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Fusion of video cameras with laser range scanners- the coastal monitoring system of the future?

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Coastal video monitoring systems have proven to be the most efficient way to follow the multiple scales of coastal hydro- and morpho-dynamic processes, and have resulted in important scientific contributions during the past 3 decades. The present contribution reports on recent developments in optical monitoring techniques, using sensor arrays which combine digital video cameras with laser range scanners; an approach which can improve the performance of several field and laboratory applications for nearshore measurements. Extensive testing during large-scale experiments, simulating highly erosive storm events and the consecutive post-storm recovery, has shown that the hybrid approach can reduce geo-rectification errors by an order of magnitude and in several cases, can facilitate the extraction of quantitative information from coastal imagery. The system provided wave-by-wave, water and beach surface elevation measurements in the swash zone, and has great potential for several other applications, such as detailed monitoring of wave breaking and other complex, three-dimensional wave propagation processes, as well as of complex morphologies without many of the artefacts of monoscopic video systems. Finally, apart from the laboratory, stationary version, it has been successfully implemented on a mobile platform, suitable for field application and capable of monitoring coastal areas of several km.