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Title of Ph.D. thesis: Monitoring and verification of geologic carbon dioxide (CO₂) storage using tracer techniques

Description:

- Development of a radiocarbon reactive tracer methodology for the CARBFIX Project in Iceland. The tracer will be used to monitor and account the amount of injected CO₂ in the subsurface and to track the transport of CO₂ and its mineralization in the aquifer.
- Development of a SF₅CF₃ (trifluoromethyl sulfur pentafluoride) stable tracer technique, and design of an injection system for this tracer. SF₅CF₃ will be used as a non-reactive tracer to monitor the transport of the injected CO₂ loaded water in the subsurface.
- Study of degassing processes of waters with high concentration of CO₂. In order to adequately monitor a CO₂ storage site, it is necessary to better understand degassing processes that might occur during sampling.

The ratio between the radiocarbon, SF₅CF₃ and other (SF₆, fluorescent dyes) tracers will allow us to monitor physical and geochemical processes, which occur in the subsurface after the CO₂ injection. Mixing between the injected and dissolved CO₂ and the ambient groundwater and absorption, dissolution and precipitation processes will change the ratio between the tracers and will tell us how the injected CO₂ disperses in the subsurface and how it is stored. The results of the study of the degassing processes will help us to develop a proper methodology to correct the measurements of degassed samples of Iceland or other CO₂ storage research sites.

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Papers and abstracts:

F. Reguera, D., Riba, I., Forja, J. and delValls, T. A. An integrated approach to determine sediment quality in areas above carbon dioxide injection and storage in agreement with the requirements of the international conventions on the protection of the marine environment. *Exotoxicology*. Accepted

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Salamanca, M.J., Jimenez-Tenorio, N., **F. Reguera, D.,** Morales-Caselles, C. and DelValls, T.A. An early approach for the evaluation of repair processes in fish after exposure to sediment contaminated by an oil spill. *Journal of Environmental Science and Health Part A* (2008) 43, 1592–1597

F. Reguera, D.; Forja, J.; DelValls, A. Carbon dioxide storage in marine geological formations. Risk assessment and management requirements in the international conventions on the protection of the marine environment. *CICTA 2008 book of Abstracts*, pag 209, GTO 2000 Sociedade de Artes Graficas Ldo (Bombarral, Portugal)

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Martin-Diaz, M. L.; Kalman, J.; Riba, I.; **Fernandez de la Reguera, D.;** Blasco, J. and DelValls, T. A. The use of a metallothionein kinetic approach for metal bioavailability monitoring in dredged material. *Environmental International* 33 (2007) 463-468 (Elsevier journal, SCI).

DelValls, T. A.; Chapman, P.M.; Drake, P.; Subida, D.; Vale, C.; **Fernandez de la Reguera, D.** and Blasco, J. (2006) Benthos Sediment Quality Assessments In: *Sustainable management of sediment resources*. Sediment

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