LIFE11 ENV GR 975
FLIRE: Floods and flre Risk assessment and management

Technical Report

Action B2

31/12/2012

Project location	Greece – Attiki region
Project starting date:	01/10/2012
Project ending date:	30/09/2015
Coordinating Beneficiary	National Technical University of Athens

Associated Beneficiary responsible for Action B2	Imperial College London
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Other Associated Beneficiaries involved in Action B2	NTUA, IRPI-CNR, FORTH
Contact Persons	NTUA: Chrysoula Papathanasiou IRPI: Tomasso Moramarco, Silvia Barbetta, Luca Brocca

Name of the Action: Urban Flood Modelling

Starting date of the Action: 01/04/2013

Ending date of the Action: 31/03/2014

Short description of the Action

Aim

The aim of the Implementation Action B.2 is the efficient coupling of a surface flow model with a sewer flow model for the simulation and forecasting of flooding in the urbanized part of the study area.

Objectives

- Proper selection of existing urban flood models (sewer flow – surface flow, 1D/1D, 1D/2D approach)
- Upgrade and customization of the selected model so that it can be implemented in cases where significant changes in land use, top soil infiltration and surface pathways morphology occur due to forest fires.
- Development of a simplified version of the urban flood model for improved computational time
- Outputs of the urban flood modelling (which will correspond to responses of the urban part of the catchment to different rainfall events, under different hydromorphological conditions) and will service as inputs for Action B.3

Expected outcomes

As foreseen in the submitter proposal, the expected outcomes of Action B.2 are:

- The information system on sewers and urban surface morphology upgraded and made compatible with the flood prediction tools.
- The data obtained by full scale monitoring and the customized model tested for full scale catchment flood modelling for planning purposes.
- Part of the whole catchment (a suitable sub-catchment) selected for testing of near real-time pluvial flood forecast processed for catchment simplification and implementation of “hybridization”.
- The selected sub-catchment calibrated for full scale urban flood prediction based on the local rainfall “nowcasting” and critical sensitivity analysis carried out with the original and “hybridized” models. The sensitivity analysis resulted in fine tuning of the model.

- Depending on the amount and severity of the rainfall event recorded the robustness of the integrated model tested against full scale data and the recommendation on the future full scale applications drawn.
- Analysis of the direct impacts of forest fires on the changes of surface topography, morphology and runoff abstractions carried out and the procedure for models' upgrades established and tested (event permitting).

Tasks

1. The completion of specifications of an appropriate surface runoff model for the simulation of the response of the urban part of the study area (**ICL**) [**high priority**]
2. The selection of the appropriate surface flow model and the sewer flow model (**ICL**) [**high priority**]
3. The investigation of the application of dynamical systems such as CA for the simulation of the complex urban system (**ICL**, **NTUA**) [**medium priority**]
4. The consideration of hydromorphological issues in the urban flood modelling (**ICL**, **NTUA**) [**high priority**]
5. The investigation of the application of the OpenMI platform to the model coupling procedure (**ICL**, **NTUA**) [**high priority**]
6. Efficient coupling and integration of these models taking into account differences in approximations, requirements and limitations of the selected models (**ICL**)[**high priority**]
7. Upgrade and customize these models so that they can be implemented in cases where significant changes in land use, top soil infiltration and surface pathways morphology occur due to forest fires(**ICL**) [**high priority**]
8. The development of a simplified version of the urban flood model for improved computational time(**ICL**, **NTUA**) [**medium priority**]
9. Customization of the hybrid models which combine 1D/2D models for the selected (highly flood vulnerable) areas with 1D/1D models for the rest of the catchment areas (input from Action B1(**ICL**) [**high priority**]
10. Collection of necessary datasets for the simulation procedure (including the outputs of catchment modelling described in Action B1) (**ICL**) [**high priority**]
11. Application of a methodology for rainfall data processing using advanced Bayesian interpolation techniques in synergy with spatial downscaling methods (**ICL**) [**medium priority**]
12. Identification of a suitable sub-catchment for testing of near real-time pluvial flood forecasting, necessary for the implementation of "hybridization" (**ICL**) [**high priority**]

13. Calibration of the sub-catchment for full scale urban flood prediction based on local rainfall nowcasting and critical sensitivity analysis. (**ICL**) [**high priority**]
14. Operational use of the hybrid model for near real-time flood forecasting. (**ICL**) [**high priority**]
15. The calibration of the models against rainfall – runoff data that will be used within Action B3 for the analysis of scenarios with input from the outflows of Action B1(**ICL**) [**high priority**]

Working Team

ICL

- **Professor Čedo Maksimović** – Head of the Urban Water Research Group (UWRG) within the Department of Civil and Environmental Engineering at Imperial College London; Project coordinator, senior engineer, who will work on the coordination of the ICL team advise on flooding/flood protection and interaction with forest fires, post fire flood potential assessment.

- **Callum Clench** – Project Manager, Interactions with project coordinators and other participants in the project in order to assure timely performance of the tasks agreed.

- **Maria Aivazoglou** – Civil Engineer, Environmental Engineer, flood modeler, who will work on:
    - The completion of specifications of an appropriate surface runoff model for the simulation of the response of the urban part of the study area
    - The selection of the appropriate surface flow model and the sewer flow model
    - The investigation of the application of dynamical systems such as CA for the simulation of the complex urban system
    - The consideration of hydromorphological issues in the urban flood modelling
    - The investigation of the application of the OpenMI platform to the model coupling procedure
    - Efficient coupling and integration of these models taking into account differences in approximations, requirements and limitations of the selected models
    - Upgrade and customize these models so that they can be implemented in cases where significant changes in land use, top soil infiltration and surface pathways morphology occur due to forest fires

- The development of a simplified version of the urban flood model for improved computational time
- Customization of the hybrid models which combine 1D/2D models for the selected (highly flood vulnerable) areas with 1D/1D models for the rest of the catchment areas (input from Action B1
- Collection of necessary datasets for the simulation procedure (including the outputs of catchment modelling described in Action B1)
- Application of a methodology for rainfall data processing using advanced Bayesian interpolation techniques in synergy with spatial downscaling methods
- Identification of a suitable sub-catchment for testing of near real-time pluvial flood forecasting, necessary for the implementation of "hybridization"
- Calibration of the sub-catchment for full scale urban flood prediction based on local rainfall nowcasting and critical sensitivity analysis
- Operational use of the hybrid model for near real-time flood forecasting
- The calibration of the models against rainfall – runoff data that will be used within Action B3 for the analysis of scenarios with input from the outflows of Action B1

NTUA

- **Maria Mimikou** – Project Coordinator, who will coordinate the NTUA team.

- **Christos Makropoulos** – Internal Project Coordinator, who will cooperate with ICL for:
  - The investigation of the application of dynamical systems such as CA for the simulation of the complex urban system
  - The investigation of the application of the OpenMI platform to the model coupling procedure
  - The development of a simplified version of the urban flood model for improved computational time

- **Chrysoula Papathanasiou** – Civil Engineer, Hydrologist, flood modeler, who will cooperate with ICL for:
  - The investigation of the application of dynamical systems such as CA for the simulation of the complex urban system
  - The consideration of hydromorphological issues in the urban flood modelling

- The development of a simplified version of the urban flood model for improved computational time

- **Evangelos Baltas** – Senior Engineer, Hydrologist and flood modeler, who will cooperate with ICL for:
  - The consideration of hydromorphological issues in the urban flood modelling
  - The development of a simplified version of the urban flood model for improved computational time

- **Nikolaos Mamassis** – Senior Engineer, Hydrologist, expert in Geoinformatics, who will cooperate with ICL for:
  - The consideration of hydromorphological issues in the urban flood modelling
  - The development of a simplified version of the urban flood model for improved computational time

Deliverables

The Implementation Action B.2 has two deliverables:

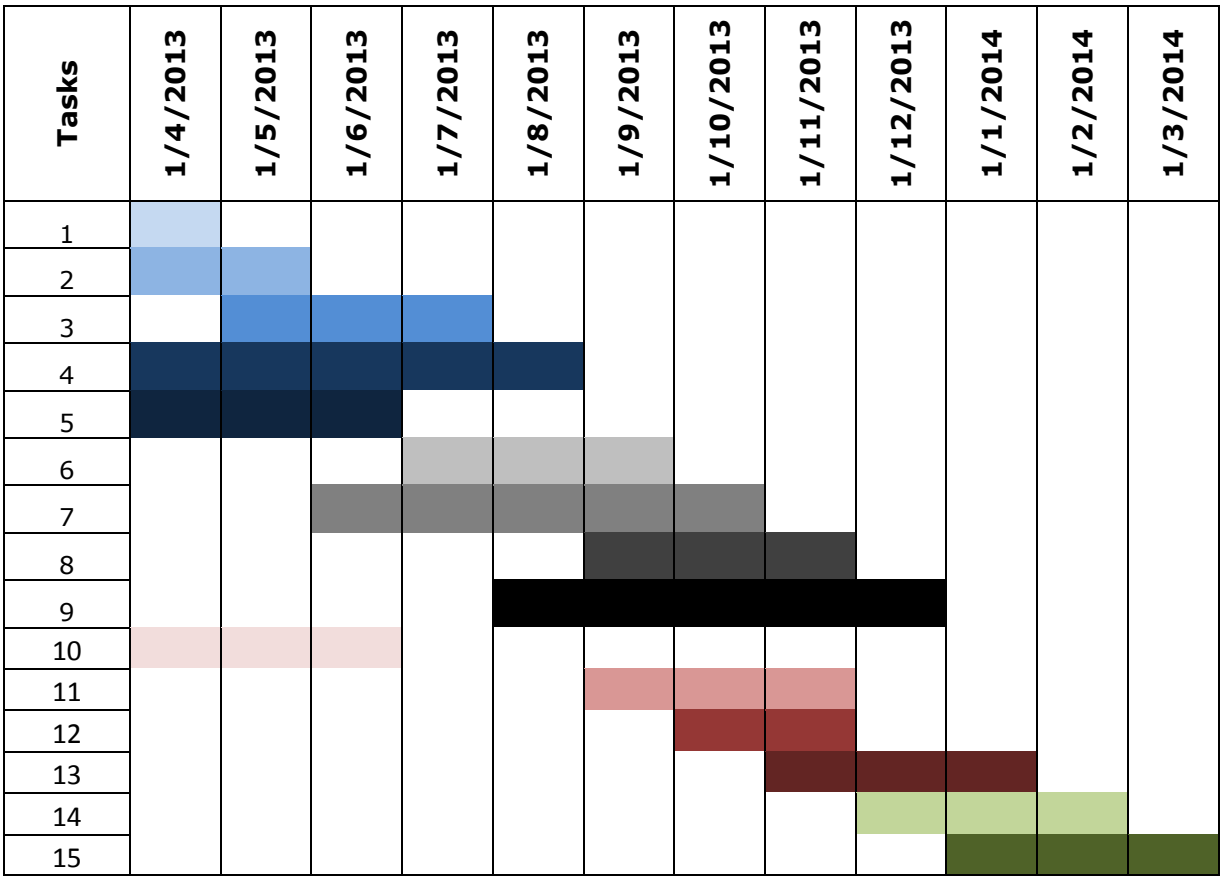
1. ***Small scale flood prediction*** that has to be ready by **31/01/2014**
2. ***Report on full scale flood forecasting*** that has to be ready by **28/03/2014**

Both the Small scale flood prediction and the Report on full scale flood forecasting will have the format of a short technical report which will include relevant graphs, tables and text, presenting in brief some general conclusions from the flood prediction of the urban zone of the study area.

Milestones

The Implementation Action B.2 has one milestone, the **"*Application of flood protection model*"** that has to be delivered by **31/01/2014**.

Gantt-chart



Key references

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