



Eidgenössische Technische Hochschule Zürich  
Swiss Federal Institute of Technology Zurich

Lecture with Computer Exercises:  
Modelling and Simulating Social Systems with MATLAB

Project Report

Räumlich hochauflösende Bestimmung von hydraulisch

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## **Agreement for free-download**

We hereby agree to make our source code for this project freely available for download from the web pages of the SOMS chair. Furthermore, we assure that all source code is written by ourselves and is not violating any copyright restrictions.

Name 1

Name 2

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## 1 Abstract

## 2 Individual contributions

## 3 Introduction and Motivations

### *The Shock*

12. January 2010, 16.53 local time in Haiti: during one minute the earth is shaking with magnitude 7.0 (on the Moment magnitude scale) with an epicentre 25 Km west of Haiti,Âs capital Port-au-Prince. Followed by at least 52 aftershocks this earthquake is the most dramatic in the 21. Century: the Haitian government estimated that 316,Â0000 people had died , one million people lost their home and 3.2 million are directly affected.

### *Geological overview*

The quake was located on the active plate boundary with the Caribbean Tectonic Plate shifts eastwards relative to the North American Plate. This causes a highly dangerous strike-slip-fault system here with the southern active Enriquillo-Plantain-Garden-fault. The quake is caused by a rupture of this system, which has been blocked for the last 2500 years, loading stress



Abbildung 1: Hier steht die Beschreibung des Bildes

### *Primary impacts*

As Haiti is one of the poorest country in the Western Hemisphere the economy is highly vulnerable to natural disasters. In addition to earthquakes, the ,Äüisland of Hispaniola,Äü shared by the Dominican Republic and Haiti, has often been stroked by Hurricanes.

The huge devastation and damage in the whole country, but especially in the region of the capital, destroy not only human life, furthermore infrastructure, which would have been necessary to respond to the disaster. Not only all hospitals in the capital, as well air, water and land transport facilities and the communication system was destroyed. As well a lot off the public and government buildings were damaged (e.g. the National Assembly, the Palace of Justice and the Supreme Court)

### *The time afterwards*

In the following months after the earthquake many people slept in the streets

because their houses have been destroyed or they were feared that their buildings won't survive upcoming aftershocks. Slow distribution of resources resulted in violence and some people began with plundering.

The earthquake destroyed thousands of families and made collapse a whole social system and destroyed economic interactions in a country. Anarchy and a law-free area was the result. Haitians' dramatic fight for survival began in the silent seconds after the earthquake and still goes on.

#### *Upcoming problem: Cholera*

During the period of reconstruction in October 2010 Haiti was confronted by a new dangerous problem: a cholera epidemic broke out!

Cholera is a bacterial infection caused by a bacterium named as *Vibrio cholerae*. The symptoms are mainly watery diarrhoea and vomiting. The transmission occurs generally by drinking infected water. Cholera doesn't have to be lethal but requires an appropriate treatment in a hospital. In Haiti in January 2012 some 7025 deaths by Cholera have been reported. The source of the illness still is not clearly identified, but localized in the Artibonite River about 100 Km north of Port-Au-Prince (The affected victims had drunk water from the infected river). Some UN investigators did researches, hoping to find the real source from the Epidemic and they are guessing the initial strain was imported by UN peacekeeper from Nepal. The Nepali soldiers may be the source of the outbreak as wastewater from their outhouses at their base flowed into and contaminated the Artibonite River. However who brought the origin strain to Haiti is not of primary importance, rather than to control the plague and this is still one of the most important priority nowadays in Haiti.

#### *Motivation*

By the end of October 2010 the Cholera epidemic accomplished four out of ten Haitian departments: Artibonite, Centre, Nord and Ouest. That includes as well the Capital, especially the slum district *Cité Soleil*. In the following days Cholera was spread

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