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TITLE: Effects of storm events on the shelf-to-basin sediment transport in the southwestern end of the Gulf of Lions (Northwestern Mediterranean)

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ABSTRACT:

Abstract. Shelf-to-basin sediment transport during storms was studied at the southwestern end of the Gulf of Lions from November 2003 to March 2004. Waves, near-bottom currents, temperature and sediment fluxes were measured on the inner shelf at 28-m depth, in the Cap de Creus submarine canyon head at 300-m depth and in the northwestern Mediterranean basin at 2350-m depth. This paper is a synthesis of results published separately in different papers; it includes some new data and focusses on the subject of storms. It is the first paper in which simultaneous data about the effect of storms on the shelf, the slope and in the basin are shown together. During the winter studied, there were two severe E-SE storms with significant wave heights > 7 m: one in December 2003 and one in February 2004. During these storms, coastal water was exported off-shelf producing strong near-bottom currents (up to 82 cm s^{-1}) at the canyon head that resuspended sediment and increased the downcanyon sediment fluxes by several orders of magnitude. The suspended sediment flux increase in the canyon head was much larger during the February storm than during the December storm. At the deep basin site, particle fluxes also increased drastically (1–2 orders of magnitude) immediately after the February storm but not after the December storm. The reason was that the February storm was reinforced by dense shelf water cascading and was long enough (43 h) to transfer large amounts of resuspended sediment from shallow shelf areas to the canyon head and from there to the northwestern Mediterranean basin. Thus, in the western Gulf of Lions, severe winter E-SE storms occurring during the dense shelf water cascading period can significantly increase the transfer to deep-sea (> 2000 m) environments of shelf and slope resuspended material, including anthropogenic contaminants and organic matter.

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