

The Role of Public Safety Divers in Supporting Scientific Diving: Examples from Italy

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Introduction

Sometimes the typology of the dive demands skills, equipment, experience and training above those commonly available to scientific divers.

Public safety divers may have the necessary characteristics to act as a support team for scientific diving in many situations.

In Italy, the main role of the National Fire Brigade Scuba Teams is search and rescue, but they are also involved in supporting environmental and archaeological research activities. The divers have experience in operating in very unforgiving environments including caves and polluted waters.



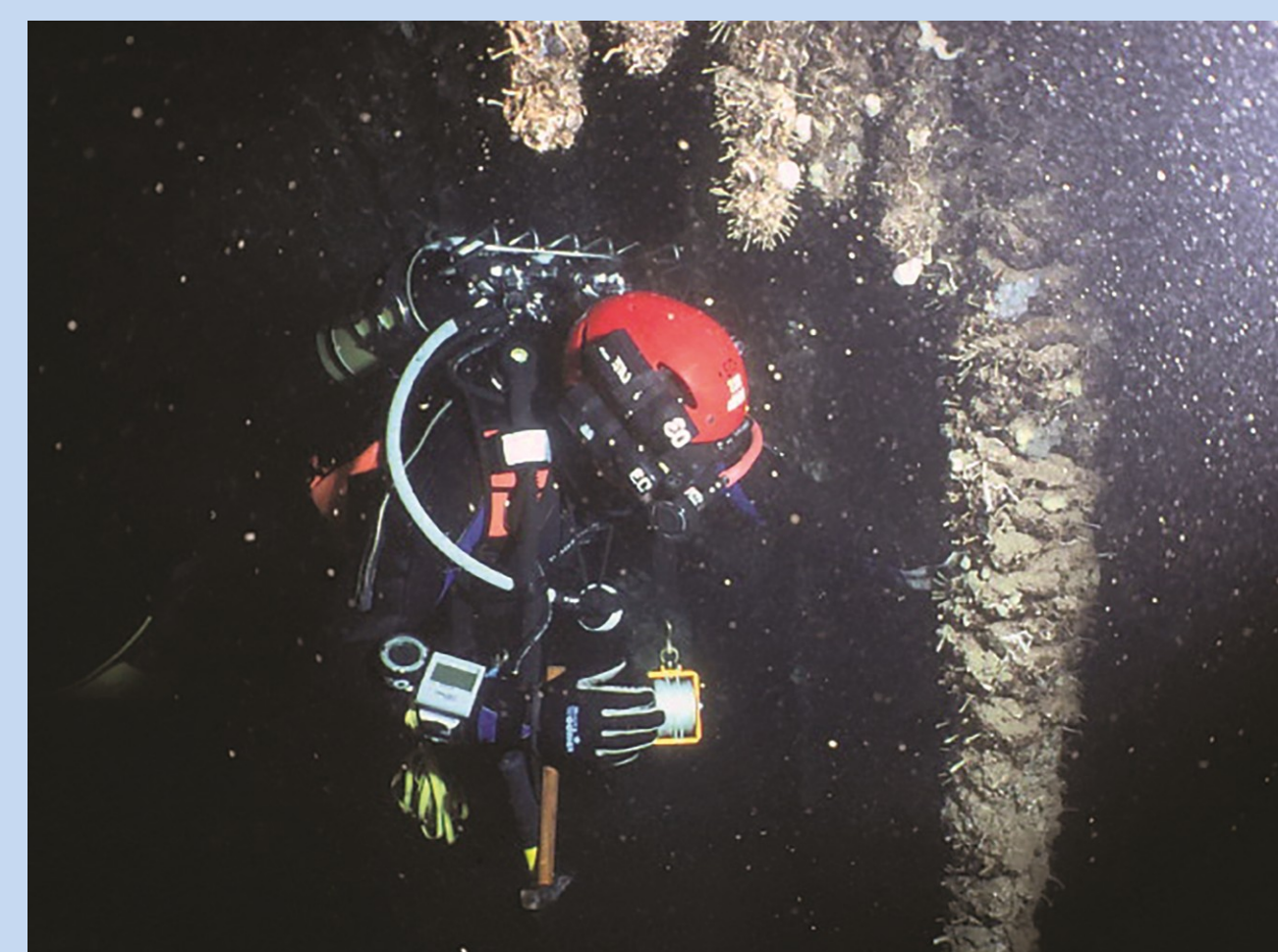
Scuba Diving team of the Italian Fire Brigade

Argentarola Cave



The cave's entrance

Argentarola Island lies close to the shore of southern Tuscany and hosts a cave that underwent phases of flooding and emersion during the last 215 ka. For this reason, a stalagmite was recovered to obtain records of the variations of the sea level in the form of alternate levels of calcite and serpulid worm overgrowth layers.

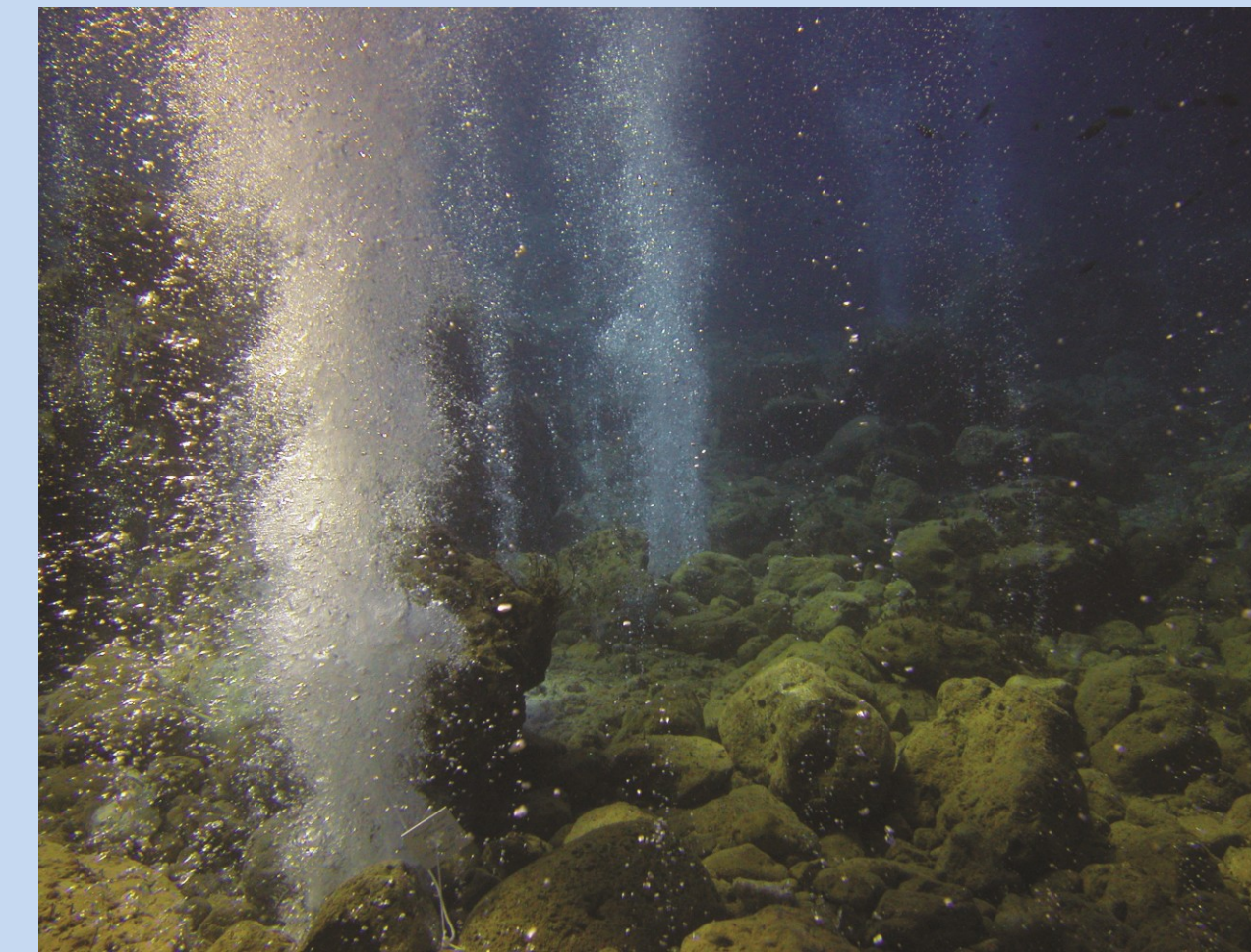


A diver measuring the dimension of stalactites in the cave

Despite the relatively shallow water (about 20 m/66 ft), the cave is a challenging environment due to the presence of thick deposits of silt on the bottom that can be easily stirred reducing the visibility to zero. The firemen created a cableway, which was necessary to move the stalagmite in a controlled manner to avoid damage to the specimen and/or the cave.

Panarea Island submarine volcanic activity

In 2002, an area offshore the island of Panarea (Aeolian Islands) was affected by a submarine eruption of geothermal fluids of volcanic origin. The Italian National Institute of Geophysics and Volcanology (INGV) started survey and monitoring activity to assess the origin of such emissions and their potential hazard for the local population. The presence of potentially toxic gases (CO₂, H₂S) required the use of enhanced personal protection in the form of dry suits and full-face masks during some of the operations.

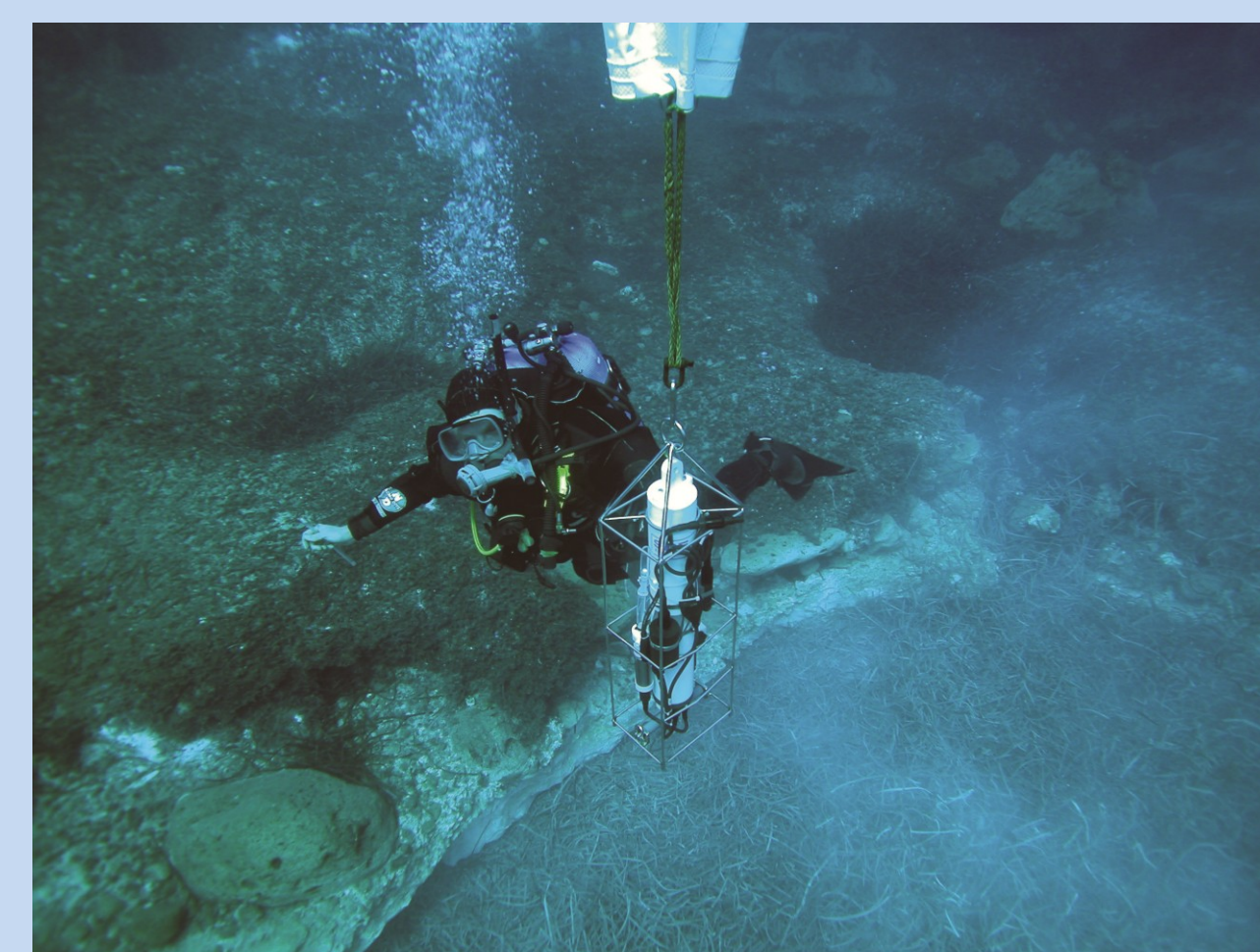


Submarine gas vents in Panarea Island

The Italian Fire Brigade scuba divers joined the scientific divers in supporting the submarine sampling operations also providing a motorboat that was used as a diving platform; this helped reduce the costs of fieldwork operations. Moreover, the specific skills of the firemen in diving in polluted waters were a key factor in developing sound and reliable diving procedures aimed at the highest safety levels for the divers.



A diver carrying fluids measurement devices



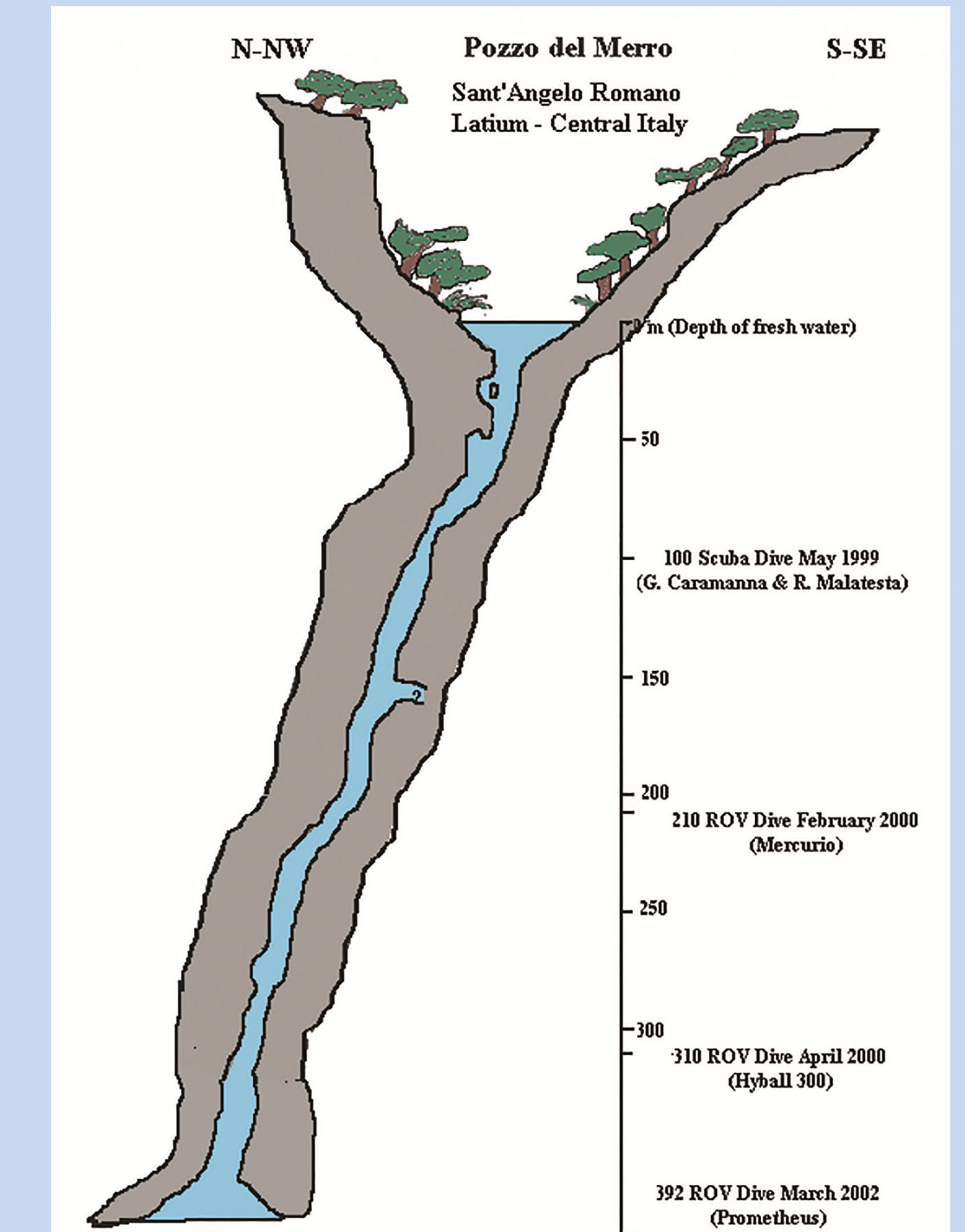
A multi-parametric probe was used for chemical profiles

A multidisciplinary research activity included sampling of the emitted fluids, hydrographic measures and profiling of the trends of the main chemical and physical parameters of the water in order to assess the magnitude of the impact of the vents on the marine ecosystem.

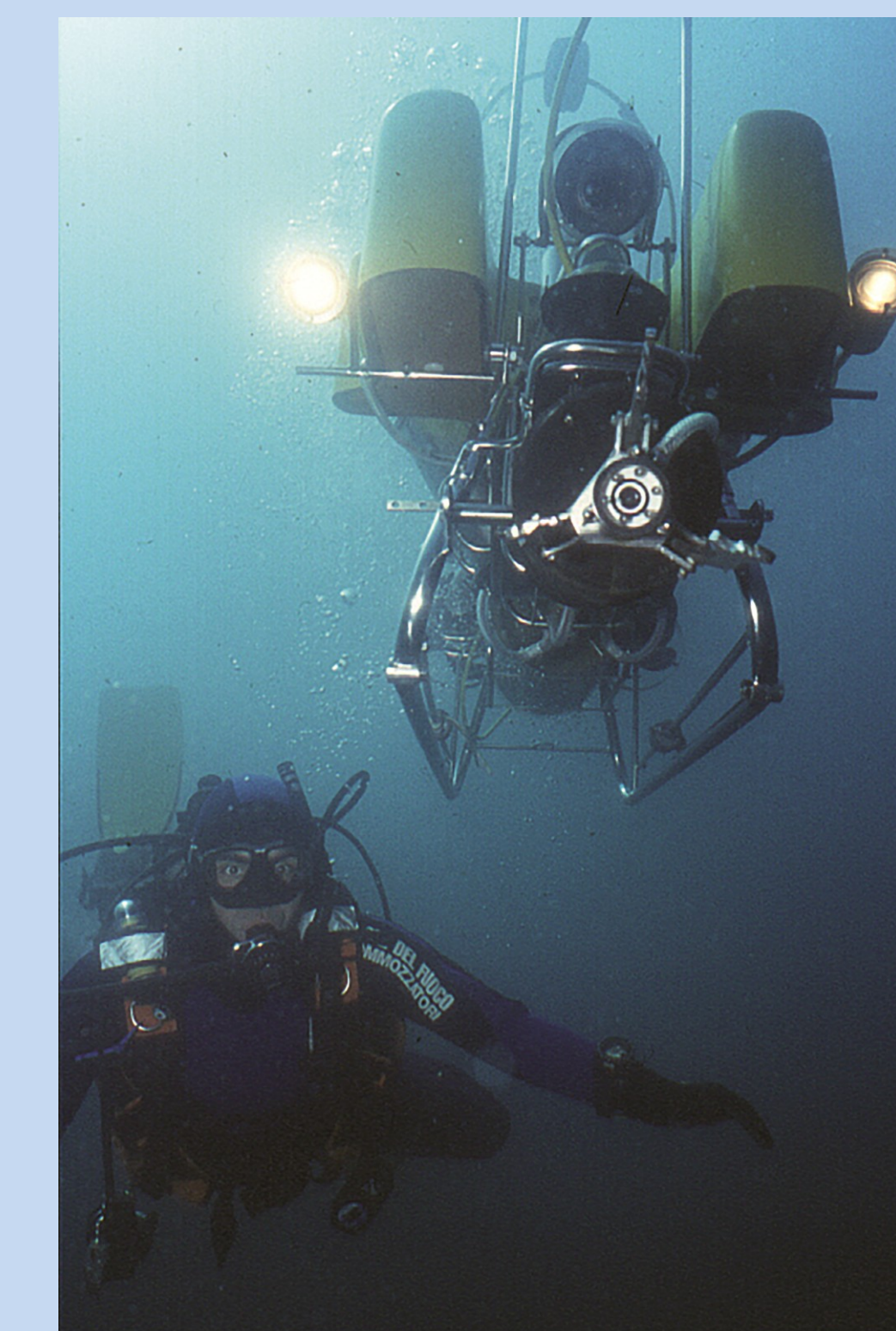
"Pozzo del Merro" Sinkhole

"Pozzo del Merro" is a deep water-flooded sinkhole in Italy that was explored and studied by scientific divers in the late 1990s and early 2000s.

The submerged section of the cavity is a sub-vertical karst shaft that is 396 meters deep. Due to this extreme depth, ROVs supported divers in the exploration.



Schematic vertical section of "Pozzo del Merro"



A diver with "Mercury" ROV

The National Italian Fire Brigade deployed three different ROVs (Mercury, Hyball 300 and Prometheus) during consecutive exploration efforts. One ROV carried a multi-parametric probe that was used to monitor the main chemical and physical parameters of the water column. This was very complex logistically and required the firemen to design and build a floating platform and trolley to carry the equipment back and forth from the sinkhole's surface opening to the water surface about 70 meters below ground.

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Conclusions

The collaboration between scientific and public safety divers allowed targets to be reached that otherwise may not have been possible.

Building on this successful experience, the development of an even closer collaboration between research institutions and public safety teams in the field of scientific diving operations is desirable, leading to high-quality research activities and effective exchange of knowledge and experience with mutual benefit and cost-savings.

The advantage was also reciprocal, as the Firemen were exposed to challenging scenarios that were more realistic than a simulation, thus providing valuable experience for continuous training, which is a mandatory part of their institutional activity.

Selected references

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