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Resolving explicitly the Black Sea in the Mediterranean Sea simulations using a fully coupled atmosphere-ocean model.

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The Black Sea is one the major contributors of freshwater to the Mediterranean Sea. The water transport through the Dardanelles and Bosphorus Straits accounts approximately 8% of the total Mediterranean freshwater budget. Such a transport is driven by several factors: the constraint of the narrow morphology of the straits, the hydrological system of the Black Sea and the meteorological conditions affecting the Black Sea area. Up to now, the efforts of the numerical modeling dedicated to reproduce the Mediterranean Sea circulation take into account a simplified water input from the Black Sea, which consists on the calculation of the water budget as the net freshwater flux over the Black Sea plus freshwater from the river system. To tackle the misrepresented physical processes on the Black Sea, we have included its basin as part of the Mediterranean Sea simulations to resolve explicitly its hydrological system. Moreover, a high resolution regional atmosphere model is fully coupled to the ocean model to achieve an interactive surface interface, including sea level pressure and calculation of surface fluxes. A terrestrial runoff model closes the water budget. This allows for a variable outflow with episodes of inflow of Mediterranean water into the Black Sea.

The goal of this work goes one step forward on the understanding the Black Sea hydrological system as an input of water transport to the Mediterranean Sea. We analyze on daily basis the outflow of the Black Sea in terms of both: the atmospheric dynamical forcing of the ocean and the water balance. The heat and salt transport at Dardanelles and Bosphorus Straits are investigated as well. The analysis covers the seasonal and intrannual variability of Black Sea outflow in the decade from 1990 to 2000.