EGU2020-13848
https://doi.org/10.5194/egusphere-egu2020-13848
EGU General Assembly 2020

Assimilating satellite soil moisture and flood extent maps into a flood prediction model.

Renaud Hostache[1], Patrick Matgen[1], Peter-Jan van Leuuwen[2,3], Nancy Nichols[2], Marco Chini[1], Ramona Pelich[1], and Carole Delenne[4,5]

[1]Luxembourg Institute of Science and Technology, Environmental Research and Environment, Esch-sur-Alzette, Luxembourg (renaud.hostache@list.lu)

[2]University of Reading, Department of Meteorology, Reading, United Kingdom.

[3]Colorado State University, Department of Atmospheric Science, Fort Collins, Colorado, USA.

[4]University of Montpellier, HydroSciences Montpellier, CNRS, IRD, Montpellier, France

[5]Inria, Lemon, Montpellier, France

The main objective of this study is to investigate how innovative satellite earth observation techniques that allow for the estimation of soil moisture and the mapping of flood extents can help in reducing errors and uncertainties in conceptual hydro-meteorological modelling especially in ungauged areas where potentially no or limited runoff records are available. A spatially distributed conceptual hydrological model is first developed allowing for the simulation of soil moisture and flood extent. Using as forcing of this model rainfall and air temperature time series provided in the globally and freely available ERA5 database it is then possible to carry out long-term simulations of soil moisture, discharge and flood extent. Next, time series of soil moisture and flood extent observations derived from freely available satellite image databases are jointly assimilated into the hydrological model in order to retrieve optimal parameter sets. For this assimilation experiment, we take benefit of recently introduced Particle Filters with tempering that circumvent some of the usual particle filter limitations such as degeneracy and sample impoverishment. As a proof of concept, we set up an identical twin experiment based on synthetically generated observations and we evaluate the performance of the calibrated model.