



**HAL**  
open science

## Modelling river discharge and sediments fluxes at sub-daily time-step: Insight into the CRUE-SIM project devoted to Mediterranean coastal flash floods

Laurie Boithias, Sabine Sauvage, H el ene Roux, Evelyne Richard, Claude Estournel, J.M. S anchez-P erez

### ► To cite this version:

Laurie Boithias, Sabine Sauvage, H el ene Roux, Evelyne Richard, Claude Estournel, et al.. Modelling river discharge and sediments fluxes at sub-daily time-step: Insight into the CRUE-SIM project devoted to Mediterranean coastal flash floods. 2015 International SWAT Conference, Jun 2015, Pula, Italy. pp. 1-2, 2015. hal-01329984

**HAL Id: hal-01329984**

**<https://hal.science/hal-01329984v1>**

Submitted on 10 Jun 2016

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destin ee au d ep ot et  a la diffusion de documents scientifiques de niveau recherche, publi es ou non,  emanant des  tablissements d'enseignement et de recherche fran ais ou  trangers, des laboratoires publics ou priv es.



## Open Archive TOULOUSE Archive Ouverte (OATAO)

OATAO is an open access repository that collects the work of Toulouse researchers and makes it freely available over the web where possible.

This is an author-deposited version published in: <http://oatao.univ-toulouse.fr/>  
Eprints ID : 15737

**To cite this version :**

Boithias, Laurie and Sauvage, Sabine and Larnier, Kévin and Roux, Hélène and Richard, Evelyne and Sanchez-Pérez, José-Miguel and Estournel, Claude *Modelling river discharge and sediments fluxes at sub-daily time-step: Insight into the CRUE-SIM project devoted to Mediterranean coastal flash floods*. (2015) In: 2015 International SWAT Conference, 22 June 2015 - 26 June 2015 (Pula, Italy)

Any correspondence concerning this service should be sent to the repository administrator: [staff-oatao@listes-diff.inp-toulouse.fr](mailto:staff-oatao@listes-diff.inp-toulouse.fr)

## Modelling river discharge and sediments fluxes at sub-daily time-step: Insight into the CRUE-SIM project devoted to Mediterranean coastal flash floods

Laurie BOITHIAS <sup>a,\*</sup>, Sabine SAUVAGE <sup>a</sup>, H el ene ROUX <sup>b</sup>, Evelyne RICHARD <sup>c</sup>, Claude ESTOURNEL <sup>c</sup>, Jos e-Miguel SANCHEZ-PEREZ <sup>a,\*</sup>

### Context and objectives

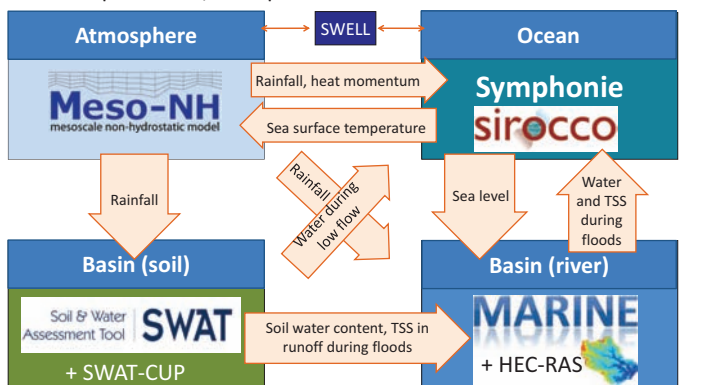
The CRUE-SIM (2014-2017) project is focused on the transport of dissolved and sorbed matter during **flash floods**. It is an interdisciplinary project that brings together atmosphere physicists, hydrologists and oceanographers to study and model flash floods across the Mediterranean region : it integrates water and sediment transport as a consequence of intense rainfall, **from the catchment to the sea**. The objectives of the project are:

- (1) the **coupling** between atmosphere, ocean and sea with continental hydrological and hydrodynamic models
- (2) the **integration of the feedbacks** and the **forcing continuity** from one compartment to the other along the brief but intense events that will be studied

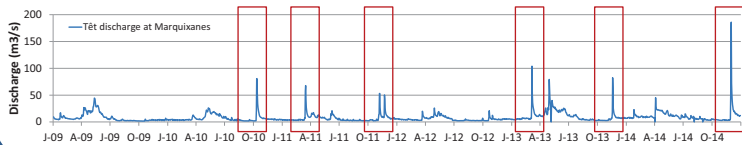
In this poster we present the **contribution of SWAT sub-daily modelling** within the CRUE-SIM project.

### CRUE-SIM modelling approach

- 4 compartments, 4 coupled models:

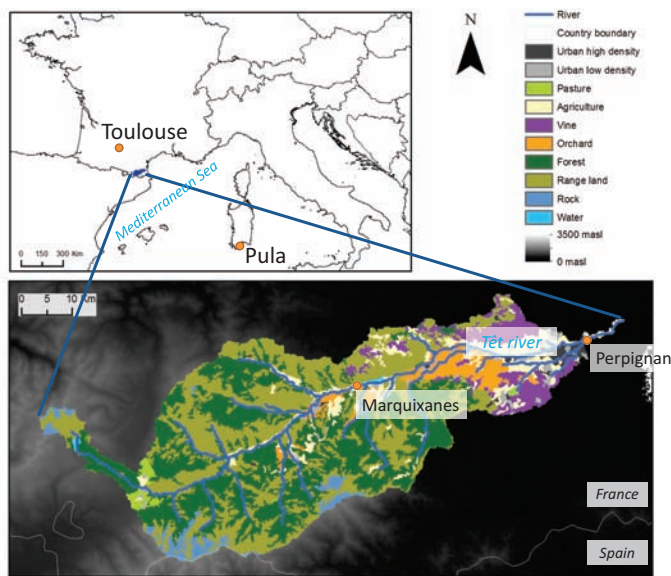


- Selection of the flood events :



### Study site

1380 km<sup>2</sup>, shallow sandy soils  
Typical flash flood prone coastal Mediterranean basin



### Input data

- DEM : SRTM 90 m
- Land use : Corine Land Cover
- Soil : FAO classes, INRA soil properties
- Hourly precipitation : SAFRAN when no rain, Meso-NH during rainfall events
- PET climate variables : SAFRAN

### SWAT model set up

- Minimal drainage area = 1500 ha
- 66 sub-basins (20±14 km<sup>2</sup>), 549 HRU
- Warm up : 2005-08, Cal.: 2009-11, Val. 2012-15

### SWAT-CUP set up

Parameters	Unit	Min value	Max value	Parameters	Unit	Min value	Max value
CH2	mg/l	0.1	0.1	ESCO	hru	0.7	0.9
ALPHA_2F		0.01	1	EPKO	hru	0.7	1
GW_DELAY	day	0	500	LAT_TIME	hru	0	180
GW_REVP	day	0.02	0.2	CANMX	hru	0	100
GWQMN	day	0	5000	CV_N	hru	0.01	0.6
RCHG_DP	day	0.01	0.99	SOL_K	sol	0.1	0.1
REVAPMN	day	0	500	SOL_AWC	sol	0.1	0.1
CH_N2	mg/l	0.025	0.15	SOL_BD	sol	0.1	0.1
CH_K2	mg/l	0.01	0.5	SOL_CBN	sol	0.1	0.1
CH_N1	mg/l	0.025	0.15	SURLAG	sol	0.1	0.1
CH_K1	mg/l	0.01	0.5				

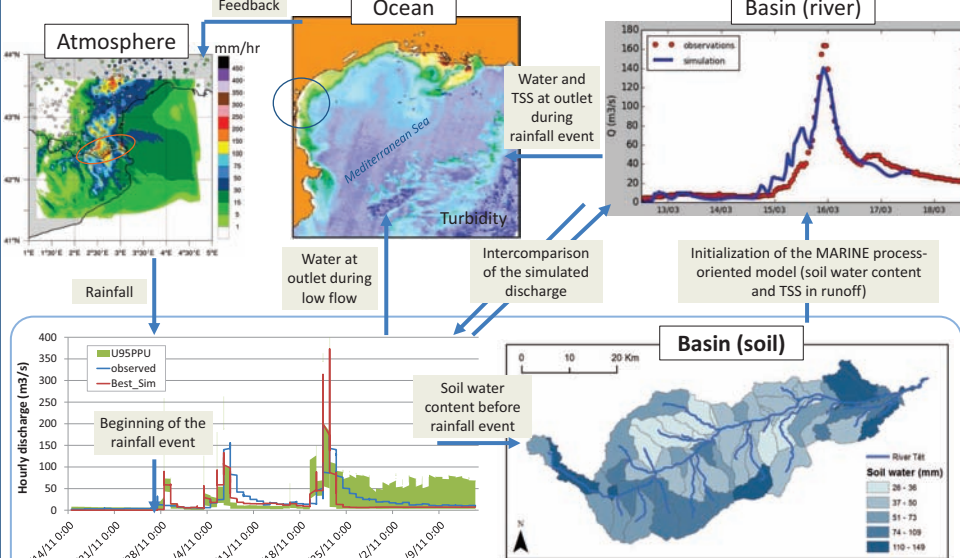
### Runoff model

Sub-daily time-step simulation : Green & Ampt equation

$$f_{inf,t} = K_e \cdot \left( 1 + \frac{\Psi_{wf} \cdot \Delta\theta_v}{F_{inf,t}} \right)$$

where  $f_{inf}$  is the infiltration rate at time  $t$  (mm/hr),  $K_e$  is the effective hydraulic conductivity (mm/hr),  $\Psi_{wf}$  is the wetting front matric potential (mm),  $\Delta\theta_v$  is the change in volumetric moisture content across the wetting front (mm/mm) and  $F_{inf}$  is the cumulative infiltration at time  $t$  (mm H<sub>2</sub>O).

### First results



SWAT contribution: hourly simulations of discharge, soil water content, and total suspended sediment loads in runoff with SWAT/SWAT-CUP

### Conclusions and perspectives

- SWAT is able to simulate the hourly discharge of a highly reactive Mediterranean coastal basin
- The calibration of total suspended sediments during flash floods is in progress: next step !

<sup>a</sup> University of Toulouse; INPT, UPS; Laboratoire Ecologie Fonctionnelle et Environnement (EcoLab), Avenue de l'Agrobiopole, 31326 Castanet Tolosan Cedex, France. CNRS, EcoLab, 31326 Castanet Tolosan Cedex, France

<sup>b</sup> Universit e de Toulouse; INPT, UPS; Institut de M ecanique des Fluides de Toulouse (IMFT), All ee Camille Soula, 31400 Toulouse, France. CNRS, IMFT, 31400 Toulouse, France

<sup>c</sup> University of Toulouse; Laboratoire d'A eroLogie (LA), 14 avenue Belin, 31400 Toulouse, France. CNRS, LA, 31400 Toulouse, France

\* Corresponding authors: [l.boithias@gmail.com](mailto:l.boithias@gmail.com) and [jose-miguel.sanchez-perez@univ-tlse3.fr](mailto:jose-miguel.sanchez-perez@univ-tlse3.fr)