Flooding and mud flow risk

Senior scientists

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Research Field and Subjects

- Study of the processes controlling flooding and mud flow risk, in particular:
  i) rainfall-runoff and surface sediment transport;
  ii) the connectivity of surface flow in terms of soil surface properties (roughness, infiltration capacity, etc…);
  iii) the space-time distribution of moisture content;
  iv) hydraulic properties and other physical properties of the soil surface by means of geophysical and nearby remote sensing techniques.
- Development and improvement of flood risk and mud flow models on different spatial scales.
- Development of model parameterisation schemes in terms of soil structure on different scales.
- Development of techniques for identifying the physical properties of soil, in particular inversion techniques.
- Design and evaluation of flood and sediment control technologies and strategies and techniques for sustainable soil and water management.

Representative References

- MINET J., LALOY E., LAMBOT S., VANCLOOSTER M. Effect of high-resolution spatial soil moisture variability on simulated runoff response using a distributed hydrologic model. Hydrology and Earth System Sciences 15, 1323-1338. **2011**.
- EVRARD O., VANDAELE K., BIELDERS C., VAN WESEMAEL B. A grassed waterway and earthen dams to control muddy floods from a cultivated catchment of the Belgian loess belt. Geomorphology 100(3–4): 419–428. **2008**.
- LALOY E., BIELDERS C. Plot scale continuous modelling of runoff in a maize cropping system with dynamic soil surface properties. Journal of Hydrology 349(3–4): 455–469. **2008.**

Main Equipment

- Hydraulic equipment. Equipment for river discharge logging: weirs, parshall flumes, hydraulic gauges, gauging station, tipping buckets with different capacity. Hydraulic canal for the calibration of hydraulic instruments.
- Surface flow simulator for the study of surface run-off processes under controlled conditions. Rainfall simulator.
- Soil physical equipment. Equipment for the determination of the density of soil (pycnometer), soil porosity (mercury porosimetry), soil moisture retention pF- curve (multi-step, pressure chamber), soil hydraulic conductivituty curve (infilrometers).
- Advanced surface hydrological and soil hydro-ecological models: The Meshed Hydrological Model (MHM), i.e. a spatially distributed hydrological model for the prediction of flow in hydrological catchments

Products and Services

- Hydrological risk assessment studies of small hydrological catchments, using advanced hydrological modelling tools, in particular ARCGIS (geographical data analysis, spatial modelling), MHM-TFM (hydrological modelling), HEC-RAS (hydraulic modelling), STREAM (mud flow)
- Provider of hydrological data, in particular from the hydrological monitoring network of the site of Louvain-la-Neuve (meteorological data, rainfall network, parshall flume at the outlet of the artificial lake, survey well) and from microcatchments

Keywords

Flooding
Mudflow
Runoff
Soil erosion
River flow
Rainfall
Flood control
Storm basin
Hydrological model

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