Cyclone damage at mesophotic depths on Myrmidon Reef (GBR)

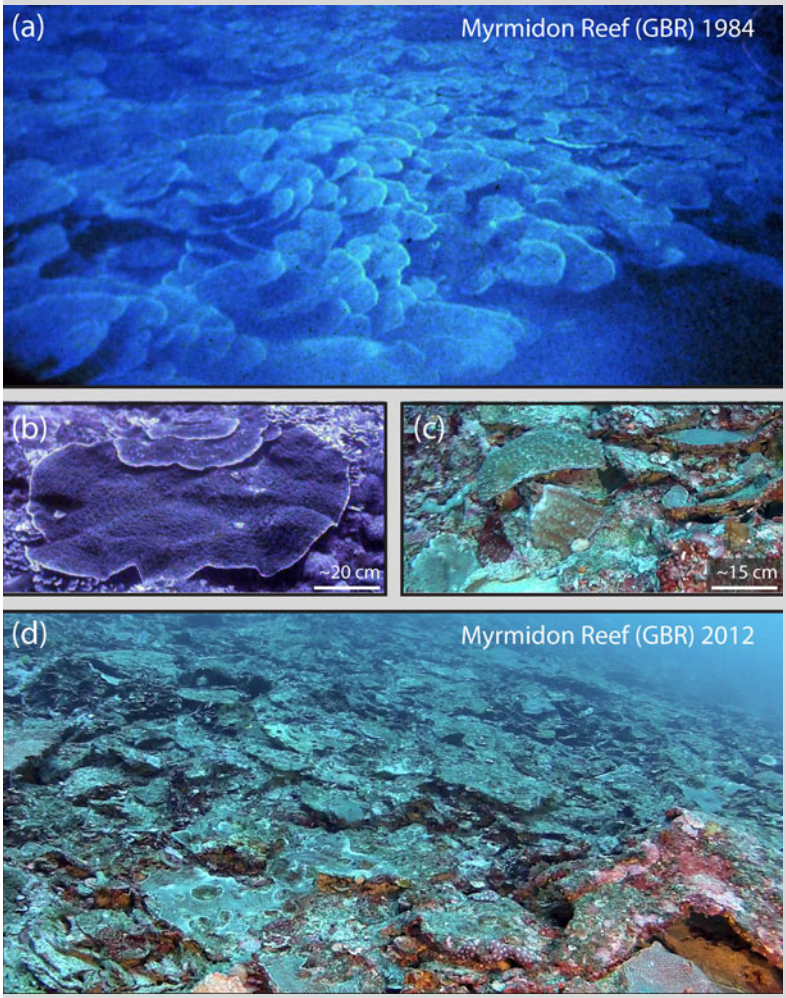

Fig. 1 Mesophotic coral community (~60 m) on the ocean-facing slope of Myrmidon Reef (Great Barrier Reef): **a**, **b** photographs from 1984 using the Platypus submersible (photographs by D. Hopley), and **c**, **d** video still from 2012 using a ROV

The Great Barrier Reef (GBR) supports diverse, extensive mesophotic coral ecosystems (~30–100 m) along the edge of Australia's continental shelf (Bridge et al. 2012). The first exploration of these deepwater reefs was conducted in the early 1980s using a small manned submersible, the Platypus, at Myrmidon Reef (Hopley et al. 2007). On the eastern reef front, a thriving mesophotic coral community was discovered consisting of large, plating corals (*Leptoseris*, *Pachyseris*, and *Montipora*) and extremely high coral cover (Fig. 1a, b). Nearly 30 years later, we revisited the exposed front of Myrmidon Reef (18.2657°S, 147.4016°E) as part of the ''Catlin Seaview Survey'' (September 2012). Using a remotely operated vehicle, we surveyed an area of ~500 m^2 between 50 and 65 m depth and observed extensive fields of plate-like rubble, overturned corals, and some living, recently broken-off coral fragments (e.g., *Pachyseris, Montipora*, and *Podabacia*) (Fig. 1c, d). Given the signs of recent injury, the observed damage was likely caused by severe Tropical Cyclone Yasi, which passed ~100 km north of Myrmidon Reef in early February 2011, and was the only significant storm in this area since Cyclone Larry in 2006.

Mesophotic reefs often escape the effects of storm-induced waves, which may play an important role in their persistence over time and highlights their potential as ''refugia'' (Bongaerts et al. 2010). Here, we present the first observations of extensive storm damage at mesophotic depths on the Great Barrier Reef, demonstrating that great depths do not necessarily guarantee protection from severe storms. Given that the severity and frequency of cyclones are predicted to increase due to climate change, we need a better understanding of the growth and recovery rates of coral communities in deeper water.

Acknowledgments We would like to thank David Whillas, Kyra Hay, Linda Tonk, Jaap Barendrecht, Terry Done, David Hopley, David Harris, Susie Green, Russell Kelley, and ''Reef Connections.'' The study was undertaken as part of the ''Catlin Seaview Survey'' funded by the Catlin Group Limited and the Global Change Institute.

References

Bongaerts P, Ridgway T, Sampayo EM, Hoegh-Guldberg O (2010) Assessing the 'deep reef refugia' hypothesis: focus on Caribbean reefs. Coral Reefs 29:309–327

Bridge TCL, Fabricius KE, Bongaerts P, Wallace CC, Muir PR, Done TJ, Webster JM (2012) Diversity of Scleractinia and Octocorallia in the mesophotic zone of the Great Barrier Reef, Australia. Coral Reefs 31:179–189

Hopley D, Smithers SG, Parnell KE (2007) The geomorphology of the Great Barrier Reef: development, diversity and change. Cambridge University Press, Cambridge, United Kingdom

P. Bongaerts (✉) · N. Englebert · O. Hoegh-Guldberg
Global Change Institute, The University of Queensland, St Lucia, QLD 4072, Australia
e-mail: pim@uq.edu.au

P. Muir
Museum of Tropical Queensland, Townsville, QLD 4810, Australia

T. C. L. Bridge
ARC Centre of Excellence for Coral Reef Studies, James Cook University, Townsville, QLD 4811, Australia

Received: 28 January 2013 / Accepted: 10 June 2013 / Published online: 27 June 2013

Coral Reefs (2013) 32: 935
DOI 10.1007/s00338-013-1052-y