

Aerial exposure influences bleaching patterns

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Fig. 1 Bleaching of the west-north-west face of corals that had been aerially exposed (*left colony*) while those not exposed showed no bleaching signs (*right colony*)

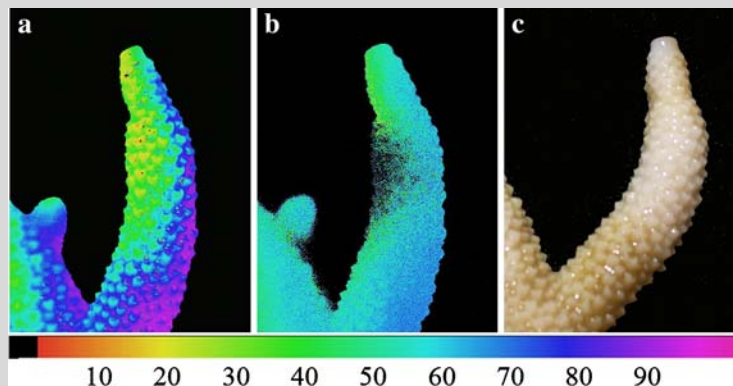


Fig. 2 Comparison of the west-north-west aspect (left side) and unbleached eastern aspect of an aerially exposed branch of *Acropora millepora*. **a** Absorptivity and **b** maximum potential quantum yield for **c** the coral branch. Colour bar represents relative values from 0 to 100

On the 17th December 2005 *Acropora millepora* and other reef flat corals at Heron Island (23.44S, 151.91E) were found to have bleached on the west-north-west face of aerially exposed branches (Fig. 1). Visual surveys on the 15th and 16th had not detected any bleaching signs. In the preceding 3 days, water temperatures reached a maximum of 32.0°C on the 15th December and exceeded 31.0°C for only 2.5 h. Past studies suggest this alone is not sufficient to cause bleaching. Analysis of wind speed and direction for the morning of the 17th showed that the low tide at 03:00 hours coincided with 4 h of high winds from the west-north-west. Peak gusts (57 km h⁻¹) were within the highest 2.5% of all reading from the previous 6 years. Analysis of the red absorbing photosynthetic pigments (absorptivity) and dark-adapted fluorescent yield (Ralph et al. 2005) demonstrated a 65% loss of photosynthetic pigments and a 40% decrease in yield on the west-north-west face of exposed corals (Fig. 2) compared to the eastern side.

Distinct directional bleaching patterns have previously been observed and linked to exposure to high solar radiation (Brown et al. 1994). Although solar radiation cannot be ruled out in the present case, the direction of the bleaching (west-north-west) is more consistent with the observed wind direction, rather than the sun azimuth (west-south-west) during the preceding low-tide periods. It appears that the stress of high winds and aerial exposure, possibly together with the sub-bleaching water temperature, prompted the observed bleaching pattern.

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References

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