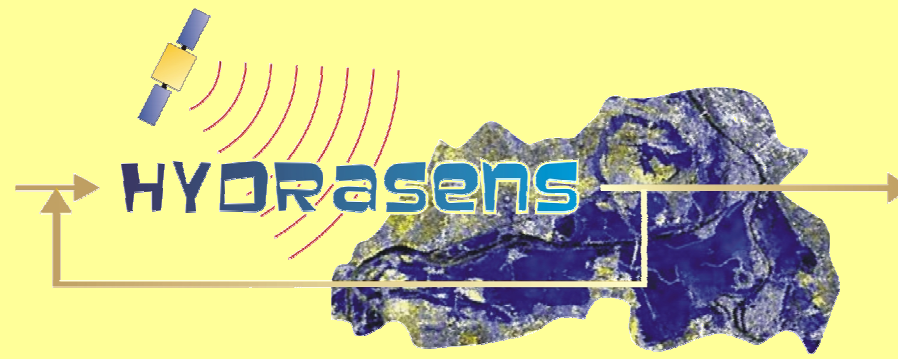
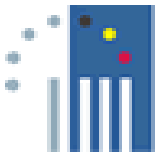


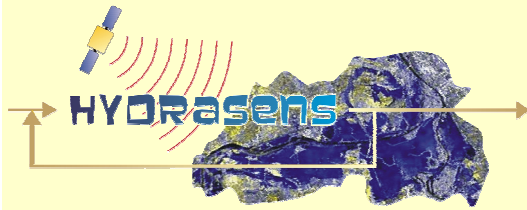
# Integrating radar remote sensing, hydrologic and hydraulic modelling for surface water management



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BELGIAN SCIENCE POLICY

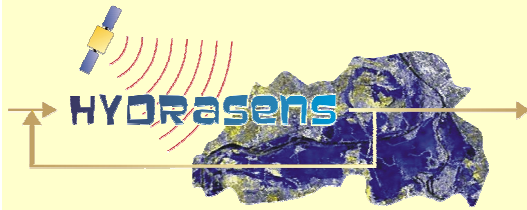


## Integrating radar remote sensing, hydrologic and hydraulic modelling for surface water management

### 5-year thematic pole project

- Partners: UG-WRM: **Niko Verhoest (Coordinator)**  
Laboratory of Hydrology and Water Management  
Research Unit "Water Resources Monitoring", Ghent University
- UCL: **Marnik Vanclooster**  
Department of Environmental Sciences and Land Use Planning  
Université catholique de Louvain
- UG-KERMIT: **Bernard De Baets**  
Department of Applied Mathematics, Biometrics and Process Control  
Research Unit "Knowledge-based Systems", Ghent University
- UG-HM: **Valentijn Pauwels**  
Laboratory of Hydrology and Water Management  
Research Unit "Hydrologic Modeling", Ghent University
- CRP-GL: **Lucien Hoffmann**  
Centre de Recherche Public – Gabriel Lippmann  
Department of Environment and Agro-Biotechnologies, Luxembourg





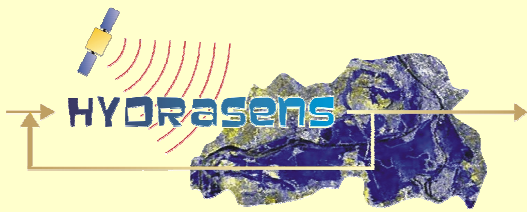
## Integrating radar remote sensing, hydrologic and hydraulic modelling for surface water management

### The overall goals of the project

- to explore new strategies to integrate **radar remote sensing**, hydrologic, and hydraulic **modelling** for **water management** purposes through data assimilation, with an emphasis to **flood forecasting**
- to demonstrate the applicability of **advanced data assimilation** schemes for a set of water management problems.

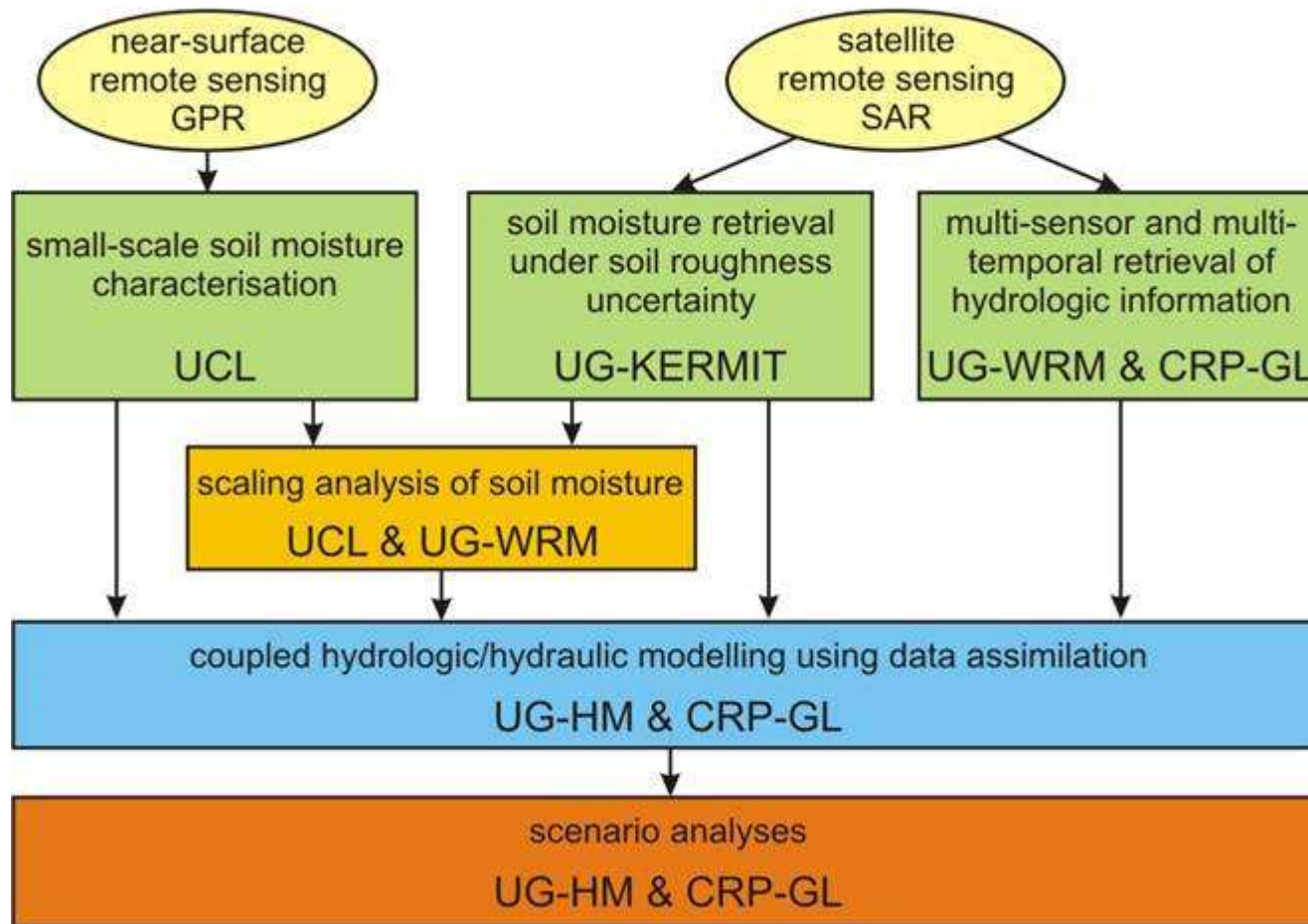
### Involves:

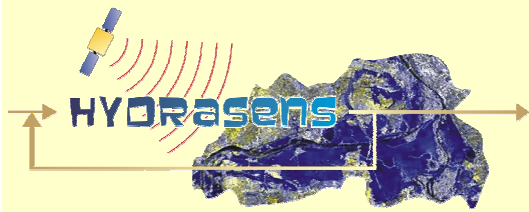
- ✓ soil moisture retrieval from advanced hydro-geophysical techniques, focusing on GPR
- ✓ retrieval of soil moisture from SAR data, including uncertainty assessment
- ✓ flood delineation through fusion of SAR data and high accuracy digital elevation models
- ✓ scaling of soil moisture based on GPR and SAR observations
- ✓ assimilation of multi-scale soil moisture observations into hydrologic models
- ✓ coupling of a hydrologic and a hydraulic model
- ✓ designing adequate data assimilation algorithms for the coupled system



# Integrating radar remote sensing, hydrologic and hydraulic modelling for surface water management

## Flowchart of the project

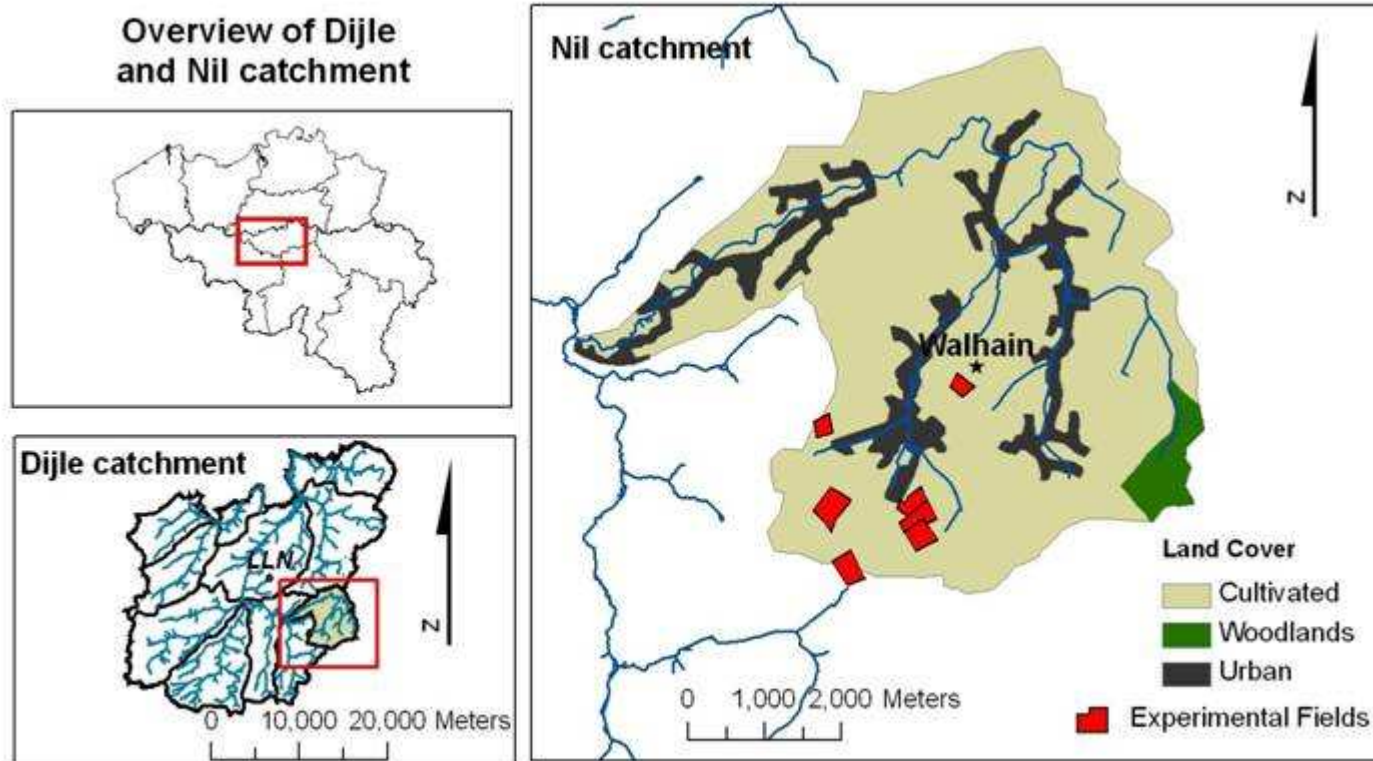




# Integrating radar remote sensing, hydrologic and hydraulic modelling for surface water management

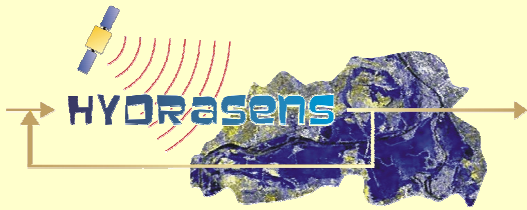
## Test sites

### Dijle catchment



Projected Coordinate System: Belge Lambert 1972  
Land Cover class from Corine Land Cover, Région Wallonne

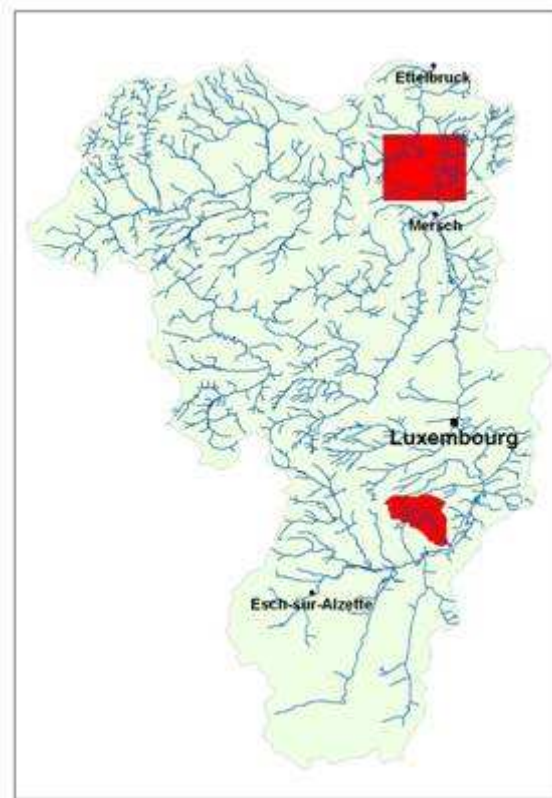


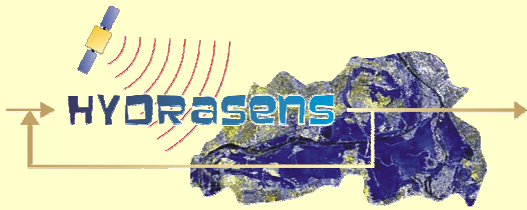


# Integrating radar remote sensing, hydrologic and hydraulic modelling for surface water management

## Test sites

### Alzette catchment





## Integrating radar remote sensing, hydrologic and hydraulic modelling for surface water management

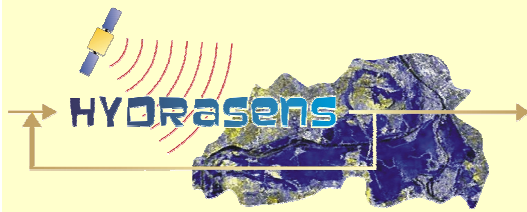
### Field campaigns

- 25/01/2008 First ENVISAT-ASAR acquisition over Alzette site
- 07/02/2008 First ALOS PALSAR acquisition over Dijle site

first in-field test of new GPR-platform







## Integrating radar remote sensing, hydrologic and hydraulic modelling for surface water management

Website <http://lhwm.ugent.be/HYDRASENS>

|  <b>INTEGRATING RADAR REMOTE SENSING, HYDROLOGIC AND HYDRAULIC MODELLING FOR SURFACE WATER MANAGEMENT</b>  |  |
|---|--|
| Introduction  | Description Teams Test sites Publications Events Internal site   |
| Introduction  | <p>The HYDRASENS project is sponsored by the Belgian Science Policy in the framework of the Research Programme for Earth Observation "STEREO II" (Support to the exploitation and Research in Earth Observation).</p> <p>The main aim of this project is to investigate how radar remote sensing of soil moisture and flood extents can be used to improve predictions of hydrologic and hydraulic models through data assimilation. Within this 5-year project different research items can be discerned:</p> <ul style="list-style-type: none"> <li>• small scale soil moisture monitoring using ground penetrating radar (GPR) techniques</li> <li>• soil moisture and flood extent monitoring using space borne Synthetic Aperture Radar (SAR) imagery using state-of-the-art backscattering models and techniques</li> <li>• uncertainty assessment on soil moisture estimates based on possibility theory</li> <li>• coupling a hydrologic and hydraulic model for improved flood forecasting</li> <li>• implementation and development of several data assimilation techniques</li> </ul> <p>The project consists of 5 partners and employs 5 researchers and 1 technical staff member.</p> |
|      |  |