

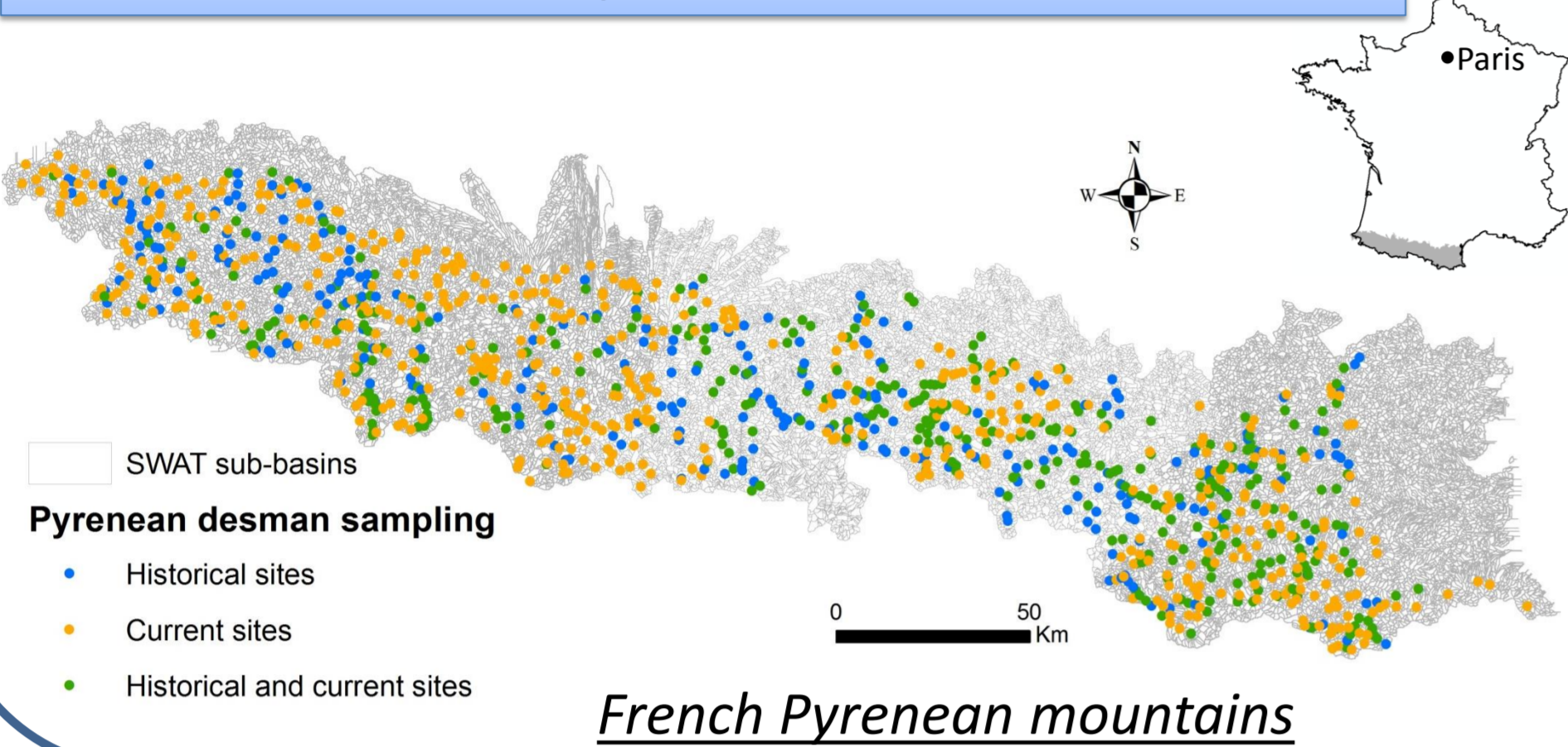


Context and objectives

The Pyrenean Desman (*Galemys pyrenaicus*) is an endangered small semi-aquatic mammal restricted to the Iberian Peninsula. The aim of this study is to understand the influence of recent hydrological and climate change on the distribution shifts of the Pyrenean desman in the French Pyrenees.

Study area and data

Historical (1985-1992) and current (2011-2013) distribution of the Pyrenean Desman



Surface area: 23 694 km²
 Number of sub-basins: 29 915
 Dominant regime: pluvio-nival
 Mean flow: 1.47 m³/s (0.01 – 116.29 m³/s)
 Mean annual precipitation: 1049 mm
 Mean elevation: 671.50 m (0 - 3298)
 Dominant land use: forest

Modelling stream flow

Input data

Land use
 (25 ha resolution, Corine Land Cover)

Soil
 (1 km resolution, Food and Agriculture Organization)

Topography
 (25 m resolution, French National Geographic Institute)

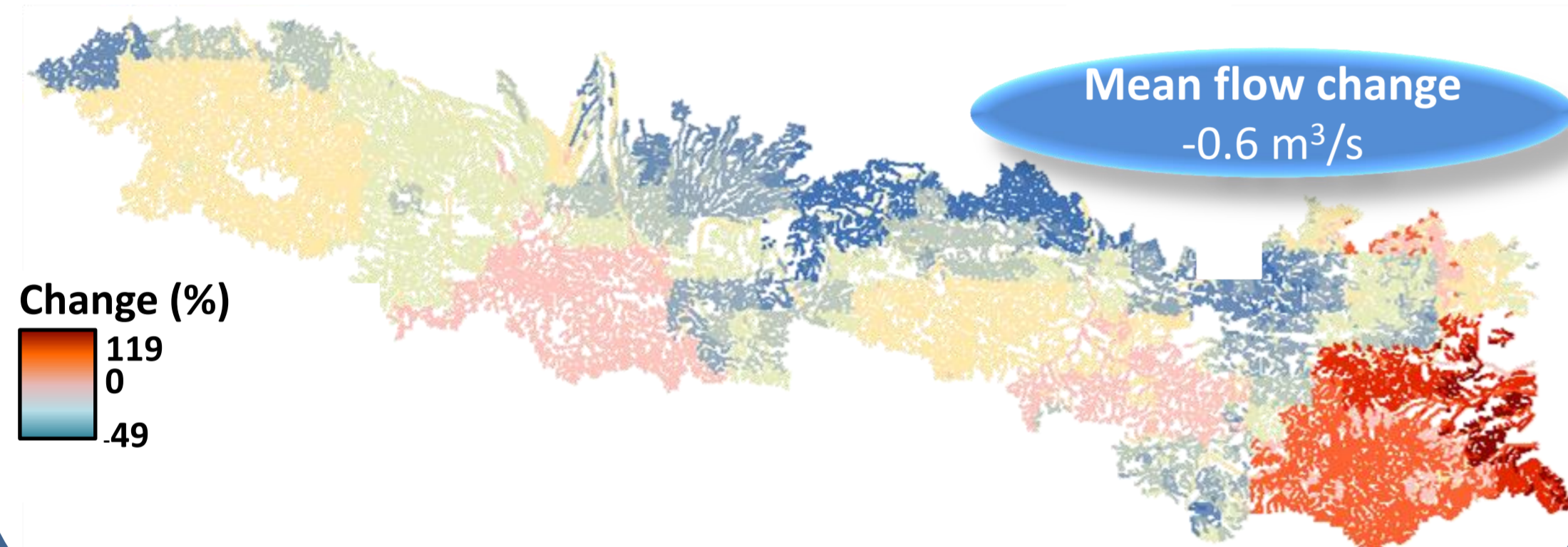
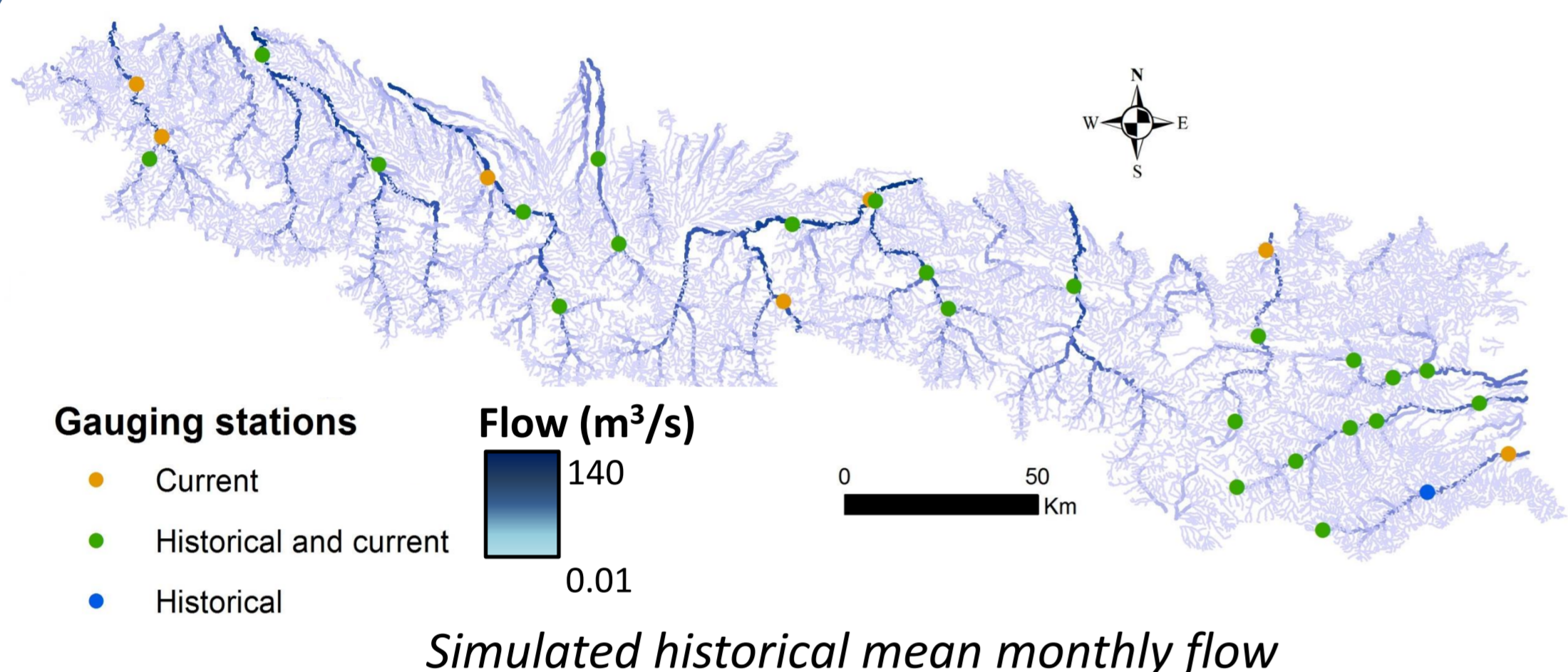
Climate
 (SAFRAN, 8 km resolution, Météo France)



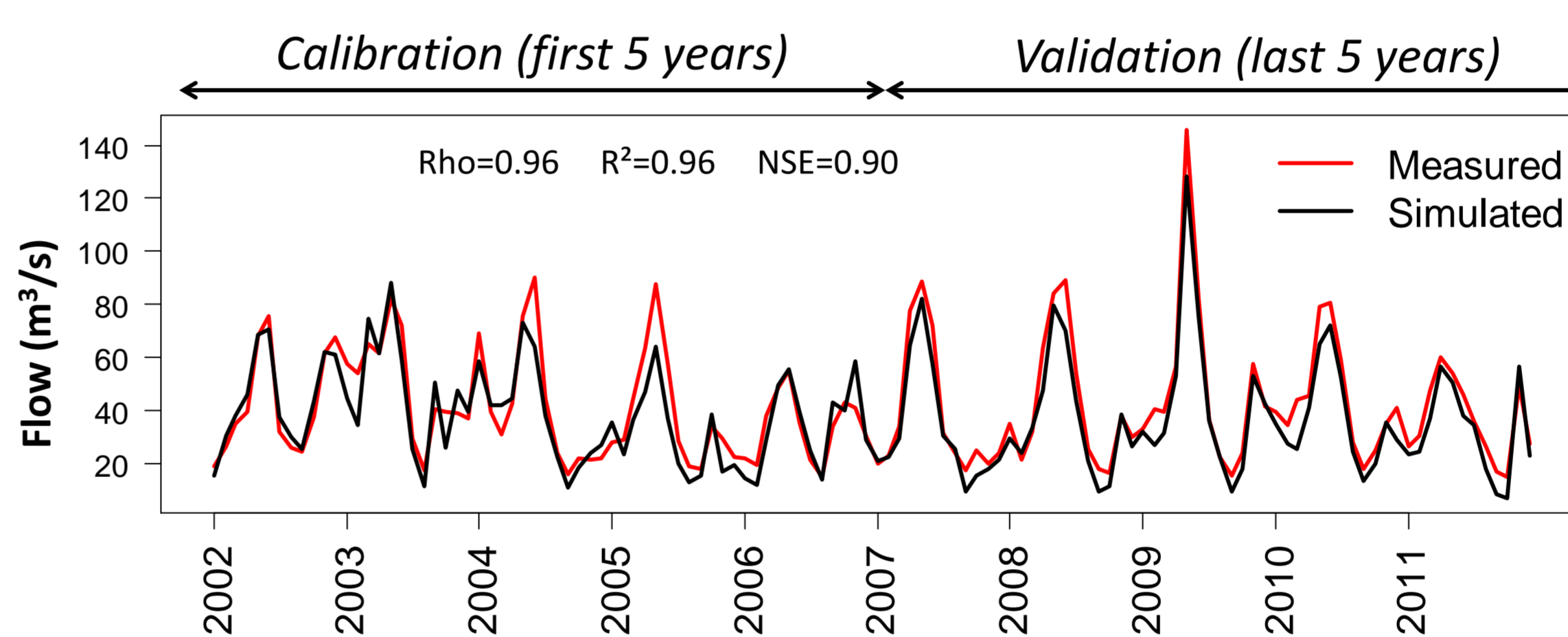
Historical and current stream flow simulations

Hydrological variables

Results: flow simulations



Results: calibration and validation



Example of current simulated and measured stream flow at the Pyrenean gauging station "Pont de Rieulhes", at a monthly time step over 10 years

Mean evaluation statistics for the validation period

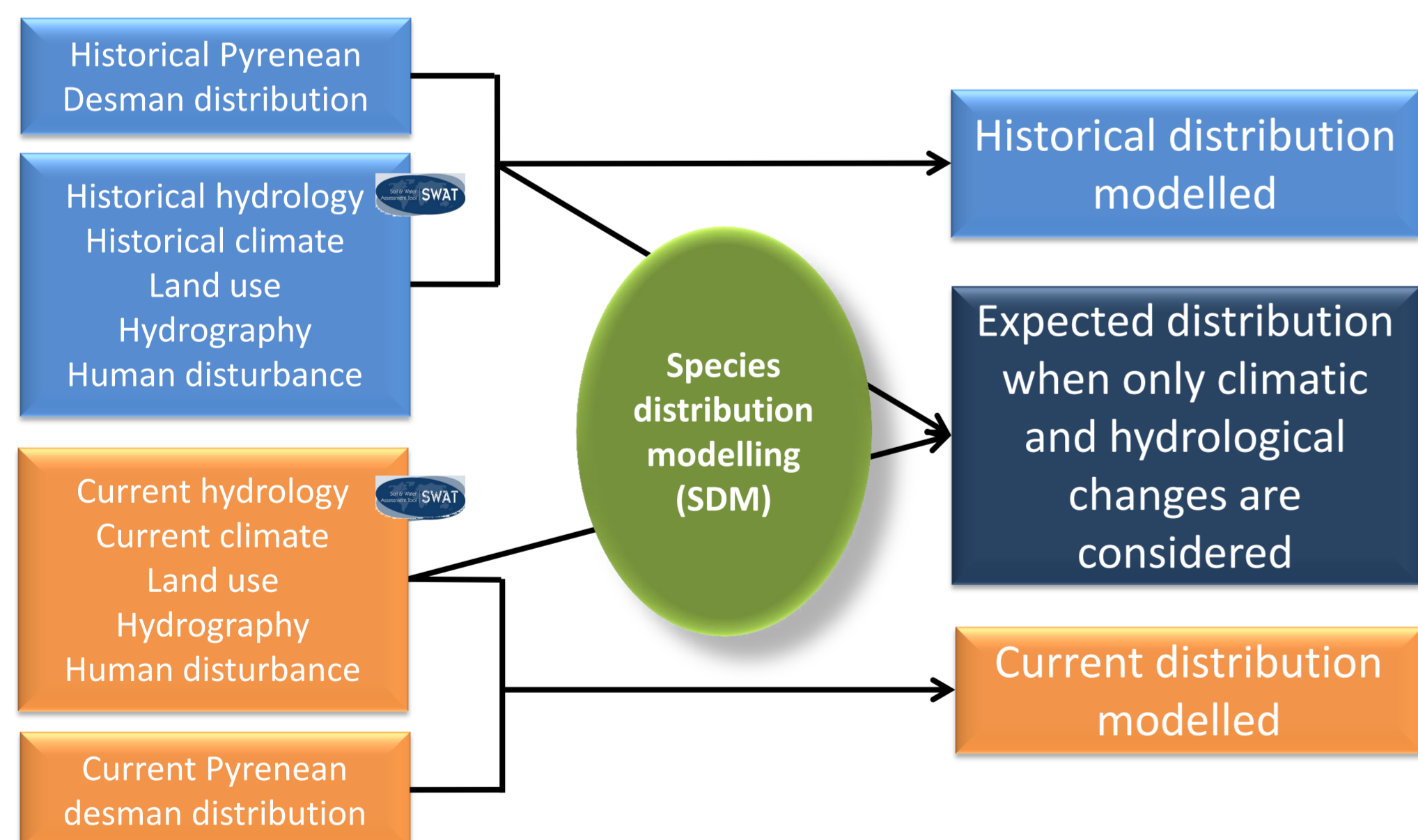
Historical period (1976-1985)

Rho = 0.79 (± 0.21)
 R² = 0.66 (± 0.27)
 NSE = 0.24 (± 0.93)

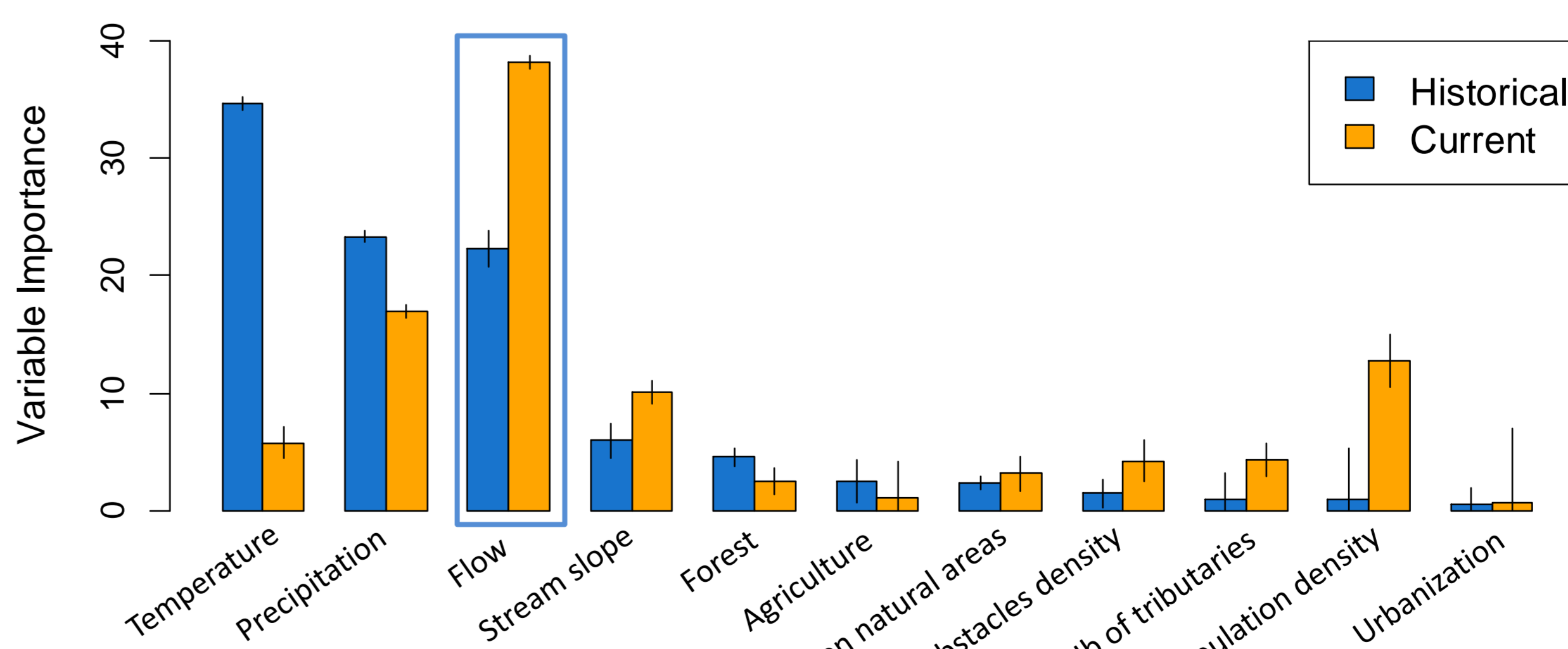
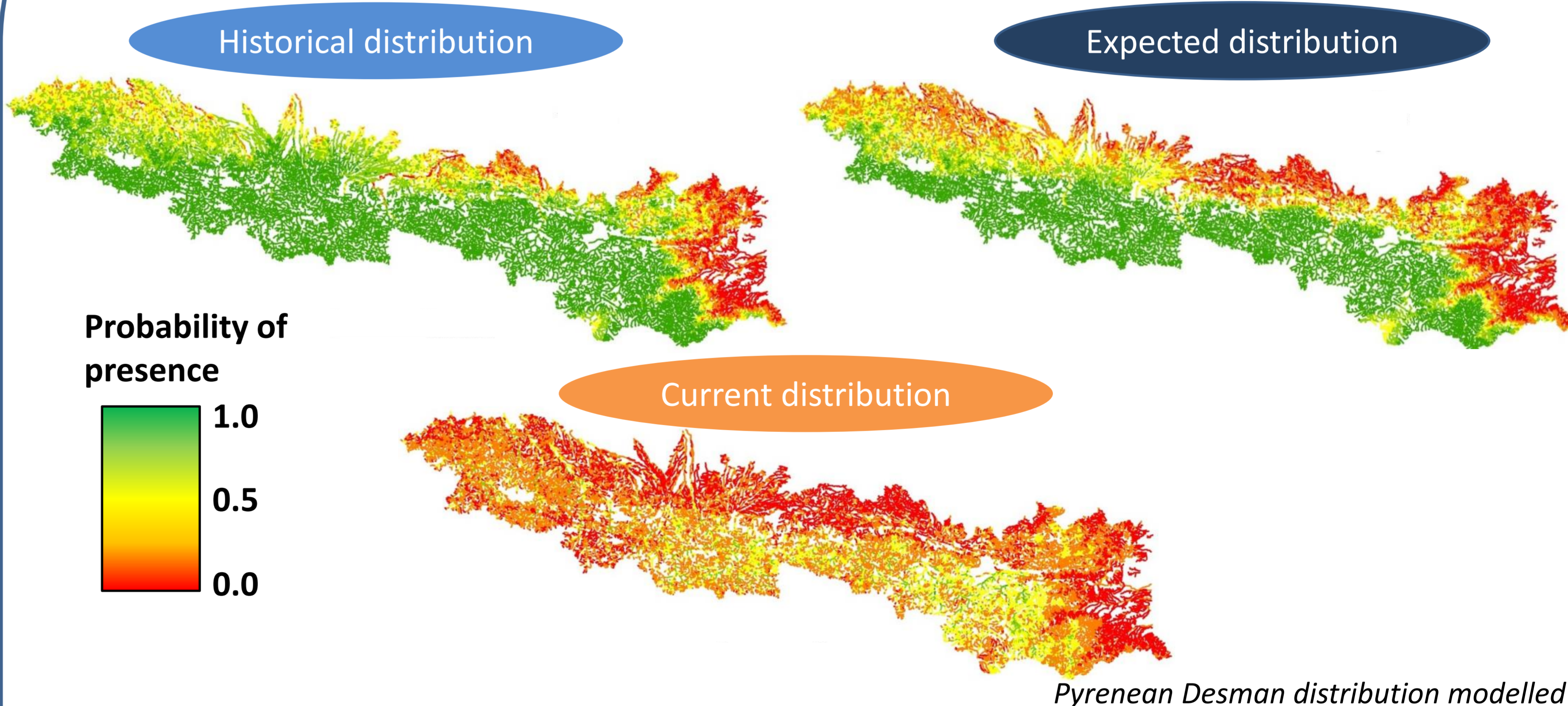
Current period (2002-2011)

Rho = 0.83 (± 0.18)
 R² = 0.67 (± 0.24)
 NSE = 0.36 (± 0.56)

Species distribution modelling



Results: Pyrenean Desman distribution and flow influence



Influence of environmental variables on the distribution of the Pyrenean Desman

Conclusions

- Substantial hydrological changes have occurred in the French Pyrenees over the last 25 years
- Hydrology strongly influences the distribution of the Pyrenean Desman
- Climatic and hydrological changes alone are not sufficient to explain the strong range contraction of the Pyrenean desman

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