

## **Large Scale Hydrological Modelling of Lagoon-Riverine Systems Using a “Pseudo-2D” Routing Method: Patos Lagoon Basin Case Study**

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Hydrological modelling applications in areas with complex hydrodynamics, such as floodplains, lakes and lagoons are commonly performed by a one direction coupling of a hydrological model, which simulates the rainfall-runoff process, and a hydraulic model, capable of simulating the complex water dynamics over the terrain. In some cases, two different hydraulic models are coupled, one with 1D routing to simulate rivers and another with 2D or 3D routing to simulate more complex water features. In this work we investigate an alternative possibility, not very often explored, consisting in the use of a hydrological model programmed with what we called a pseudo-2D hydraulic flow routing approach, in order to represent all the processes in a lagoon-riverine large scale system, named Patos Lagoon (PL) basin, located in the South of Brazil. We used the name pseudo-2D approach due to the consideration of a 1D hydraulic model being able to transfer water in catchments within a flooded region not only to the catchment downstream, but to other adjacent catchments laterally. The main guiding question was: can we simulate a coupled lagoon-riverine large scale basin system using one single hydrological model with a pseudo-2D flow routing module? Results denoted that the answer to this question is yes, once rivers hydrographs, floodplains, PL submerged area and PL levels were similar in the comparisons between simulations and field observations. In addition, the model enabled to provide first estimates to the PL outflow to the sea based on a complete hydrological-hydraulic modelling approach. However, some limitations still exist within the developed approach, such as the need for wind and tidal effects representation in the developed schema, which is a subject for further research.