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The effects of a severe storm event on the NW coast of Lefkada Island, Ionian Sea (Greece).

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Among the many factors influencing coastal morphology, severe storms, as extreme events, have been recognised (Paskoff, 1993, Pirazzoli et al, 2002, Ullmann et al, 2006, Ferreira et al, 2006) as the factor playing the major role in coastal evolution. It has been shown that large storms can cause rapid and extensive erosion, especially when the shore zone is exposed to the open sea.

A severe storm on November 10, 2007, with NW winds exceeding 44 knots in the NE Ionian Sea, has drastically affected the barrier beach that separates the Lefkada lagoon from the open sea. This barrier beach is approximately 5.5 km long, 10-11 m high and up to 300 m wide, consists of sandy to slightly gravely sandy sediments and is exposed primarily to wind waves from N, NW and W directions. The shore face has an average slope of about 5°.

The meteorological conditions were recorded with a Davis weather station installed on the backshore at a height of 6 m above sea level, whilst simultaneous hydrodynamic measurements were made with the use of a recording tide/wave gauge, placed about 40 cm above the seabed at a water depth of 3 m. The nearshore water circulation was studied with the use of drifters and fluorescent dye. Eleven profiles of the beach were surveyed periodically to monitor the topographic changes of the barrier beach and a grid of depth-of-disturbance rods was measured before and after the storm to study

the microtopographic changes of the seafloor and the beach face. Sedimentological samples prior to and after the storm event were collected and analysed to document the textural changes of the coastal zone.

The recorded data highlighted the rapid and strong response of the hydrodynamic conditions to the wind and barometric pressure fluctuations. The wind and water level measurements documented a high-energy event with a duration of 14 hours, sustaining wind speeds higher than 20 m/s and resulting in a rise of the mean sea level from 8 cm (average) to 19 cm (peak of the storm). Under these conditions wave run-up exceeded 50 m, overtopping in some places the barrier system and reaching the lagoon. Profile measurements showed extensive severe erosion of the subaerial profile resulting in a planar active beach face and a decrease of the beach slope to 2°. The surface elevation of the whole beach has decreased by 10 to 30 cm on average; which corresponds to a loss of sediment of the order of 50-70*103 m3. Part of this sediment was deposited in the nearshore zone, infilling pockets in the beach rock formations of the seafloor and raising the nearshore bottom by up to 50 cm, whereas most of the sediment was carried offshore, beyond the point of no return, causing permanent damage to the beach.

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