1. INTRODUCTION

The problem: short length of available observations.

Synthetic Continuous Simulation:
- Stochastic Weather Generator (WG) + Hydrological model (HM)
- Stochastic generation of continuous synthetic precipitation (P) series and stochastic generation of continuous synthetic discharges (Q).

Pros:
- Continuous long series of meteorological data with similar statistical properties as those of observed data → Initial soil moisture content
- Parametric WG → different weather scenarios can be simulated
- Multi-site WG → spatio-temporal variability

Cons:
- Adequacy of the meteorological model
- Sub-daily complexity and high computational requirements
- Adequacy of hydrological model

2. SYNTHETIC CASE STUDY

Nine Synthetic populations: Mediterranean Semi-arid, Humid and Extremely Humid climate according to De Martonne Aridity Index (IndA), each one with three different climate extremality (ξ = 0.05; ξ = 0.11; ξ = 0.25).

For the sake of simplicity, basin characteristics are obtained from an existing study. Drainage area: 180 km² approx.

Two different hydrological characteristics of the basin were analyzed, reproducing an ephemeral and a permanent regime.
- Ephemeral regime (70% overland flow, 30% interflow, 0% base flow)
- Permanent regime (30% overland flow, 40% interflow, 30% base flow)

3. METHODOLOGY

GWEX
- Multi-site WG of daily P and Q
- Sensitivity to climate extremality

Monte Carlo method
- Generation of a very long synthetic Q population
- Estimation of GWEX parameters for sample Q
- Generation of 5000 years of P with “perfect” model
- Simulation of 5000 years of Q with “perfect” model

TETIS
- Exact P* (equivalent to a “perfect” regional study)
- Generation of a long synthetic P population

4. RESULTS

Extreme rainfall regime complicates even more Flood Frequency Estimation of high Return Period flood quantiles Q₁₅

Soil difficult to obtain reliable quantile estimates: HIGH UNCERTAINTY

Additional information is needed (e.g., regional precipitation studies)

5. CONCLUSIONS

As obtained in preliminary studies [5-6], additional information is needed to reduce the uncertainty of P and Q.

Climate extremality has been demonstrated to be a key factor for the WG performance. As increases, there is more uncertainty on the quantile estimates, especially in those associated with high T.

For Mediterranean semi-arid climates, where the precipitation regime is less homogeneous, uncertainty of the quantile estimations is clearly higher compared to Humid and Very Humid climates. Quantile estimations in these climates present less uncertainty.

Uncertainty propagates through Hydrological Model, being this propagation lower in the case of Very Humid climate.

6. REFERENCES


7. ACKNOWLEDGEMENTS

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