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From time series analysis to hydrodynamic modelling in a complex hydrosystem: applications for the hydrodynamic characterization and modelling of a karst aquifer with sparse data (Oeillal spring, France).

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The Narbonne-Sigean sedimentary basin is composed by Oligocene sediment, alluvions from the Aude River and the Fontfroide-Montredon limestone massif. The significant tectonics during the Oligocene rifting brought all of these formations to the surface in the Malvesi area. A normal fault affects the area and causes the Jurassic unit to rise in the form of a horst: the Montlaures massif. The Oeillal spring is located on the south border of this massif. The karst spring outflows at 4 pools with different physico-chemical signature. Each of these pools is equipped with a CTD probe. Moreover, the area is monitored with piezometric and temperature measurements that allow characterizing each of the main geological formations near the Oeillal spring. Though measurements started more than ten years ago (2007), continuous monitoring is available on one hydrological cycle, only. Indeed, only sparse data are available over the period 2007-2018, which required proposing a methodology to allow the optimal use of the available data in the modelling workflow. The present study thus focuses on this methodology and on the use of numerical tools such as time series analysis (auto and cross-correlation analysis, spectral analysis) to determine a suitable modelling approach (lumped or distributed model) adapted to the hydrodynamic modelling of karst springs with sparse data.