Punctuated coral growth in response to intermittent storms

Fig. 1 Exposed colonies of *Siderastrea siderea* in the back-reef area of Grecian Rocks Reef in the Florida Keys. Yellow arrows point to punctuated intervals of burial by storms. Calendar years on right of photo correspond to known major hurricanes

While diving and snorkeling in shallow water (1–3 m) on the leeward side of the exposed reef flat at Grecian Rocks within the Florida Keys National Marine Sanctuary in December 2006, we discovered numerous exposed colonies of *Siderastrea siderea*. These *S. siderea* colonies each measured approximately 40 cm in total height with the upper ~10 cm still being alive. Each coral head is represented by three punctuated periods of coral growth (Fig. 1). These corals were found in areas dominated by mobile carbonate sand. Based on measured growth rates of shallow-water colonies of *S. siderea* (average $\sim 5.75 \text{ mm yr}^{-1}$) from the region (WF Precht, unpublished data using annual growth band records from slabbed co-

lonies), we calculated that the exposed portions of these corals are approximately 70–75 yr in age. Using the measured height of each individual section, we can reconstruct the history of these colonies in relationship to the passage of known significant hurricanes in the upper Florida Keys. The notch at the base of the lowermost section is coincident with the passage of the Great Florida Keys Hurricane of 1935, the second notch correlates with the passage of Hurricane Donna in 1960, and the third notch (at the base of the living coral) is contemporaneous with Hurricane Andrew in 1992. Each of the three storms moved from east to west over the Florida Keys. Each punctuated segment records coral growth during the intervening period between major storms. During the passage of Hurricane Wilma in October 2006, the bases of these colonies were excavated and exposed. Hurricane Wilma traversed the Florida reef tract in the opposite direction from these earlier storms, moving west to east; transporting great quantities of sediment out of the back reef and onto the fore reef. These colonies show the amazing resilience of *S. siderea* to sediment burial and help to explain the widespread occurrence of these corals on reefs throughout south Florida.

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