 – 16:00: Embayed and structurally controlled beaches
- 16:10 – 17:00: Wave-dominated coastlines in a changing climate

### **Day 2. Monitoring, modelling and forecasting of waves and coastal change**

- 10:00 – 11:00: Traditional and state-of-the-art coastal monitoring techniques
- 11:10 – 12:10: Remote sensing of the coastal zone
- 12:10 – 13:10: *Lunch break*
- 13:10 – 14:00: Making sense of coastal data
- 14:10 – 15:00: Introduction to coastal modelling
- 15:10 – 16:00: Early warning systems for predicting coastal risk
- 16:10 – 17:00: Case study of an early warning system on the Italian coastline

### **Day 3-5. Field to Eastern Korean Coast (Wave-dominated)**

- Field trip to Korean east coast
- 08:00 11<sup>th</sup> (Wed.) September: Departure from IS-Geo of KIGAM
- 18:00 13<sup>th</sup> (Fri.) September: Return to IS-Geo of KIGAM

**About the presenter – Prof. Dr. Burhard W. Flemming**



Prof. Dr. Burhard W. Flemming, born in 1944, began his academic education at the University of Kiel (Germany) where he graduated in 1972 (MSc equivalent), majoring in marine geology and sedimentology. While in Kiel, he qualified himself as a scientific diver, his master's thesis having essentially been an underwater project on wave abrasion and deposition in the western Baltic Sea. Early in 1973, a foreign student exchange scholarship took him to the University of Cape Town (South Africa) where he engaged in a PhD project on depositional processes in Saldanha Bay and Langebaan Lagoon located along the west coast of South Africa. He was awarded his PhD degree in 1977. Already in 1975 he had become a member of the newly created National Research Institute for Oceanology (CSIR) where he assisted in building up a marine geoscience division, which he took over as Divisional Head in 1980. During this time his research focused on regional current-generated bedforms and sediment dispersal along the southeast African continental margin driven by the Agulhas Current. In October 1984, he followed in the footsteps of Hans-Erich Reineck as Head of the Senckenberg Marine Research Station in Wilhelmshaven (Germany), being mainly engaged in the investigation of tidal depositional processes. At the same time he gave undergraduate courses in sedimentology at the University of Bremen, being honoured for his teaching engagement with an extramural professorship in 1998. Burg Flemming retired in 2009 at the age of 65, having to date published over 150 papers in scientific journals and books.

**About the presenter – Dr. Mitchell Harley**



Dr. Mitchell Harley is a research associate at the Department of Physics and Earth Sciences, University of Ferrara, Italy. He received his BEng (Environmental) and BSc (Oceanography/Meteorology) degrees at the University of New South Wales in Australia and went on to complete his PhD in the field of beach morphodynamics and wave climate variability. He is currently involved in developing Early Warning Systems for coastal storm risk at various sites across Europe. His research interests include developing innovative coastal monitoring techniques,

understanding embayed beach rotation, global wave climate variability, coastal modelling  
and real-time forecasting of coastal risks.