UNDER THE POLE
UNDERWATER SCIENTIFIC EXPLORATION

Emmanuelle Périé-Bardout
Co-Founder and Co-Director
UNDER THE POLE

The biggest problem with the ocean's depths is that we don't see them. Our planet's oceans, vital to life on Earth, remain largely unexplored, with 95% of their surface still understudied. Among the least known and protected habitats is the **mesophotic zone**, situated between 30 and 200 meters deep. This zone, characterized by moderate light penetration, derives its name from the Greek words "meso" (middle) and "photic" (light). Despite its obscurity, the mesophotic zone is a **biodiversity hotspot,** an **ecological bridge** between surface and deep ecosystems, and a **refuge** from increasing environmental and anthropogenic pressures.

The mesophotic zone accounts for about **5% of the ocean's surface**, and over **99% of it lies within our exclusive economic zones**. This zone, though often overlooked, is essential for maintaining marine biodiversity and is already affected by human activities such as acidification, pollution, and intensive fishing—often more so than the surface zone. Yet, **our understanding of these ecosystems is minimal**.

We are Emmanuelle and Ghislain Bardout, and together we have been leading UNDER THE POLE for the **past 16 years.** Our **underwater exploration program aims to explore, study and document the world's oceans down to 200 meters deep, from polar to tropical regions, with the goal of contributing to the conservation of oceanic ecosystems**. To fulfill our missions, we have developed advanced **deep-diving expertise**, extending scientific work to depths commonly reaching 120m and occasionally beyond. This new approach has become feasible over the past twenty years due to technological advancements, providing fresh insights into mesophotic ecosystems.

Our current **10-year scientific exploration program, DEEPLIFE**, conducted with an international consortium led by CNRS, focuses on **mesophotic marine animal forests**. These forests, dominated by animals like black corals and gorgonians, are **among the planet's richest and most diverse ecosystems**, comparable to terrestrial forests in complexity and ecological value. Our previous program, with CNRS and CRIOBE, revealed that in French Polynesia, coral reefs extend to 172 meters. We also observed that mesophotic corals avoid coral bleaching, and that the highest coral diversity was found between 40 and 60 meters. These results are just a few examples demonstrating that studies in this zone are **changing our understanding of coastal ecosystems and their functioning**. They **challenge our conservation models**, which often overlook biodiversity and habitats beyond 30-40 meters.

Despite their importance, **mesophotic ecosystems face several critical challenges**:

- **Lack of Knowledge**: These ecosystems remain largely unexplored and understudied due to the technical challenges of accessing and exploring them.

- **Natural and Anthropogenic Threats**: Mesophotic ecosystems are increasingly affected by global and regional threats such as extreme weather events, thermal stress, bleaching, acidification, pollution, fishing, and extractive activities. Their potential as resilient refuges is becoming uncertain, and natural resources may disappear before we have the chance to discover and study them.
- **Insufficient Protection**: MPAs are key tools for conserving mesophotic ecosystems. However, their implementation and effectiveness are inadequate. Currently, less than 10% of the mesophotic zone is covered by MPAs, falling short of global targets and far from the 30% protection goal by 2030 established by the UN Convention on Biological Diversity. Existing MPAs often favor surface ecosystems over deeper zones, with the mesophotic and rariphotic zones (150-300m) being the least protected despite high fishing efforts.

Given the mesophotic zone's significance, **we recommend**:

- Promoting a **three-dimensional approach** to ocean study and protection, integrating depth as a crucial dimension for sustainable marine resource management.
- Specifically **incorporating the mesophotic zone** into global ocean conservation policies and tools, in line with scientific recommendations.
- Achieving high/strong/integral **protection goals**, especially in priority areas with high fishing efforts and weak protection measures.
- **Strengthening MPA protections** according to international recommendations, including banning activities such as bottom trawling.
- Applying the **precautionary principle** in exploiting the mesophotic zone and the seabed in general.
- **Facilitating and encouraging exploration, research, and knowledge** production on mesophotic ecosystems to overcome knowledge barriers that impede proper protection.

With one year to go until the third United Nations Conference on the Oceans, Under The Pole calls for action : specific exploration, research, and effective protection of the mesophotic zone and its most neglected ecosystems are necessary to ensure marine life's resilience against global changes.