



Jul 11th, 11:10 AM - 11:30 AM

Climate change impacts on the water resources of the Garonne River watershed: a blue and green water approach

Youen Grusson

University of Toulouse, youen.grusson.1@ulaval.ca

José Miguel Sanchez Perez

Laboratoire Ecologie fonctionnelle et Environnement, CNRS, EcoLab, jose-miguel.sanchez-perez@univ-tlse3.fr

Sabine Sauvage

Laboratoire Ecologie fonctionnelle et Environnement, CNRS, EcoLab, sabine.sauvage@univ-tlse3.fr

François Anctil

Laval University, francois.anctil@gci.ulaval.ca

Follow this and additional works at: <https://scholarsarchive.byu.edu/iemssconference>

 Part of the [Civil Engineering Commons](#), [Data Storage Systems Commons](#), [Environmental Engineering Commons](#), [Hydraulic Engineering Commons](#), and the [Other Civil and Environmental Engineering Commons](#)

Grusson, Youen; Sanchez Perez, José Miguel; Sauvage, Sabine; and Anctil, François, "Climate change impacts on the water resources of the Garonne River watershed: a blue and green water approach" (2016). *International Congress on Environmental Modelling and Software*. 22.

<https://scholarsarchive.byu.edu/iemssconference/2016/Stream-D/22>

This Event is brought to you for free and open access by the Civil and Environmental Engineering at BYU ScholarsArchive. It has been accepted for inclusion in International Congress on Environmental Modelling and Software by an authorized administrator of BYU ScholarsArchive. For more information, please contact scholarsarchive@byu.edu, ellen_amatangelo@byu.edu.

Climate change impacts on the water resources of the Garonne River watershed: a blue and green water approach

Youen Grusson^(a,b,c), **José Miguel Sanchez Pérez**^(a,b), **Sabine Sauvage**^(a,b), **François Anctil**^(c)

^(a) University of Toulouse; INPT, UPS; Laboratoire Ecologie Fonctionnelle et Environnement (EcoLab),
Avenue de l'Agrobiopole, 31326 Castanet Tolosan Cedex, France

(youen.grusson.1@ulaval.ca)

^(b) CNRS, EcoLab, 31326 Castanet Tolosan Cedex, France (jose-miguel.sanchez-perez@univ-tlse3.fr /
sabine.sauvage@univ-tlse3.fr)

^(c) Laval University, Dept Genie Civil & Genie des Eaux, Quebec City, PQ G1V 0A6, Canada
(francois.Anctil@gci.ulaval.ca)

Abstract: Most of the modeling works on the impact of climatic change in hydrology focus on overland flows or, less frequently, on aquifer recharge. This study proposes to take into consideration the largest part of the water cycle as possible, applying the recent concept of integrated water resources management which divides water resources into two classes: green and blue waters. Blue water groups all resources “usable” by society, such as groundwater or stream flow. The green water is by default “unusable”, mainly soil water content and evapotranspiration (ET). The SWAT model was operated at the Garonne catchment scale (50 000 km²) to evaluate the evolution of blue and green waters. To be able to test the influence of climatic change, a particular attention has been paid during the calibration/validation steps on: i) The use of a weather data grid (SAFRAN product) on which climate projection data are also available, in order to reduce the bias from spatial change between calibration and projection periods ii) The temporal transposability of the model in the face of changes in climate and land use information iii) The simulation of snow pack which is a very influential component of the Garonne hydrological system. Calibration and Validation period has been carried out over a period from 1960 to 2010. Thereafter, the model has been used over a projective period from 2010 to 2050, using a climate ensemble of 10 regional models, driven by global models, using 2 emission scenarios (RCP4.5 and RCP8.5). The analysis of the overall period (1960-2050) brings to light an impact of climate change particularly significant on the green water flux (ET) and stock (Soil water). Decreasing of snow pack appears to be the main impact on blue water stock. This change in water stocked by snow along with changes in the rainfall regime distribution over the year, lead to a modification of blue water fluxes, and particularly on discharge volume which increase from autumn to spring.

Key Words: Climate Changes, green and blue water, Swat model, Garonne River