

<b>Project Number</b>	2
<b>Name/title of the PhD course</b>	PhD in Biotechnology
<b>Name/Title of the PhD project</b>	<i>Impact of subsurface microbiology on hydrogen storage and reservoir storage efficiency</i>
<b>Recruiting organisation and Department/Faculty of reference</b>	The Department of Biology of the University of Naples Federico II is one of the largest in the country with over 300 people between Faculty, Technicians and Postdocs, and about 80 PhD students. The Department is highly interdisciplinary, spanning all domains of life sciences. Serving a student population of about 1,500 it hosts and organizes courses in both Italian and English in all major Life Science disciplines, and it is the home of two international Master Degree Programs in “Marine Biology” and in the “Biology of Extreme Environments”. The departments is equipped with all major modern instruments and facilities, from electron microscopy, to a vivarium, large computational clusters both hosted internally and in collaboration with the SCOPUS supercomputer consortia. The Early Career Researcher will work mainly with the team of Prof. Donato Giovannelli. The Giovannelli Lab ( <a href="http://www.donatogiovannelli.com">www.donatogiovannelli.com</a> ) is composed of ca. 25 people working at the interface between microbial ecology and planetary evolution, combining classic microbiology techniques with fieldwork and molecular and computational approaches. The Lab was recently awarded a ERC Starting Grant to study the role of trace elements in shaping microbial diversity, and it has recently acquired new large instruments, including a state-of-the-art IRMS and a ICP-MS. Projects in the Giovannelli Lab include Arctic permafrost, continental and marine subsurface, relationships between tectonics, geothermal areas and the microbiology of underground hydrogen storage.
<b>Scientific context and Objectives</b>	Identify the major microbial player involved in hydrogen consuming reaction in existing UHS sites combining shotgun metagenomic approaches with laboratory experiments and modeling. To isolate new microorganisms from UHS sites to be used as models for controlled laboratory experiments to guide future in situ approaches
<b>Expected Results</b>	To create a European database of microbial strains, metagenome assembled genomes and metagenomic sequences related to UHS conditions and provide a first order estimate of the quantitative impact of subsurface microbes on hydrogen storage. To describe and deposit into international culture collection UHS relevant strains. To assess the potential for different hydrogenotrophic metabolism to impact UHS operation in diverse geological settings.
<b>Secondment opportunities</b>	UEDIN, K Edlmann (3 months): R2 will join the HyStorPor team to perform imaging of biofilm formation using the hydrogen imaging micromodels and XR-CT facilities at UEDIN. ENI (1month) collect subsurface core and fluid samples and data.
<b>Brief CV of main Supervisor</b>	Donato Giovannelli is currently Professor of Microbiology at the Department of Biology of the University of Naples (Unina) “Federico II” and ERC starting grantee. He is the Director of a new Master Degree program in the Biology of Extreme Environments at the University of Naples, and an expert in subsurface microbiology. His group combines the use of culture-dependent and independent approaches in microbiology with fieldwork, computational approaches and geochemical measurements at the interface between microbiology and geology. He is currently the PI of 1 ERC grant, 2 National grant and 1 major industry collaboration on the microbiology of Underground Hydrogen Storage, and he is Co-I or collaborator on 2 European grants, 3 National grants and 2 US grants. He is advisor or co-advisor of 9 Masters students and 11 PhD student and 3 postdocs.
<b>Publications</b>	<ol style="list-style-type: none"> <li>1. Fullerton, K. M., Schrenk, M. O., Yücel, M., Manini, E., Basili, M., Rogers, T. J., et al. (2021). Effect of tectonic processes on biosphere–geosphere feedbacks across a convergent margin. <i>Nature Geoscience</i> 14, 301–306. doi: 10.1038/s41561-021-00725-0.</li> <li>2. Giovannelli, D., Barry, P. H., de Moor, J. M., Jessen, G. L., Schrenk, M. O., and Lloyd, K. G. (2022). Sampling across large-scale geological gradients to study geosphere–biosphere interactions. <i>Frontiers in Microbiology</i> 13. doi: 10.3389/fmicb.2022.998133.</li> <li>3. Rogers, T. J., Buongiorno, J., Jessen, G. L., Schrenk, M. O., Fordyce, J. A., de Moor, J. M., et al. (2022). Chemolithoautotroph distributions across the subsurface of a convergent margin. <i>ISME J</i>, 1–11. doi: 10.1038/s41396-022-01331-7</li> </ol>
<b>Projects participation</b>	<ol style="list-style-type: none"> <li>1. Principal Investigator, ERC Starting Grant 2020 COEVOLVE. <a href="http://www.coevolve.eu">www.coevolve.eu</a></li> <li>2. Principal Investigator, Hyenergy; Industry Funded project. 2022-2023 ENI</li> <li>3. Principal Investigator, Programma Ricerche Artico (PRA) MeltingICE. 2022-2024</li> </ol>