



Analysis of cyclone water budgets in the North Atlantic and their role for Europe

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Europe's water budget is largely influenced by cyclones. We determine the time evolution of the water cycle of North Atlantic winter cyclones, and analyse their influence on Europe. The basis is a high-resolution climate simulation of the regional climate model REMO which is driven at the lateral boundaries by reanalysis data. Using a tracking algorithm for pressure lows, the spacial and temporal development of individual cyclones can be studied in detail on different atmospheric height levels. The trace of the cyclone center, the intensity, the spacial extent, as well as the amount of precipitation and evaporation over the extent area, are calculated for their life cycle. Special emphasis is drawn to the question if there is a correlation between the water budget of the cyclone over the ocean and over land. We found that the amount of precipitation that a cyclone provides over Europe depends on its intensity in the first place, but to a much smaller extent on the amount of evaporated water over the ocean. A trend analysis in the modeled 40 years period between 1960 and 2000 shows a positive trend in cyclone intensity in the mid-latitudes ($<60^\circ$ North), while a positive trend in cyclone frequency was found in the high-latitudes ($>60^\circ$ North).