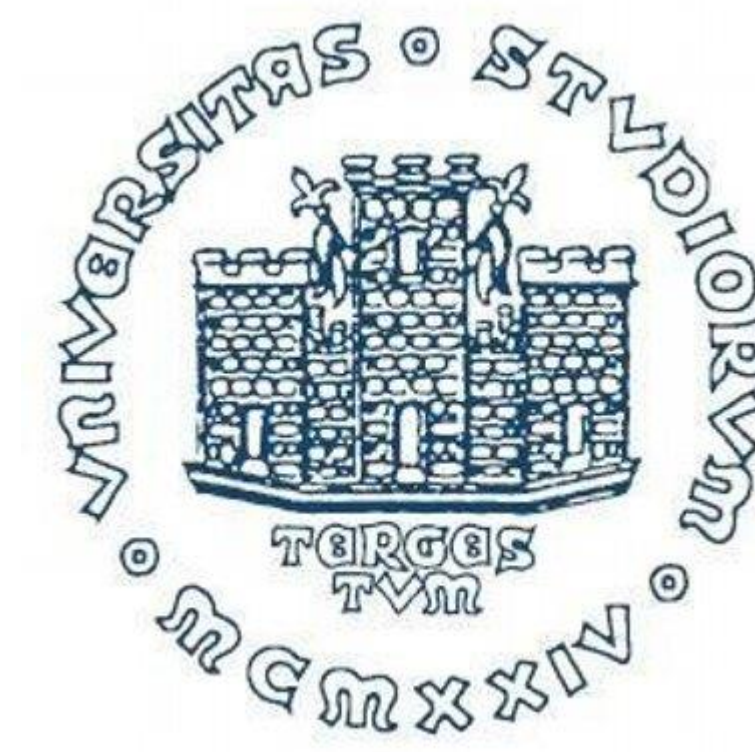




The “Diving Brain”: cognitive effects of inert gas narcosis



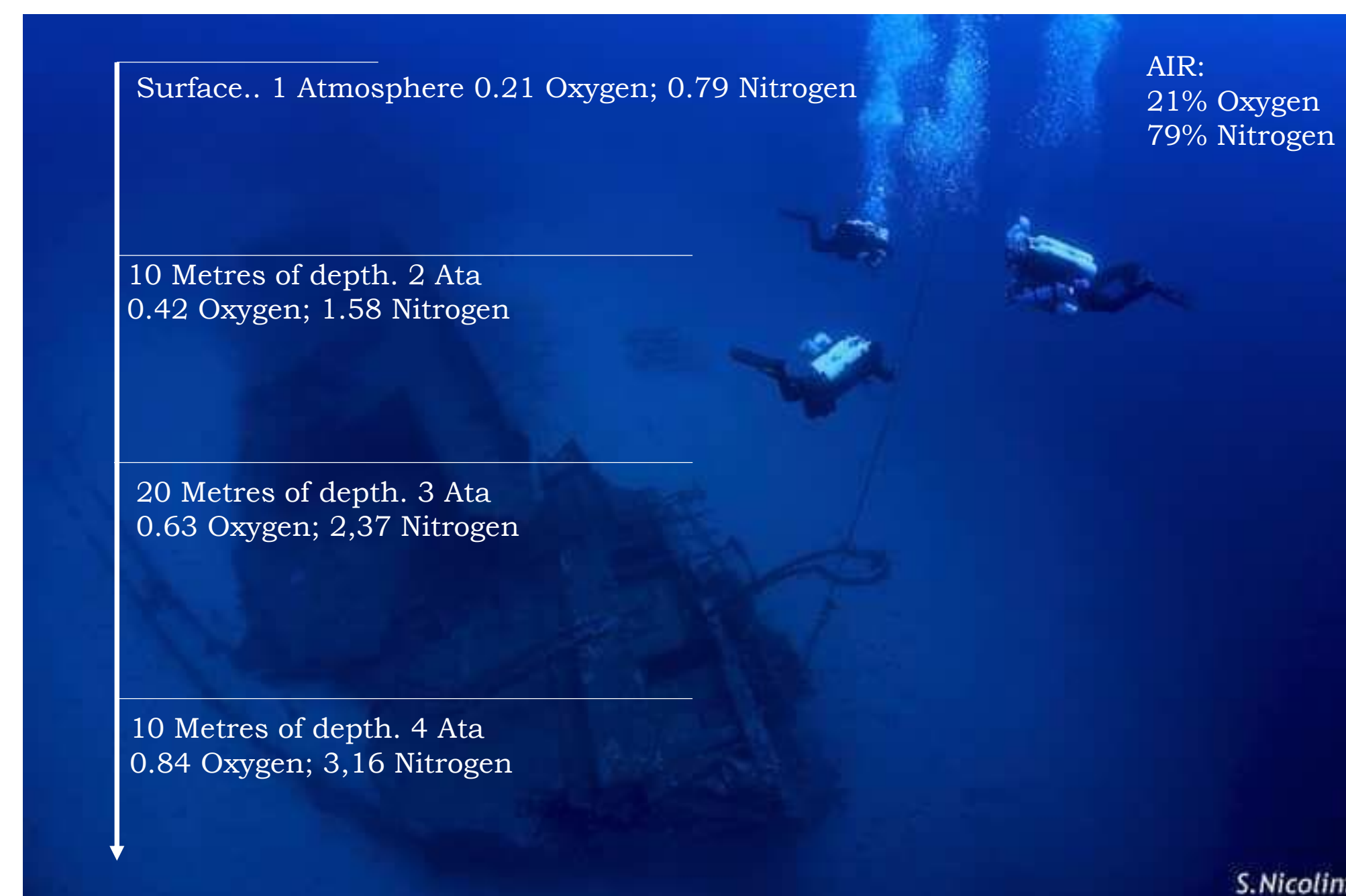
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INTRODUCTION

Nitrogen Narcosis is a reversible syndrome affecting divers performing deep dives breathing air. Symptoms go from euphoria, slow reasoning and reaction time, impaired motor coordination, to complete loss of consciousness. Symptoms severity increases as the nitrogen partial pressure increases, with depth.

(Benke, 1935; Freiberger et al., 2016)



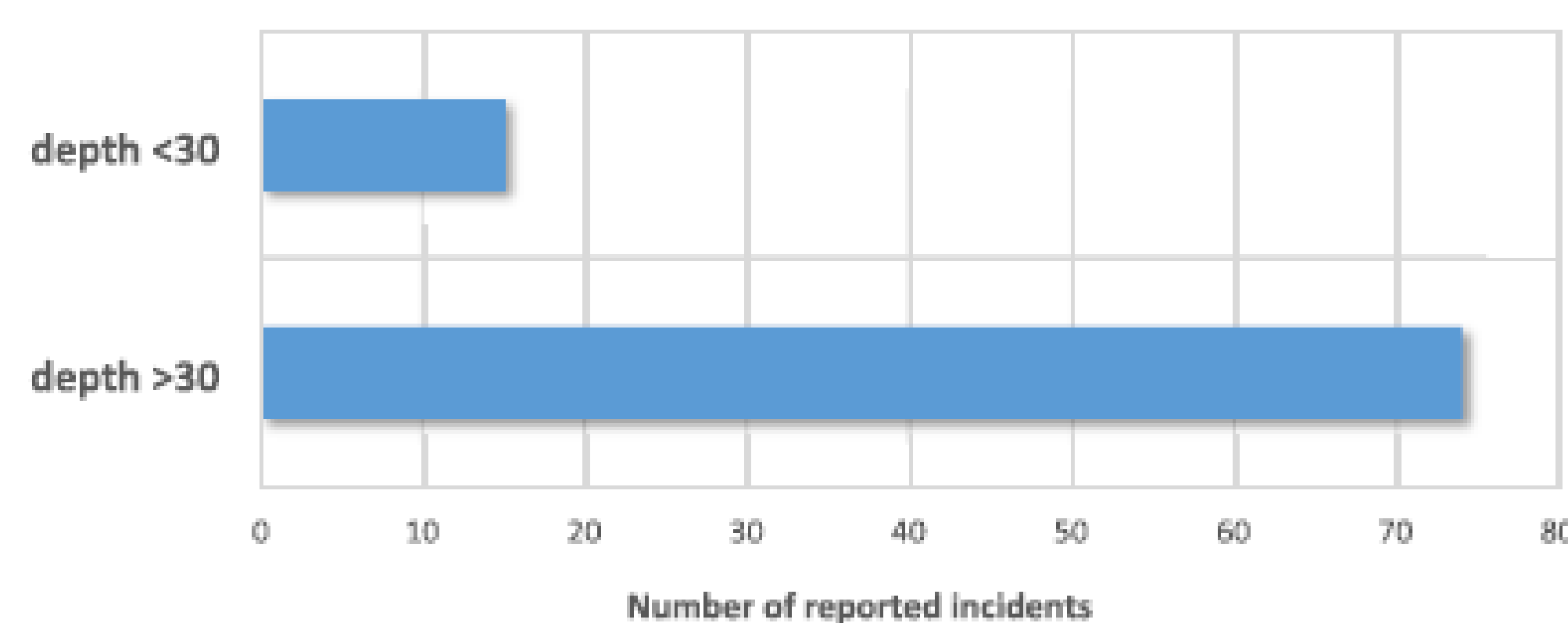
Physiological alterations

- Electroencephalographic modifications:
 - Frontal shift of alpha frequencies
 - General increase in theta and delta waves (Pastena et al., 2005)
- Alteration in neurotransmitter homeostasis in Basal Ganglia
 - Increment in GABA receptor activity
 - Reduction in extracellular GLU
 - Reduction in extracellular dopamine (Rostain and Lavoute, 2016)

Specific vs A-specific mechanism

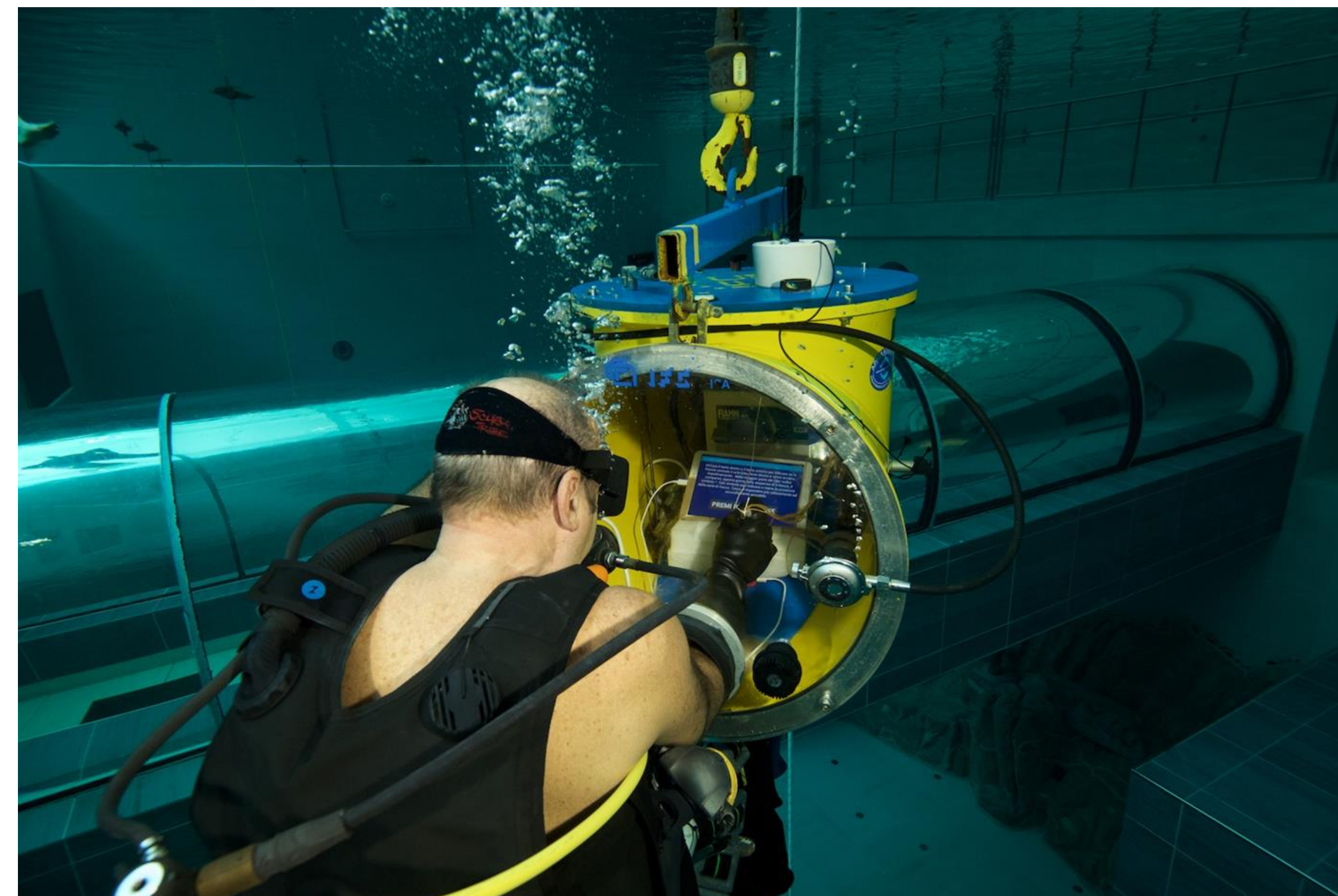
RELEVANCE OF THE STUDY

Actual limit for air dive: 39 metres

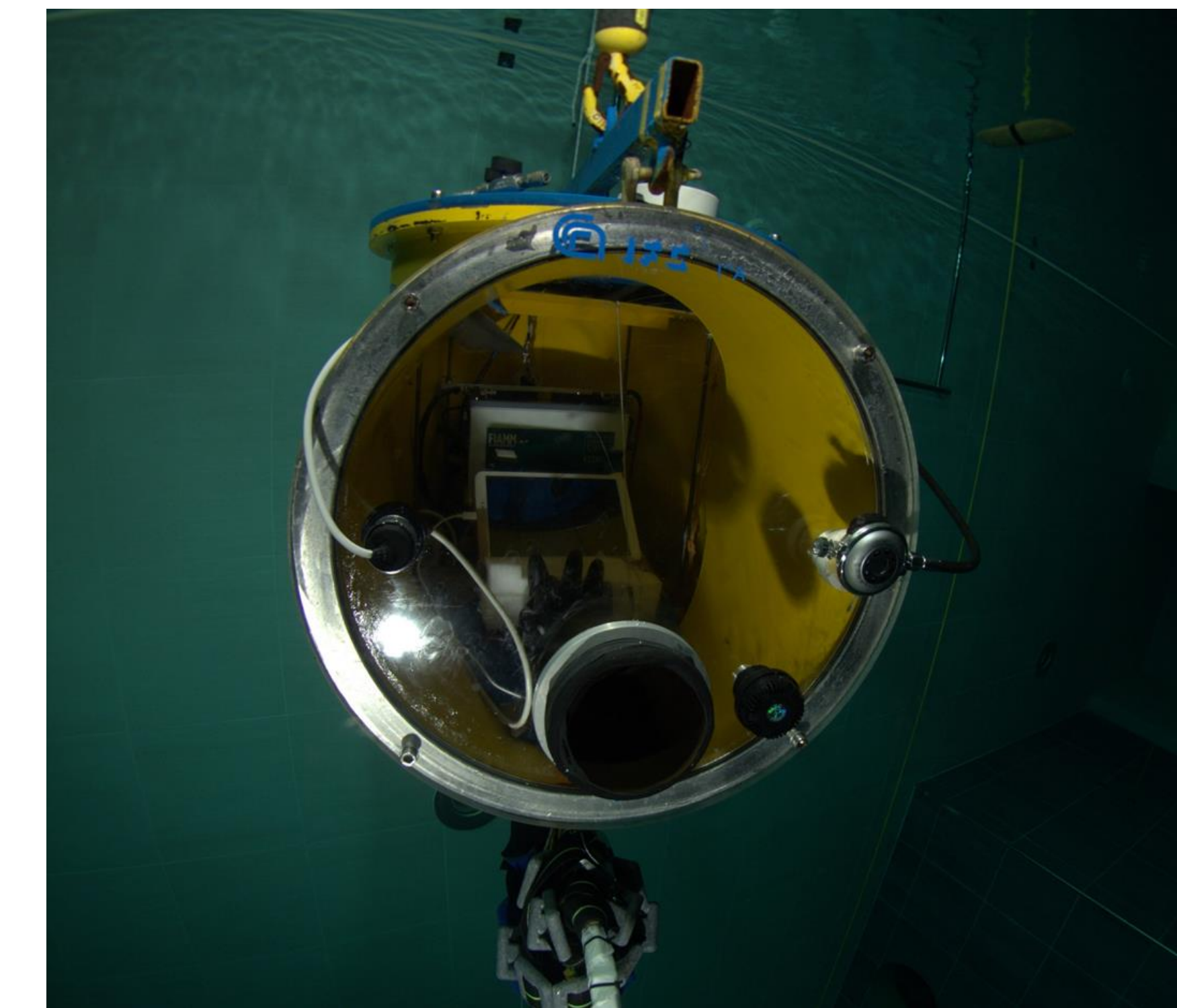


Clark, 2015

MATERIALS AND METHODS

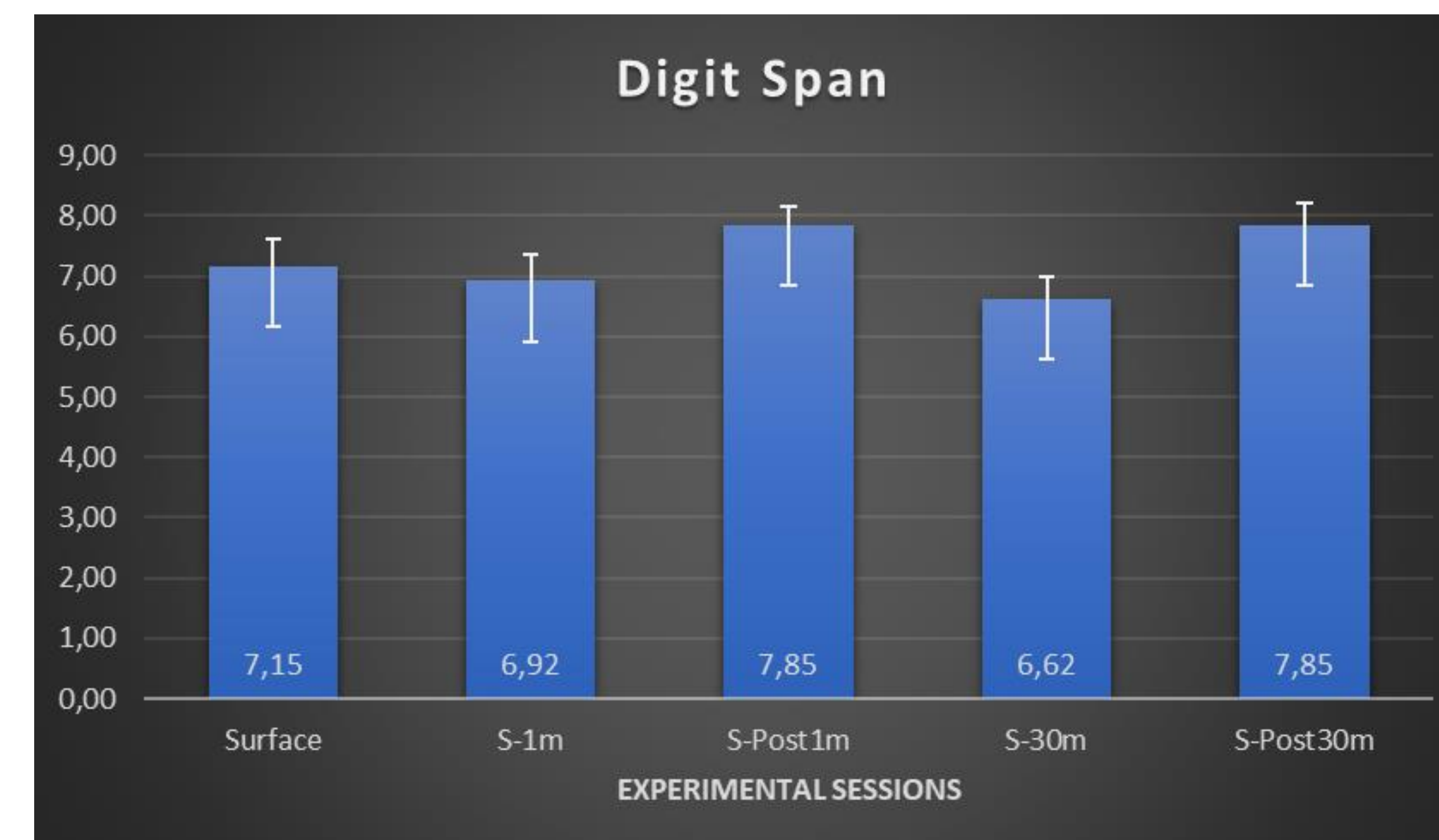
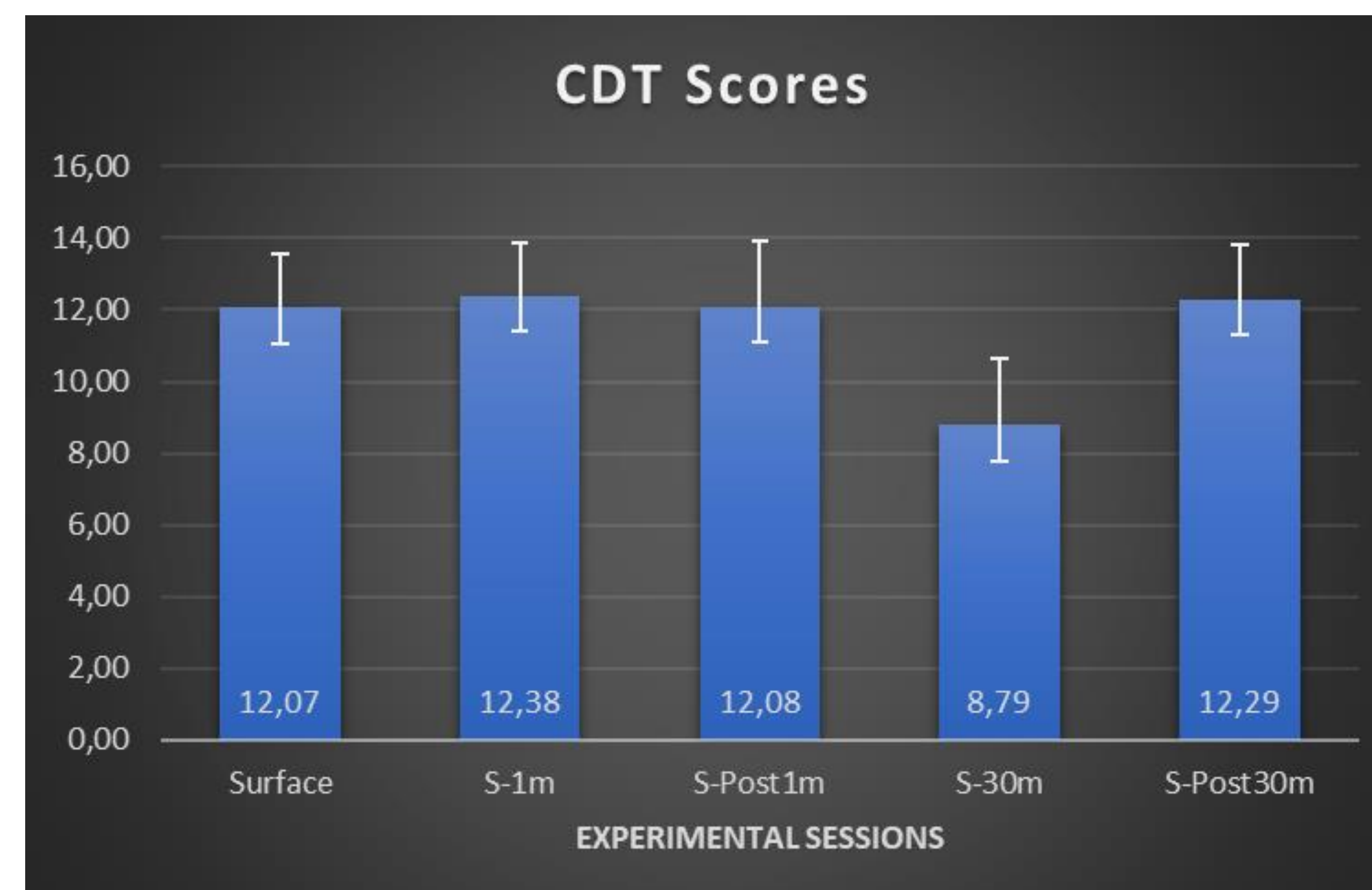


Experimental Paradigm



Thirteen expert divers performed a dive at two different depths, i.e. at 1 and 30 metres. Visuo-spatial functions and short-term memory were evaluated with the Clock Drawing Test (CDT) and the Digit Span Test, respectively and compared to a surface performance. Each subject was its own control. Tests were administered with an ad-hoc tablet application, specifically created for the study. The tablet was inserted in an underwater self-equalized case and managed by volunteers thanks to latex glove. Data were analyzed with repeated measures ANOVA, using depth level as within-subjects factor.

RESULTS



From left to right: Clock Drawing Test (CDT) Scores.

The graph shows the trend of volunteers' performance along different experimental sessions. The asterisk evidence significant data.

Digit Span Test. The histogram represent subjects' scores during each session; the asterisk signs significant data.

Nitrogen impairs working memory, reduces visuospatial coordination and comprehension capabilities at depths lower than 39 metres.