**Introduction**

In 1996 the suggestion was made by Peter Glynn that ‘deeper reefs’ may be protected from some of the pressures which threaten shallow coral reefs. New researchers formally consider Mesophotic Coral Ecosystem which begin at 30m (the limit of recreational scuba diving) and end with the last photosynthetic corals around 100m.

MCEs are understudied as those qualified for SCUBA survey work typically focus on shallow reefs due to time constraints. Studies employing ROVs or submersibles tend to target the greatest depths possible and so overshoot MCEs. This work utilizes recent advances in CCR rebreather technology, allowing the safe and economical use of mixed gas decompression diving.

The deep reef refuge hypothesis suggests at sites where shallow and mesophotic reefs occur, an impacted shallow reef may be able to recover due to replacement from the deeper reef.

**PHD aims**

Defining the mesophotic zone by photosynthetic coral communities rather than absolute depth limits. Sites inevitably vary, using fixed depth bands prevents logical comparisons.

To determine how depth generalist corals are able to survive under different irradiance and temperature regimes. Adaptations may prevent migration mesophotic to shallow.

Quantifying the reproductive output of mesophotic reefs in comparison to shallow reefs. How useful is a mesophotic coral ‘lifeboat’?

**Future interests**

Using coral coring and stable isotope techniques to compare long term records of bleaching in mesophotic and shallow water corals and to age mesophotic colonies.

Population genetics to illustrate the degree of vertical connectivity across a mesophotic to shallow gradient

Quantifying differences in gametogenesis between shallow and mesophotic colonies.

Utilising the mesophotic zone for conservation, can we use deeper reefs to support the shallows?

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**Additional projects**

A meta-analysis pooling historical mesophotic community data in an attempt to define the region in terms of coral communities.

A physiology case study of *Aipastrea lamarcki* one of the dominant mesophotic corals on Utila. Data collected includes O2 incubations, PAM readings and stable isotope samples. Where energy in the form of light is removed how can *A. lamarcki* survive? Is their a reduction in metabolic rate, an increase in filter feeding or an improvement in photosynthetic efficiency?

Stress in the mesophotic zone. Do *A. lamarcki* colonies with depth exhibit a gradient in Sulphur compound expression?

A serendipitous bleaching trial with *A. lamarcki*. Do shallow and mesophotic corals fare differently under a severe El Nino?

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**Acknowledgments and contact details**

jack.laverick@env.res.ox.ac.uk, University of Oxford, department of Zoology.

Website: Facebook.com/ThinkingDeep

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**Additional figures**

*Fig 1. An Ordination of hard coral community data from three dive sites; Coralview (CV,40m) Little Bight (LB,40m) and The Maze (TMA,85m). Stress of the plot = 0.15. 41 species contribute to measure of similarity. Depth is principally expressed left to right. There appears to be no clear break defining a shallow and mesophotic hard coral community. Two more sites await analysis.*

*Fig 2. Each column reflects data averaged across four, 50m video transects collected by rebreather diver. The type of bottom cover was identified every 25cm intercept of the tape. A comparative over-estimate of coral cover as coral was preferentially recorded over other cover types to feed into the Ordination plot.*