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ONE AND TWO-DIMENSIONAL MODELING OF THE SALADO-CHADILEUVÚ RIVER AND ITS ASSOCIATED WETLANDS, PROVINCE OF LA PAMPA

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Abstract. The Desagüadero-Salado River, from National Route 188 in San Luis-Mendoza (35°10'03"S, 66°29'52"W) to the locality of La Reforma in La Pampa (37°33'06"S, 66°13'35"W), shows a severe decrease and intermittency of its flows, with a total interruption of flows towards the south of the Puelches lagoon system (38° 8'46"S, 65°54'50"W). In this study, the altered hydrodynamics of the river and its floodplain wetlands were simulated using a 1D kinematic model coupled with a 2D quasi-inertial model. The modelling hydraulic structure was defined from Bing ™, Google Satellite ™, and TanDEM-X ©DLR digital elevation model (DEM) imagery owing to the virtual unavailability of field data. The simulations achieved a good fit of the one-dimensional kinematic model, with an NSE value equal to 0.9154 and an RMSE of 0.7614 (m³/s), for a five-year event at a daily rate, considering that it slightly overestimated the peak flows and underestimated the minimum flows. Nevertheless, the flood times and recession periods were correctly estimated. The two-dimensional model was highly dependent on the DEM used. For this reason, it was decided to manually correct the DEM in areas where the Salado River has form natural levees, and they are not correctly represented because they are smaller than the spatial resolution of the DEM. These corrections made possible a substantially improved the simulation of the flood footprint. On the other hand, it was concluded that the two-dimensional model is sensitive to evapotranspiration, as estimated from satellite data. This suggests its potential to simulate the phenomenon of wetland contraction in times of cessation or a decrease in flow. In the future, this line of research aims to achieve an accurate simulation of the dynamics of wetland expansion - contraction and the two-dimensional–one-dimensional coupling necessary to simulate the dynamics of the Chadileuvú River (outflow of the system), which is channelled from the drainage of the wetland area of the Salado River. The results obtained thus far allow us to conclude that the methodology used is able to represent, with good results, one-dimensional dynamics in courses with scarce hydrometric data and without an in-situ survey of the physical characteristics of the riverbed. Moreover, it has been shown that the quasi-inertial approach for two-dimensional simulations has many advantages, particularly in terms of numerical stability and execution time, for the simulation of complex hydrography in large plain areas.