



An assessment of the feasibility of the use of satellite-only rainfall estimates for the hydrological monitoring in central Italy

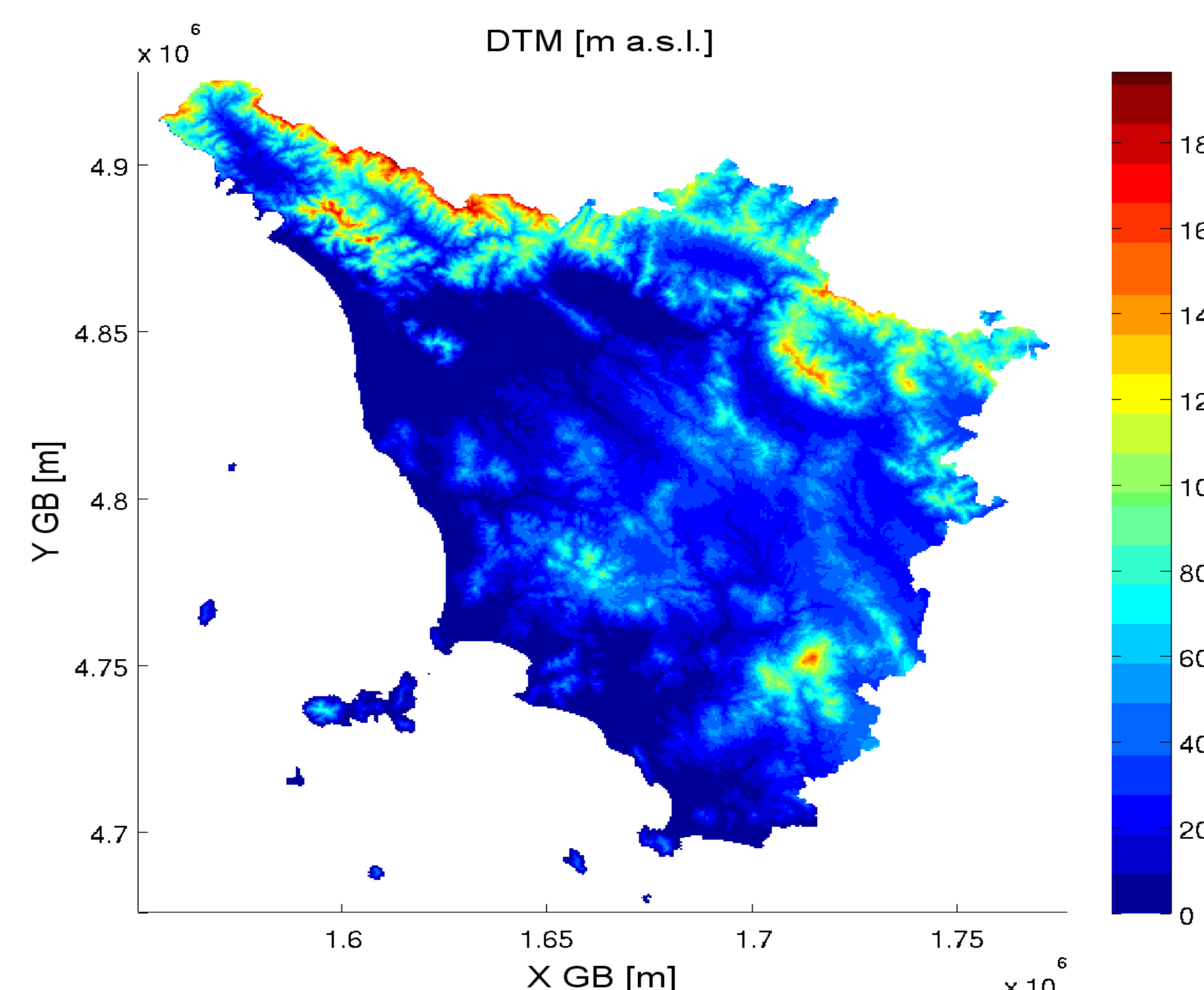
Lorenzo Campo (1), Francesca Caparrini (2)

1. University of Florence, Civil and Environmental Engineering, Florence, Italy (E-mail: lcampo1@dicea.unifi.it), 2. Eumechanos, Florence, Italy (E-mail: f.caparrini@eumechanos.it)

1. Introduction

The need for accurate distributed hydrological modelling has constantly increased in last years for several purposes: agricultural applications, water resources management, hydrological balance at watershed scale, floods forecast. The main input for the hydrological numerical models is rainfall data that present, at the same time, a large availability of measures (in gauged regions, with respect to other micro-meteorological variables) and the most complex spatial patterns. While also in presence of densely gauged watersheds the spatial interpolation of the rainfall is a non-trivial problem, due to the spatial intermittence of the variable (especially at finer temporal scales), ungauged regions need an alternative source of rainfall data in order to perform the hydrological modelling. Such source can be constituted by the satellite-estimated rainfall fields, with reference to both geostationary and polar-orbit platforms. In this work the rainfall product obtained by the Aqua-AIRS sensor were used in order to assess the feasibility of the use of satellite-based rainfall as input for distributed hydrological modelling. The MOBIDIC (MOdello di Bilancio Distribuito e Continuo) model, developed at the Department of Civil and Environmental Engineering of the University of Florence and operationally used by Tuscany Region for flood prediction and management, was used for the experiments. In particular two experiments were carried on:

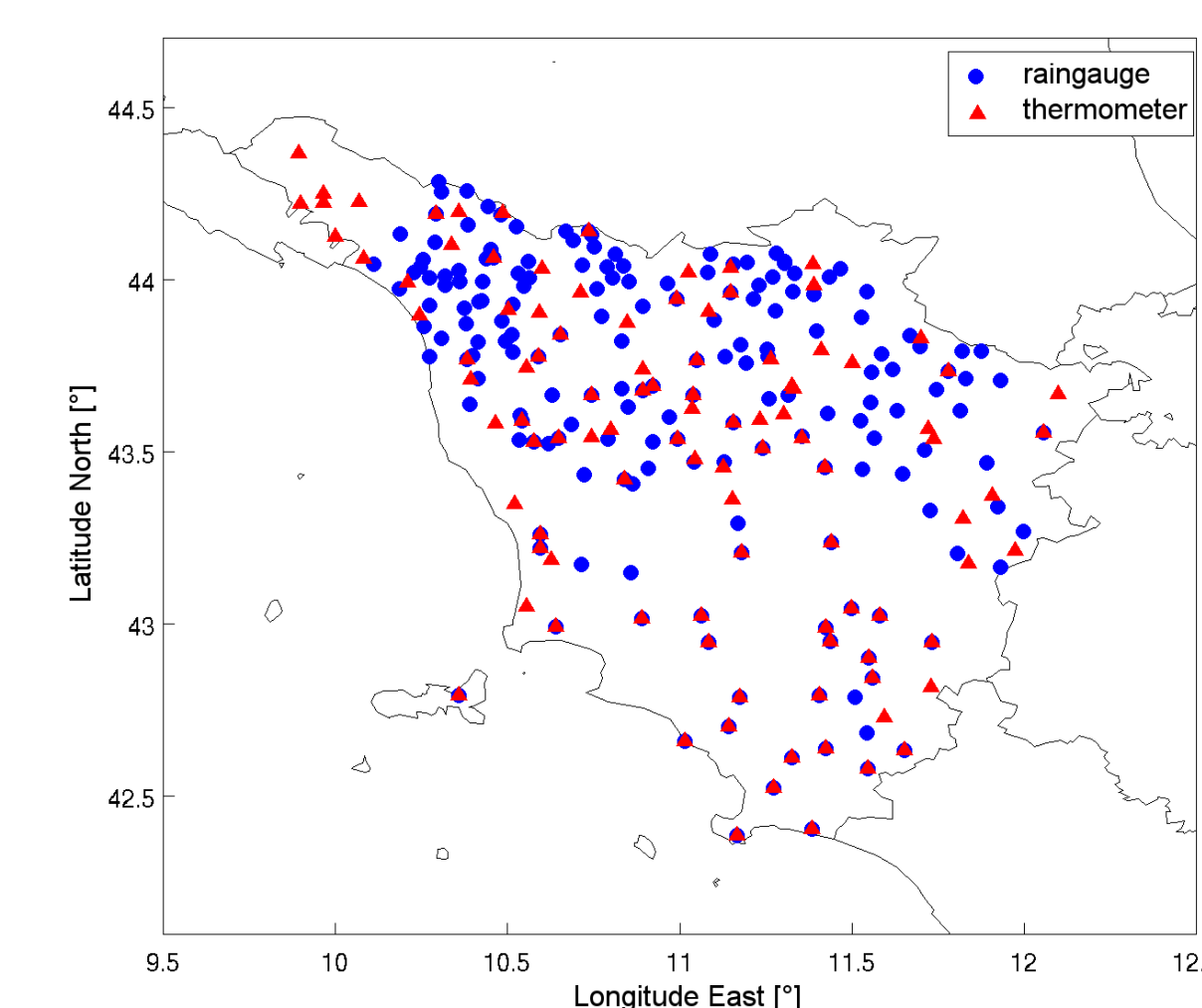
- hydrological simulation with the use of rain-gauges data
 - simulation with the use of satellite-only rainfall estimates.
- The domain of the study was the Tuscany, in central Italy, and the period studied was 2005-2006.



2. Model and data

The satellite product used was the Aqua-AIRS rainfall operational product, provided in daily maps with global cover and an horizontal resolution of about 20 km.

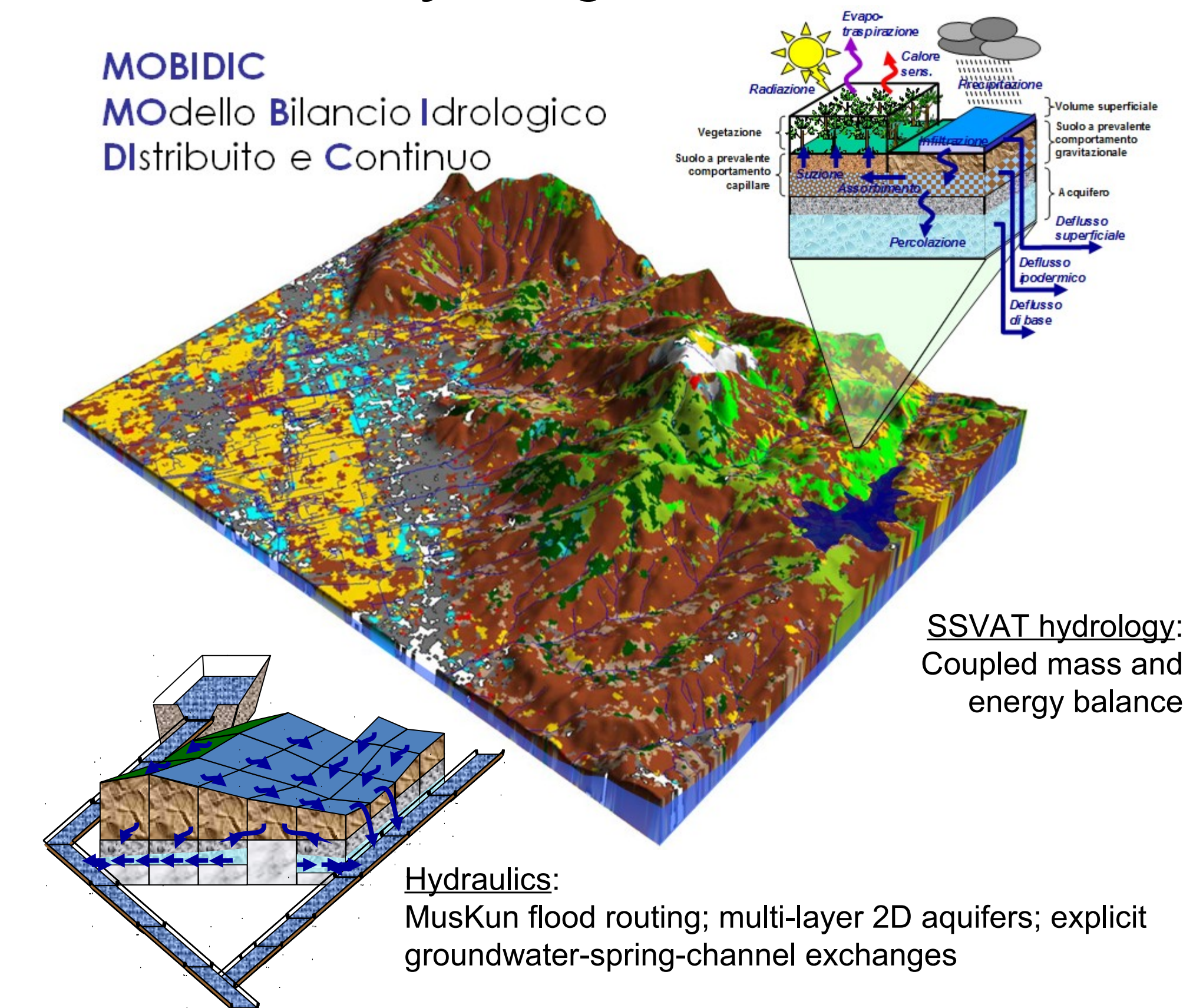
The MOBIDIC model is a complete, distributed hydrological model that allow to simulate all the main phenomena involved in the hydrological balance: channel routing, infiltration, evapotranspiration, groundwater dynamics, percolation, runoff, etc.



AQUA satellite

Distributed Hydrologic Model

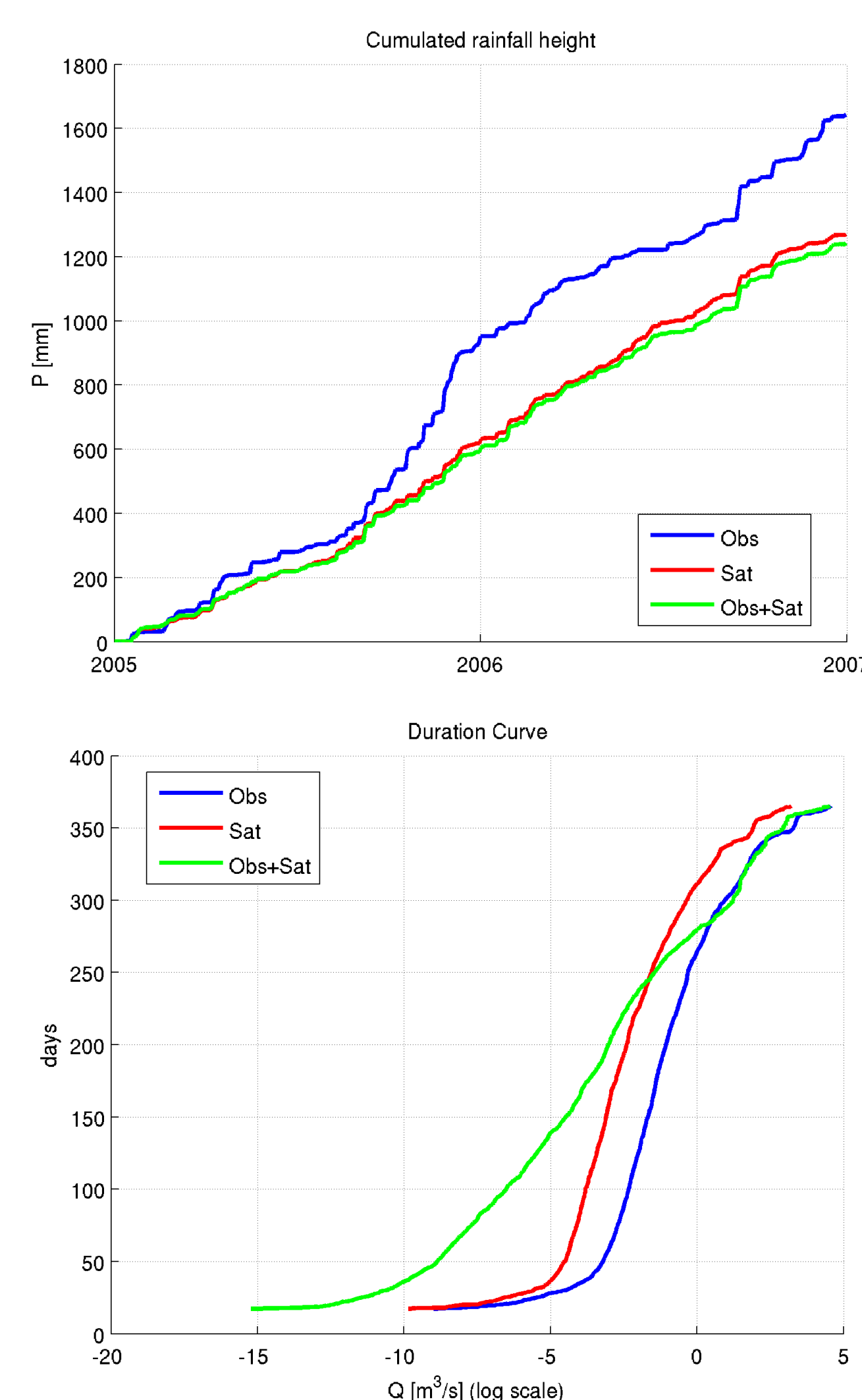
MOBIDIC
Modello Bilancio Idrologico
Distribuito e Continuo



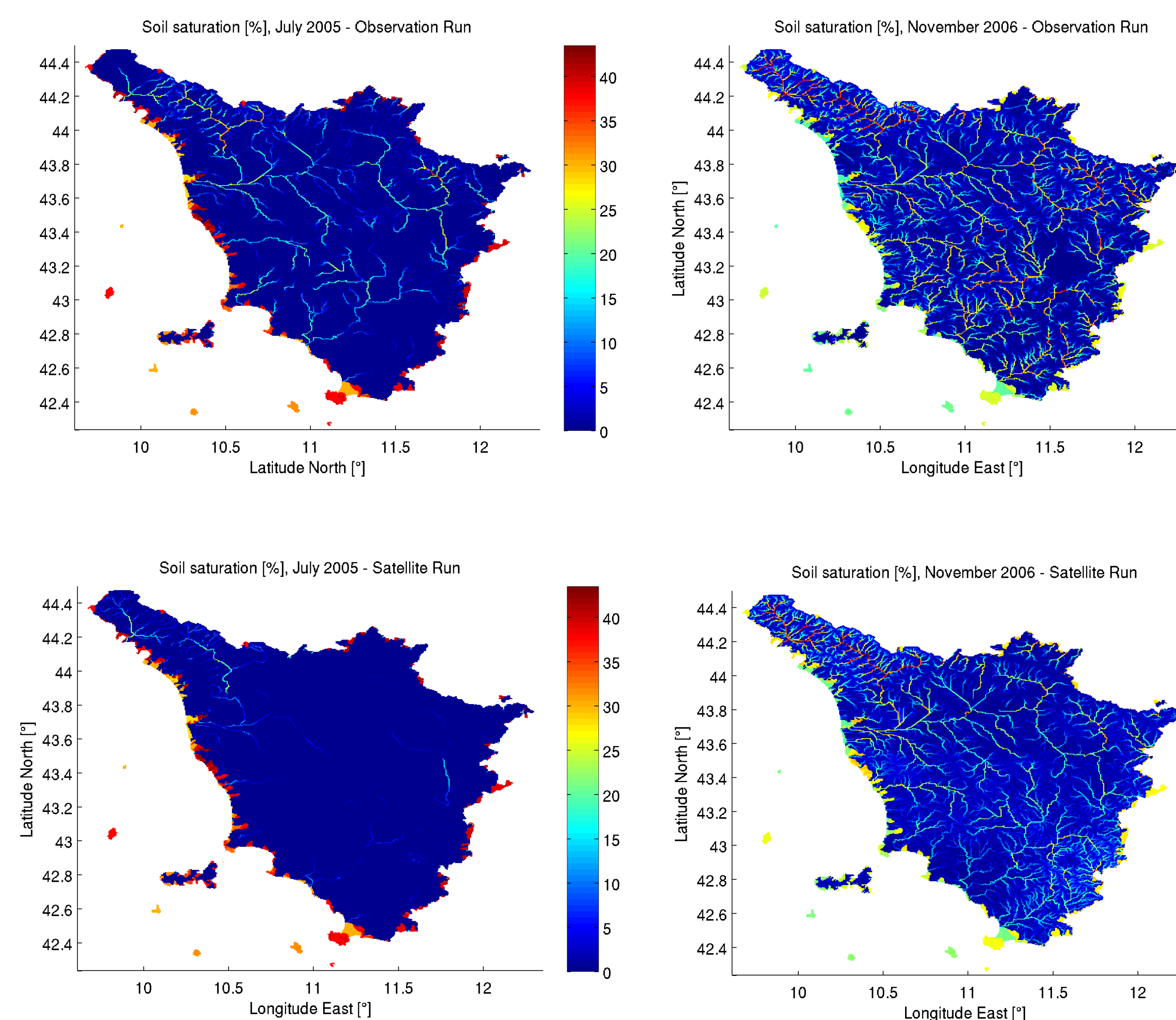
3. Hydrologicqal simulations

In order to evaluate the reliability of the satellite-based rainfall estimates for hydrological balance purposes, two simulations were performed with the hydrological model MOBIDIC:

- simulation with the actual observed rainfall in the period 2005-2006 (from the raingauges ground network)
- simulation utilizing the AIRS-estimated rainfall in the same period



Soil saturation



Evapotranspiration

