



## Spring School announcement

### CGS Europe 2<sup>nd</sup> Spring School on CO<sub>2</sub> Geological Storage

***Date & place: April 18–24, 2013 at Murighiol, Romania***

#### Advanced course on geological storage of carbon

**CGS Europe:** The "Pan-European coordination action on CO<sub>2</sub> Geological Storage", is a project funded within the 7<sup>th</sup> Framework Programme of the European Community for research, technological development and demonstration activities. CGS Europe pools together the expertise of the key research institutes in the area of CO<sub>2</sub> geological storage in European Member States and Associated Countries. It sets up coordination and integration mechanisms between the CO<sub>2</sub>GeoNet Association - the European Network of Excellence on the Geological Storage of CO<sub>2</sub> - and 23 other participants, thus covering most of Europe with 24 EU Member States and 4 Associated Countries. CGS Europe provides an independent platform and reference source where national, European and international experts, institutes and regulators are able to access the most up-to-date results of CO<sub>2</sub> storage-related studies, share experiences and good practices, discuss the implementation of regulations, identify research needs to face upcoming challenges, and build new projects.

**Programme of Study:** The *CGS Europe Spring School on CO<sub>2</sub> Geological Storage* shall provide the theoretical and practical knowledge on CCS based on recent international research and development work. Vital elements are:

- *Climate change*
- *CO<sub>2</sub> geological storage aspects*
  - *identifying, mapping and completing geological storage sites for the CO<sub>2</sub>*
  - *aquifers, enhanced oil and gas recovery*
  - *multiple underground usage, storage without compromising other operations*
- *Assessment of storage capacity*
- *Safety precautions and consideration, information strategy*
- *Injection*
- *Numerical and Analytical Modelling approach*
- *Monitoring and reporting guidelines*
- *Public awareness and involvement to research and deployment*

The thematic approach will be lectures, exercises, colloquia, study groups and a storage site visit. Most lectures will be covered by compendia, articles or other material that will be made available to the students during the course.

The *CGS Europe Spring School on CO<sub>2</sub> Geological Storage* will be open during one concentrated week – Thursday to Wednesday – April 18<sup>th</sup> to 24<sup>th</sup> 2013 with arrival on Wednesday April 17<sup>th</sup> and departure Wednesday 24<sup>th</sup> after noon. Key lecturers will be available throughout the entire week, and – as appropriate – take active part in discussions, and otherwise be available upon students' request.

**Language:** The official language of the *CGS Europe Spring School on CO<sub>2</sub> Geological Storage* will be English. This implies that all lectures will be delivered in the English language.

**Target group:** The target group is young scientists, e.g. PhD students and post docs with background in geology, engineering, geotechnologies. Master students will be considered on free chairs.

**Selection and grants:** Students eligible to attend the *CGS Europe Spring School on CO<sub>2</sub> Geological Storage* will be selected upon qualifications that must be duly documented in the application.

The attendance will be free of charge. However, direct expenses for travel and board will be carried by the students themselves. Some minor funding will be available. It is required, however, that economy class/lowest fares are chosen.

In order to receive the *COACH Studies Diploma* students have to attend the classroom sessions, and take active part in resolving of all exercises.

### **Due date and application**

The due date for submitting the application is by January 3<sup>rd</sup> 2013.

### **Applicants are required to prepare:**

1. An application letter describing our interest in the course,
2. CV,
3. Recommendations from head of department, supervisor or mentor,
4. Applicant's email address.

The forms shall be sent electronically to:

Niels E. Poulsen, GEUS email: [nep@geus.dk](mailto:nep@geus.dk)

The forms must be received no later than 16 pm Central European time on January 3<sup>rd</sup> 2012.

Please mark the subject field: Spring School 2013

## ***Why you must attend***

The goal is to provide students with diverse backgrounds a broad understanding of the issues surrounding CO<sub>2</sub> geological storage as an effective tool in a wide range of climate change mitigation options and encourage their active participation in this area.

The climate change issue is coined one of the most severe concerns of our time, and has brought leading nations into ambitious ventures in order to reduce their greenhouse gas emissions. The challenge is to provide enough power under a sustainable framework.

Up to now, no green energy source has been identified as being capable of providing very large quantities of “power on demand” at acceptable cost. Fossil fuels are prone to remain the prevalent primary energy source in the foreseeable future in Europe as well as the rest of the world. But, in response to the climate change issue, the problem of increasing CO<sub>2</sub> emissions from fossil fuels must be resolved urgently.

In this endeavour it is expected that emerging carbon capture and storage (CCS) techniques will become part of the solution. CCS is one of the solutions to reduce carbon emissions and serves as a bridging technology towards a carbon free European energy market.

**The course will give an introduction to:** Global warming and climate change, greenhouse gasses (methane, CO<sub>2</sub>...), sources, capture (focus on CO<sub>2</sub>), transport, trap types & storage options, coal seams, depleted hydrocarbon structures, enhanced recovery, deep saline aquifers.

Reservoir geology & rock properties, geological structure, rock type, cap rocks and reservoirs, mineralogy, porosity, permeability, capillary pressure and fluid distribution.

Basic reservoir concepts: Reservoir pressure, reservoir temperature, storage capacity estimation fluid flow through porous media.

Storage concept and mechanism: CO<sub>2</sub> plume, dissolution, diffusion, CO<sub>2</sub> solubility rate, mineralization, geochemical aspects, injection, pressure build up. CO<sub>2</sub> Storage Economics, cost.

Monitoring, numerical modelling, leakage, verification and legislation. Environment, health & safety: Governing regulations, risk.



## **GeoEcoMar - National Institute of Marine Geology and Geoecology**

The National Institute of Marine Geology and Geo-ecology of Romania- GeoEcoMar, is a research and development institute established in 1993, under the co-ordination of the Romanian Ministry of Education and Research.

The main activities of GeoEcoMar relate to marine, deltaic and fluvial environmental and geoecological studies regarding the ecosystems of the River Danube - Danube Delta - coastal Black Sea geosystem; the environmental impact of anthropogenic structures (civil and hydrotechnical works) that are located along the Danube course and in the Danube Delta; geological-geophysical-geoecological survey of the Black Sea as well as of other marine areas; study of natural hazards in Black Sea environment (submarine landslides, tsunami, major storms, etc).

Since 2002, under the leadership of Dr.eng. Constantin-Stefan Sava, Head of the Geophysical Methods for Deep Investigations Department, the Institute has started studies and analysis connected with the greenhouse gas emissions as well as the possibility of geological storage of CO<sub>2</sub> in Romania. Scientists from GeoEcoMar were and are actively participating in FP-6 projects: CASTOR, as subcontractors, EU Geocapacity and CO<sub>2</sub> Net East as well as in FENCO-ERA project: Impact of communication and FP-7 projects as CGS Europe and CO2Stop. Furthermore, GeoEcoMar founded a CO<sub>2</sub> Club in 2007 in order to support the CCS activities. Scientists from GeoEcoMar have a large experience and contribution in disseminating CCS knowledge in Romania.

Nevertheless, GeoEcoMar is involved in preparing a local CCS demonstration and provided the geological expertise for the implementation of EU Directive on CO<sub>2</sub> geological storage in Romania. The first local demonstration CCS project is supported by the Romanian Government and the local authorities and is participating in the first round of NER 300 competition, an EU funding program meant to support the development of CCS demonstration and renewable projects.



**The venue is intended to be at Murighiol/Uzlina, Romania** in the Danube Delta which is the second largest river delta in Europe, after the Volga Delta, and is the best preserved on the continent. The greater part of the Danube Delta lies in Romania (Tulcea county), while its northern part, on the left bank of the Chilia arm, is situated in Ukraine (Odessa Oblast). The approximate surface is 4152 km<sup>2</sup>, of which 3446 km<sup>2</sup> are in Romania. If one includes the lagoons of Razim-Sinoe (1015 km<sup>2</sup> of which 865 km<sup>2</sup> water surface), which are located south of the actual delta, but are related to it

geologically and ecologically (their combined territory is part of the World Heritage Site), the total area of the Danube Delta reaches 5165 km<sup>2</sup>.

The location of the Spring School will be near Murighiol, on Saint George arm, at Uzlina. Saint George arm is the southwest and oldest arm of the Danube, with a length of 112 km and is connected through its channels with Razim lake. Uzlina village is located near the Uzlina Lake which is a protected area for pelican colonies.

CGS Spring School will provide the opportunity to see the Danube Delta, its geology and wild and exotic landscapes, marshes with reed, rush and sedge on the water surface, lush forest on the shore, water lilies, exotic birds and wild animals (foxes, wild horses, snakes and turtles, wild boars).

## **Teachers**

- Adam Wójcicki, PGI-NRI [www.pgi.gov.pl](http://www.pgi.gov.pl)
- Alexandra Dudu, GeoEcoMar [www.geoecomar.ro](http://www.geoecomar.ro)
- Niels Poulsen, GEUS [www.geus.dk](http://www.geus.dk)
- Pascal Audigane, BRGM [www.brgm.fr](http://www.brgm.fr)
- Rob Arts, TNO [www.tno.nl](http://www.tno.nl)
- Stefan Knopf, BGR [www.bgr.bund.de](http://www.bgr.bund.de)

## **Guest teachers**

- Ameena Camps ieaghg [www.ieaghg.org](http://www.ieaghg.org)
- Eric Drosin, Zero Emissions Platform (ZEP) [www.zeroemissionsplatform.eu/](http://www.zeroemissionsplatform.eu/)

