Current inputs of continental sediment to the English Channel and its beaches: A case study of the cliffs and littoral rivers of the Western Paris Basin.

B. Laignel, S. Costa, A. Lequien, N. Massei, A. Durand, J.P. Dupont and S. Le Bot

Summary. A qualitative and quantitative understanding of the transport of sediment from the continents to the oceans is essential for environmental and natural resource management, particularly when it is associated with rock falls, slumping, landslides, contaminant transport, or flooding. The study presented here quantifies and characterizes sediment transport from the northwest Paris Basin to the English Channel by analyzing the two processes providing the solid material: the retreat of coastal cliffs and the erosion of coastal watersheds. For the analysis, we combine two approaches, the photogrammetric analysis of retreating cliff faces and the high-frequency measurement of river discharge and suspended sediment concentration, complemented by a grain-size analysis of the sediment sources. The results indicate that the sediment contribution from cliff erosion (1 million m^3/yr producing 2 million t/yr of sediment) greatly exceeds that from the coastal rivers (43,000 t/yr). The cliff erosion input exceeds the fluvial input at the event scale as well, with cliff erosion contributing, for a single event, 200 to 2000 t/day (100 to 1000 m^3) (for the most frequent collapse), and rivers contributing 4 to 6 t/day (for a flood). The influx from rivers, however, should not be overlooked, as the 4 to 6 t/day contributed is carried by 7000 to 160,000 m^3/day of water, sometimes causing natural disasters such as floods and mudflows. The solids resulting from cliff erosion are composed of flint (462,500 t) and fine silicates (mostly silt and clay) derived from the cliff-forming chalk as well as from overlying formations (clay-with-flints and loess), whereas the fluvial inputs consist almost entirely of silt.