At the heart of the coral triangle in West Papua: an Indonesian-French scientific exploration of a white area with closed-circuit rebreathers (eCCR): [poster]
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**MATERIALS, METHODS AND ACTION STRATEGY**

**AIMS**
- Team of scientific divers including 5 eCCR and 8 open-circuit divers
- Constant oxygen partial pressure => Optimization of decompression
- Limitation of thermal losses (breathing of hot, humid air) => Decreased risk of decompression accident, no risk of headache in cold water diving
- No bubbles / silence => Greater attention to teammates and underwater behavior

**AND SCIENTIFIC BENEFITS**
- **Autonomy** => significant increase of the intervention time
- **Long duration dives** => 40-100m dives are possible
- **Non-destructive approach** => respect of biotopes
- **No bubbles / silence** => better fauna approach
- **Use of air or gas mixtures**

**ADVANTAGES : ENHANCED DIVING SAFETY ...**

**CAVING**
- Increased autonomy => Stress reduction in cavities
- Absence of bubbles => less neoprene / decreased risk of collapse of the vault

**Deep diving**
- The French-Indonesian ‘Lengguru 2014’ expedition was headed by IRD and P2O-LIPI, RCB-LIPI and POLTEK. Exploration and sampling effort were concentrated on several reef slopes and karst caves in West Papua. We explored a flooded network upstream of the village of Lengguru (96.0 meters depth). Our objective was to study the macrofauna diversity associated with these fossils cavities. We thank the local communities and the management team for their support. A European competency level applied to the use of the closed circuit rebreather in scientific diving at work. This scientific expedition was organized at the heart of the coral triangle and in a global context of biodiversity science-based assessment of functional, genetic and morphological diversity for several marine biotas (scleractinians, hard corals, gorgonians, mollusks) with primary importance for biodiversity conservation.

**REFERENCES**

1. Lembaga Ilmu Pengetahuan Indonesia (LIPI), Pusat Penelitian Oseanografi (P2O), Jl. Pasir Putih I, Ancol Timur-Jakarta, INDONESIA.
2. French National Research Institute for Sustainable Development (IRD), Noumea, NEW-CALEDONIA.
4. **Pyle RL. 1999b**. Biodiversity and underwater noises. The French-Indonesian ‘Lengguru 2014’ expedition was the first French Oceanographic campaign organized by a national and academic research organization to use the rebreather. The scientific diving operations were made under the responsibility of the French research institute IRD. Nevertheless, the French regulation presently only allows the use of rebreather for recreational uses. The main author participates as an expert for the Ministry of Labor to reform the law with specific applications to scientific purposes. This scientific expedition was therefore permitted in phase advance.

**RESULTS & OUTPUTS**

**The use of rebreather in sciences exploration constitutes a new technological paradigm.**
- Exploration and sampling effort on several reef slopes (with 40 stations) including the twilight zone (vertical transects between 100m depth and shallow)<br>  - More than 650 specimens collected (hard corals, gorgonians, scleractinians, mollusks, algae, seagrasses...)<br>  - DNA barcoding and traditional taxonomy systematically for all samples. Additional and specific molecular characterization of several marine biotas (scleractinians, corals, gorgonians, mollusks), the use of gas mixtures (no accessible to OC divers).<br>  - Observation and photo identification (several hundreds reef fishes, turtles,26-150)<br>  - A data management strategy, with a share scientific database, a photos database of several thousands images. Besides investigating organism communities based on geophysical and traditional taxonomy, biologists infer the phylogenetic relationships of sampled taxa along with those originating from peripheral regions for a better understanding of the underlying diversification processes and for helping their conservation.

Such joint scientific venture organized at the heart of the coral triangle and in a global context of biodiversity benefits, represents an important contribution to the knowledge of historical and evolutionary processes explaining the unique biodiversity encountered in this still poorly studied region located at the junction of Asia and Australia and at the interface of the Indian and Pacific Oceans. It was also the opportunity to communicate, to increase scientific capacity building, and to raise public awareness through multimedia and photographic exhibitions, seminars and various web supports including a pedagogical program.

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**FIELD AND LABORATORY METHODS**

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**www.lengguru.org**