



## **Impact of a Southern Iberia artificial lake on fog winter climatology**

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In February 2002, the lock gates of the new Alqueva dam in the Guadiana River, located in a semi-arid region of South Portugal, were closed, beginning a water reservoir that, when completed filled, will cover an area of 250 km<sup>2</sup>. The impact of this artificial lake on the onset and development of fog is investigated using numerical simulations of a nonhydrostatic mesoscale model, MesoNH. 90 winter case studies were performed using the ARPEGE analysis to initialize and force the model at a horizontal resolution of 5 km. For each case study, two simulations were performed: the control, with no lake, and one with the reservoir at its maximum level, with a constant surface temperature imposed from observations. The control simulations were validated against air surface data from the meteorological network.

Average results over the simulation domain (450×450km<sup>2</sup>) indicate that the impact of the lake on fog is minimal, at a regional scale, but tends to reduce the persistence of fog over the water surface and increase that persistence over neighbour land surface. The results also show that the impact of the lake on fog depends critically on the difference between the water surface temperature and the daily minimum air temperature: high positive differences tend to have a negative impact on fog, while little differences tend to have a positive impact. For one fog case study, a high resolution (1km) experiment was performed, showing that the local impact on fog in the vicinity of the lake may be higher than found at the regional scale.

The study also confirms, and quantifies, some known atmospheric effects of the presence of reservoirs, namely the drop of the daily air temperature range, the increase of relative humidity, the increase of wind speed over water and the development of lake breeze circulations.