

## CURRICULUM VITAE



### Dr. Giorgio Caramanna

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## EDUCATION

*July 2009*

**PhD in Geology**, University of Rome "La Sapienza", Rome, Italy

*Dissertation title:* "Field study by means of diving techniques and laboratory simulation of a submarine natural analogue to analyze the effects of potential CO<sub>2</sub> leakages from a sub-seabed carbon dioxide storage site" (in English)

*October 2001*

**MSc in Geology**, University of Rome "La Sapienza", Rome, Italy

*Dissertation title:* "Hydrogeological study of sinkholes in Central Italy" (in Italian); The dissertation is a study of the world's deepest flooded sinkhole "Pozzo del Merro" by means of cave diving techniques and ROV survey. RAI (the national Italian TV network) produced a documentary about my research activity

## OTHER QUALIFICATIONS

Advanced European Scientific Diver

International Diving Schools Association, Commercial Diver, Level 1

Nitrox and Trimix (normoxic) diver IANTD

Cave Diver NSS-CDS

Assistant Instructor PADI (918458)

Skipper's license (sailboats and motor boats), Italian Government

First Aid for Professional Divers (Divers Alert Network)

First Aid for children and babies (British Red Cross)

## LANGUAGES

English (full professional proficiency), Italian (native)

## EXPERTISE

Geothermal fluids chemistry, laboratory analysis and supervision, karst and caves hydrogeology, scientific diving techniques, risk assessment for diving operations, ROV-AUV for scientific applications, geomorphology, climate change, ocean acidification, sub-seabed gas detection techniques, environmental impact assessment, carbon capture and storage (CCS), university level teaching and tutoring, editorial skills

## PROFESSIONAL POSITIONS

*September 2014 – Present*

**Freelance consultant**

**GeoAqua Consulting**

- Environmental geology
- Underwater research support and management
- Scientific diving techniques
- Risk assessment for diving operations

*June 2014 – August 2014*

**Guest Investigator**

**Woods Hole Oceanographic Institution**, Woods Hole, MA, USA

- Biogeochemistry of oceanic geothermal emissions
- Scientific diving techniques

*September 2012 – June 2014*

**Research Fellow – level 8** (equivalent to Senior Research Fellow)

**Heriot-Watt University**, School of Engineering and Physical Sciences,  
Edinburgh, Scotland, UK

- Ecological impact of high CO<sub>2</sub> levels in aquatic environments
- Laboratory techniques for CO<sub>2</sub>-water-rock interaction (low pressure and high pressure reactors)
- Natural analogues for CO<sub>2</sub> seepage
- Supervision and tutoring of Master's students
- Teaching assistance
- Laboratory supervisor and member of the Safety Committee
- Editor of the *CICCS Newsletter* (Centre for Innovation in Carbon Capture and Storage) and administrator of the group's web-portal
- Development of inter-faculty network to study the consequences of ocean acidification and sub-seabed gas detection techniques

*November 2009 – August 2012*

**Senior Research Fellow (2012), Research Fellow (2009–2011)**

**University of Nottingham**, Department of Chemical and Environmental  
Engineering, Nottingham, UK

- Development of monitoring techniques for CO<sub>2</sub> leakages
- Fieldwork and laboratory simulations to study the effects of high levels of CO<sub>2</sub> on the environment
- Underwater fluids detection and sampling
- Geological storage risk assessment
- Feasibility study on mineral carbonation for Petroleum Development Oman
- Tutoring PhD students
- Teaching assistant for courses on geology and environmental impact
- Teaching instructor for short courses on CCS (carbon capture and storage) in the UK and China
- Development of international collaborations with academia and industry in Europe, Japan and the USA
- Outreach activity for high school students and the general public about environmental issues
- Received “Exceeds Expectation” rating and double increment increase in annual performance review for valued contributions to objectives, 2011

*September 2005 – July 2009*

**PhD studies in the framework of the EU Project CO<sub>2</sub>GeoNet**

**University of Rome “La Sapienza”**, Department of Earth Sciences, Rome, Italy

- Geological data collection and analysis
- Underwater geological survey, sampling and video documentation
- Utilization of sonar and ROV techniques for underwater gas detection
- Development of monitoring techniques for underwater CO<sub>2</sub> leakage

*April 2006 – March 2007*

**Associate Researcher and Scientific Diver**

**Italian National Institute of Geophysics and Volcanology (INGV)**, Rome, Italy

- Underwater geological study of volcanic gas (CO<sub>2</sub>) emissions in the Aeolian Islands, Southern Tyrrhenian Sea, Italy

*November–December 2005*

**Scientific Diver**

**Italian Central Institute for Marine Research (ICRAM)**, Rome, Italy

- Mooring and monitoring of a sea tide gauge
- Data elaboration

*May 2004 – October 2005*

**Professional Hydrogeologist**

**Italian National Geological Survey (APAT-ISPRA)**, Rome, Italy

- Geological survey
- GIS database on borehole data and water wells data
- Study of sinkhole genesis in Italy
- Tutoring for post-degree interns on environmental issues

*March–August 2004*

**Associate Researcher and Scientific Diver**

**Italian National Institute of Geophysics and Volcanology (INGV)**, Rome, Italy

- Underwater geological study of volcanic gas (CO<sub>2</sub>) emissions

*September 2003*

**Scientific Diver**

**Italian National Research Council (CNR)**, Rome, Italy

- Underwater geological and biological sampling
- Deployment of underwater instruments

*November 2002 – July 2003*

**Associate Researcher and Scientific Diver**

**Italian National Institute of Geophysics and Volcanology (INGV)**, Rome, Italy

- Underwater geological study of volcanic gas (CO<sub>2</sub>) emissions in the Aeolian Islands, Southern Tyrrhenian Sea, Italy

*June 2002 – August 2003*

**Scientific Diver**

**Italian National Institute for the Energy and Environment (ENEA)**, Rome, Italy and Gaeta, Central Italy

- Underwater deployment of data logger for sea level monitoring

*March–August 2002*

**Hydrogeologist**

**Roma TRE – University of Rome**, Rome, Italy

- Hydrogeological study of the regional aquifer in the city of Rome and neighboring areas in Central Italy

**OTHER POSITIONS**

**Visiting Researcher**, CO<sub>2</sub> Sequestration and Storage Research Division, Kyushu University, Japan, *February 2012*

**Visiting Professor**, Department of Ocean Technology, Policy and Environment, University of Tokyo, Japan, *February–March 2011*

**Editor**, *Royal Society of Chemistry Energy Sector newsletter*, December 2012 – June 2014

**Member of the Organizing Committee** of the 3<sup>rd</sup> International Symposium on Occupational Scientific Diving, Lecce, Italy, *November 2011*

**Chairman** of the “OCEANS 2011 Conference” session entitled “Oceanography: physical, chemical and biological,” Santander, Spain, *June 2011*

**Reviewer:**

- *International Journal of the Society for Underwater Technology*
- *Environmental Engineering and Management Journal*
- *Estuarine, Coastal and Shelf Science*
- *Greenhouse Gases, Science and Technology*
- *Journal of Limnology*

**Research Staff Representative**, Engineering Research Staff Group, Energy and Sustainability Research Division, University of Nottingham, *2011–2012*

**PhD Student Representative**, Department of Earth Sciences, University of Rome “La Sapienza”, Rome, Italy, *June 2007 – July 2009*

**GRANTS AND FUNDING**

**Edinburgh Research Partnership in Engineering and Mathematics award** for Postdoctoral and Early Career Researcher Exchanges to spend two months as a co-investigator at the Woods Hole Oceanographic Institution in the USA, *June-August 2014*

**COST Action grant** to attend “Seagrasses in Europe: Threats, responses and management” conference as invited speaker, Olhao, Portugal, *4-6 March 2014*

**UK Department of Energy and Climate Change funding**, COMET – Metering technologies for CO<sub>2</sub> transport, Heriot-Watt University, *2013, collaboration for the writing of the proposal*

**COST Action (EU funding)** to co-organize the training school on the topic “Effects of CO<sub>2</sub>/Ocean acidification on seagrass meadows” Vulcano, Aeolian Islands, Italy, *6–11 May 2013*

**COST Action (EU funding)** to co-organize the workshop “CO<sub>2</sub> effects on sea grass meadows”, University of Nottingham, UK, *May 2012*

**PhD grant**, University of Rome “La Sapienza”, Rome, Italy

**Master’s degree dissertation grant** from the Italian Water Management Society (ACEA), Rome, Italy

**PROFESSIONAL ASSOCIATIONS**

**Certified Geologist**, Italy, *February 2006* (license #1687)

**Society for Underwater Technology**, UK

**American Academy of Underwater Sciences**, USA

**Board of Directors**, Italian Association of Scientific Divers

**Representative for the Italian Association of Scientific Divers**, European Scientific Diving Panel of the European Science Foundation, *2010 – 2015*

**COMPUTER SKILLS**

Video-making software, Microsoft Office Suite, Hanna Instruments data-loggers

**PROFESSIONAL TRAINING**

LabVIEW Core 1 and 2, *2012*

Swagelok Installation Course, *2010*

**OTHER EXPERIENCE**

Invited as instructor to lead workshop on small ROV applications, Finnish course for scientific diving, *2009*

Invited as instructor to lead workshop on scientific diving techniques, Belgian course for scientific diving, *2011*

Storyboard design for CCS research video, University of Nottingham, *2011–12*

Scientific consultant for documentaries, Capmar Studios, *2000–2010*

**INVITED TALKS**

International CCS Workshop, University of Texas at Austin, USA, *2011*

International Energy Agency Greenhouse Gas Programme (IEAGHG), “Natural Releases of CO<sub>2</sub>” workshop, Laacher Sea, Germany, *2010*

UK-Japan Workshop on Environmental Impact Assessment of Carbon Storage, British Embassy, Tokyo, Japan, *2010*

## PUBLICATIONS LIST

## Dr. Giorgio Caramanna

## Journal Papers: refereed

1. Sanna A., Uibu M., Caramanna G., Kuusik R., Maroto-Valer M. (2014) **"A review of mineral carbonation technologies to sequester CO<sub>2</sub>"** Chemical Society Reviews DOI: 10.1039/c4cs00035h.
2. Caramanna G., Wei Y., Maroto-Valer M. M., Nathanail P., Steven M. (2013) **"Laboratory experiments and field study for the detection and monitoring of potential seepage from CO<sub>2</sub> storage sites"** Applied Geochemistry, 30: 105–113
3. Caramanna G., Malatetsta R., Maroto-Valer M. M. (2012) **"Scientific diving techniques for the study of flooded sinkholes in Italy"** International Journal of the Society for Underwater Technology, 31/1: 29–41
4. Caramanna G., Kekäläinen P., Leinikki J., Maroto-Valer M. M. (2012) **"Scientific diving techniques in hazardous environments"** International Journal of the Society for Underwater Technology, 31/1: 13–19
5. Caramanna G., Wei Y., Maroto-Valer M. M., Nathanail P., Steven M. (2012) **"Design and use of a laboratory rig for the study of the chemical-physical effects on aquatic environments of potential seepage from CO<sub>2</sub> storage sites"** Greenhouse Gases: Science and Technology 2: 136–143
6. Caramanna G., Voltattorni N., Maroto-Valer M. (2011) **"Is Panarea Island a valid and cost-effective natural-laboratory for the development of detection and monitoring techniques for submarine CO<sub>2</sub> seepage?"** Greenhouse Gases: Science and Technology 1: 200–210
7. Paolozzi R., Caramanna G., et al. (2010) **"The underwater exploration of the Merro sinkhole and the associated diving physiological and psychological effects"** International Journal of the Society for Underwater Technology, 29/3, 1–10
8. Conte A.M., Caramanna G. (2010) **"Preliminary characterization of a shallow-water hydrothermal sulphide deposit recovered by scientific divers (Aeolian Islands, southern Tyrrhenian Sea)"** International Journal of the Society for Underwater Technology, 29/3, 109–115
9. Espa S., Caramanna G., Bouche' V. (2010) **"Field study and laboratory experiments of bubble plumes in shallow seas as analogues of sub-seabed CO<sub>2</sub> leakages"** Applied Geochemistry, 25, 696–704
10. Caramanna G., Giordani M. (2010) **"Geomorphologic survey and hydrological measures of a karst spring by means of cave diving techniques (Amaseno, Italy)"** International Journal of the Society for Underwater Technology, 29/2, 95–99
11. Caramanna G., Espa S., Bouche' V. (2010) **"Study of the environmental effects of submarine CO<sub>2</sub>-rich emissions by means of scientific diving techniques (Panarea Island, Italy)"** International Journal of the Society for Underwater Technology, 29/2, 79–85
12. Aliani S., Bortoluzi G., Caramanna G., Raffa F. (2010) **"Seawater dynamics and environmental settings after the November 2002 gas eruption off Bottaro (Panarea, Aeolian Islands, Mediterranean Sea)"** Continental Shelf Research, 30, 1338–1348
13. Tassi F., Capaccioni B., Caramanna G., Cinti D., Montegrossi G., Pizzino L., Quattrocchi F., Vaselli O. (2009) **"Low pH waters discharging from submarine vents at Panarea Island (Aeolian Islands, southern Italy) after the 2002 gas blast: Origin of hydrothermal fluids and implications for volcanic surveillance"** Applied Geochemistry 24: 246–254

14. Voltattorni N., Sicarra A., Caramanna G., Cinti D., Pizzino L., Quattrocchi F. (2009) **"Gas geochemistry of natural analogues for the studies of geological CO<sub>2</sub> sequestration"** Applied Geochemistry 24: 1339–1346
15. Caramanna G., Ciotoli G., Nisio S. (2008) **"A review of natural sinkhole phenomena in Italian plain areas"** Natural Hazards 45: 145–172
16. Manini E., Luna G. M., Corinaldesi C., Zeppilli D., Bortoluzzi G., Caramanna G., Raffa F., Danovaro R. (2008) **"Prokaryote diversity and virus abundance in shallow hydrothermal vents of the Mediterranean Sea (Panarea Island) and the Pacific Ocean (North Sulawesi–Indonesia)"** Microb. Ecol. 55: 626–639
17. Nisio S., Caramanna G., Ciotoli G. (2007) **"Sinkholes in Italy: First results on inventory and analysis"** in Parise, M. & Gunn, J. (eds) Natural and Anthropogenic Hazards in Karst Areas: Recognition, Analysis and Mitigation. Geological Society, London, Special Publications, 279, 23–45.
18. Voltattorni N., Caramanna G., Cinti D., Galli G., Pizzino L., Quattrocchi F. (2006) **"Study of natural CO<sub>2</sub> emissions in different Italian geological scenarios"** in Lombardi et al. (eds) Advances in the geological storage of carbon dioxide 175–190
19. Chiodini G., Caliro S., Caramanna G., Granieri D., Minopoli C., Moretti R., Perotta L., Ventura G. (2006) **"Geochemistry of the submarine gaseous emissions of Panarea (Aeolian Islands, southern Italy): magmatic vs. hydrothermal origin and implications for volcanic surveillance"** Pure and Applied Geophysics 163: 759–780
20. Caramanna G., Ciotoli G., Ferrelli L., Guerrieri L., Nisio S., Vita L., Vittori E. (2006) **"Relazione tra strutture sismogenetiche, eventi sismici e fenomeni di sinkhole: un approccio metodologico in Appennino Centrale"** Mem. Descr. Carta Geol. It. 71, 121–122 (in Italian)
21. Caramanna G., Ciotoli G., Nisio S., Vita L. (2006) **"I fenomeni di sinkholes in Italia: inventario dei fenomeni naturali ed alcuni casi di studio"** Mem. Descr. Carta Geol. It. 71, 123–124 (in Italian)
22. Giardini M., Caramanna G., Calamita U. (2001) **"L'imponente sinkhole del Pozzo del Merro (Monti Cornicolani, Roma): stato attuale delle conoscenze"**. Natura e Montagna, anno XLVII, 2: 12–27 (in Italian)

#### Journal Papers: not refereed

23. Caramanna G., Andre N., Dikova M. P., Rennie C., Maroto-Valer M. (2014) **"Laboratory experiments for the assessment of the physical and chemical impact of potential CO<sub>2</sub> seepage on seawater and freshwater environments"** Energy Procedia, 63: 3138–3148
24. Wei Y., Caramanna G., Maroto-Valer M., Nathanail P., Steven M. (2013) **"An experimental study of the effects of potential CO<sub>2</sub> seepage in sediments"** Energy Procedia, 37: 3513–3520
25. Caramanna G., Maroto-Valer M. M. (2013) **"Laboratory simulations and field-study of CO<sub>2</sub> seepage in aquatic environments"** Energy Procedia, 37: 3403–3412
26. Caramanna G., Fietzek P., Maroto-Valer M. (2010) **"Monitoring techniques of a natural analogue for sub-seabed CO<sub>2</sub> leakages"** Energy Procedia, 4, 3262–3268
27. Caramanna G. (2002) **"Exploring one of the world's deepest sinkholes: the Pozzo del Merro (Italy)"** Underwater Speleology, February 2002, 4–8
28. Caramanna G. (2002) **"Le porte dell'acqua"** Speleologia 46: 32–39 (in Italian)
29. Caramanna G. (2001) **"Il Pozzo senza fine del Merro"** Speleologia nel Lazio 2: 32–34 (in Italian)

### Book chapters

30. Caramanna G., Sebastian Hennige (2014) **“Potential impact of CO<sub>2</sub> emissions on the seafloor”** In: *Advances in Environmental Research. Volume 33*. NOVA Science Publishers, Hauppauge, NY.
31. Giardini M., Caramanna G. (2012) **“Il Pozzo del Merro: storia delle ricerche e situazione attuale”** in: Giardini M. (Editor), “Sant’Angelo Romano (Monti Cornicolani, Roma). Un territorio ricco di storia e di natura” Comune di Sant’Angelo Roma, Regione Lazio: 265–273 (in Italian)
32. Caramanna G. (2012) **“Idrogeologia dell’area Cornicolana ”** In: Giardini M. (Editor), “Sant’Angelo Romano (Monti Cornicolani, Roma). Un territorio ricco di storia e di natura” Comune di Sant’Angelo Roma, Regione Lazio: 60–65 (in Italian)
33. Caramanna G. (2012) **“Il Pozzo del Merro: aspetti geologici, idrogeologici, geochimici e geomorfologici”** in: Giardini M. (Editor), “Sant’Angelo Romano (Monti Cornicolani, Roma). Un territorio ricco di storia e di natura” Comune di Sant’Angelo Roma, Regione Lazio: 274–281 (in Italian)

### Conference Papers: refereed

34. Caramanna G. (2013) **“Scientific Diving for geological research: examples from Italy”** Diving for Science 2005, Proceedings of the Joint International Scientific Diving Symposium American Academy of Underwater Sciences and European Scientific Diving Panel. Curacao, October 24–27, 2013, 31–42
35. Caramanna G., Voltattorni N., Celletti G. Maroto-Valer M. (2011) **“Are submarine CO<sub>2</sub> seepages valid analogues for sub-seabed CO<sub>2</sub> storage monitoring?”** Tenth Annual Conference on CCS, Pittsburgh, Pennsylvania (POSTER AND TECHNICAL PAPER)
36. Caramanna G., Voltattorni N., Maroto/Valer M. (2011) **“Eight years of research on a marine natural analogue for sub-seabed CO<sub>2</sub> storage seepage”** Oceans 2011, Santander, Spain (TECHNICAL PAPER)
37. Ponti M, Acunto S, Terlizzi A, Caramanna G., Cerrano C (2010) **“AIOSS and the Italian route for the professional scientific diving recognition within the EU framework”**. In: Second international workshop on research in shallow marine and fresh water systems, Milazzo, 3–10 October 2010, INGV
38. Caramanna G., Fietzek P., Maroto-Valer M. (2010) **“Monitoring techniques of a natural analogue for sub-seabed CO<sub>2</sub> leakages”** GHGT-10, Amsterdam (POSTER AND ABSTRACT)
39. Caramanna G. (2005) **“Scientific diving and ROV techniques applied to the geomorphological and hydrogeological study of the world’s deepest karst sinkhole (Pozzo del Merro, Latium, Italy)”** Diving for Science 2005, Proceedings of the American Academy of Underwater Sciences 24<sup>th</sup> Annual Symposium, Groton, Connecticut, USA, 233–238
40. Caramanna G., Voltattorni N., Caramanna L., Cinti D., Galli G., Pizzino L., Quattrocchi F. (2005) **“Scientific diving techniques applied to the geomorphological and geochemical study of some submarine volcanic gas vents (Aeolian Islands, Southern Tyrrhenian Sea, Italy)”** Diving for Science 2005, Proceedings of the American Academy of Underwater Sciences 24<sup>th</sup> Annual Symposium, Groton, Connecticut, USA 217–227
41. Caramanna G., Nisio S., Vita L. (2004) **“I fenomeni di annegamento dei sinkhole: studi preliminari su alcuni laghetti di origine incerta”** Proceedings 1<sup>st</sup> workshop “Stato dell’arte sullo studio dei fenomeni di sinkholes e ruolo delle amministrazioni statali e locali nel governo del territorio” Rome, 20–21 May 2004, 229–248 (in Italian)

42. Caramanna G. (2003) **"Speleosubacquea e geologia: una sinergia dal solido presente e promettente futuro"** Proceedings 2<sup>nd</sup> Speleology Workshop, Latium, Trevi nel Lazio, Italy (in Italian)
43. Gary M. O., Sharp J. M., Caramanna G., Havens R. (2003) **"Volcanically-influenced Speleogenesis: forming *El Sistema Zacaton*, Mexico and *Pozzo del Merro*, Italy, the deepest phreatic sinkholes in the world"** Proceedings Geological Society of America, Seattle Annual Meeting.

#### Conference Papers: not refereed

44. Caramanna G., Maroto-Valer M. (2010) **"Study of a submarine CO<sub>2</sub> natural analogue by means of scientific diving techniques"** IEA-GHG Workshop on Natural Release of CO<sub>2</sub>, Laacher See, Germany (INVITED TALK AND POSTER)
45. Caramanna G., Maroto-Valer M. (2010) **"No bubbles no troubles: monitoring techniques for CO<sub>2</sub> seepage in aqueous environments"** Challenger 2010; 14<sup>th</sup> Biennial Challenger Conference for Marine Science, National Oceanographic Centre, Southampton (POSTER AND ABSTRACT)
46. Caramanna G. (2011) **"Underwater CO<sub>2</sub> seepage monitoring"** UK-Japan Workshop on CCS marine monitoring, Ishigaki Island, Japan (INVITED TALK)
47. Caramanna G. (2001) **"Scientific utilization of scuba diving and ROV techniques in an Italian flooded sinkhole in the Latium Region (Central Italy) for the hydrogeologic and geochemical study of the karst water resource"** Proceedings of GeoItalia 2001, III Forum Italiano di Scienze della Terra, 302-303

#### Reports

48. Caramanna G. (2008) **"Underwater gas release: an initial rapid ROV and sonar survey"** in Moller I. and Pearce J. M. "Monitoring near surface leakage and its impact". JRAP 18 Report, CO<sub>2</sub>GeoNet. 102 pp.
49. Golmen L. G., Sundfjord A., Berge J. A., Caramanna G. (2007) **"Impact on sediments, seawater and marine biota from leaks. A literature review"** in: "Geological storage of CO<sub>2</sub>. The marine component". NIVA Report SNO 5478, 43 pp.
50. Chiodini G., Avino R., Caliro S., Caramanna G., et al. (2003) **"Geochimica delle emissioni gassose sottomarine di Panarea: origine magmatica vs. idrotermale ed implicazioni per la sorveglianza vulcanica"** GNV General Assembly Report (in Italian)
51. Caramanna G., Carapezza M. L., Cioni R., et al. (2003) **"Primi sei mesi di monitoraggio delle diverse fasi (solida, liquida e gassosa) presso le esalazioni sottomarine di Panarea a partire dal novembre 2002"** GNV General Assembly Report (in Italian)