

# Methods and Activities of the *Climate Cluster*: An Overview

P. Laux<sup>1</sup>, H. Kunstmann<sup>1</sup>, J. Cullmann<sup>2</sup>, T. Tran<sup>3</sup>, P. Nguyen<sup>1,2,3</sup>, T. Dang<sup>1,3</sup>, R. Pedroso<sup>4</sup>, L. Ribbe<sup>4</sup>

- 1 Karlsruhe Institute of Technology, Institute of Meteorology and Climate Research (KIT, IMK-IFU), Garmisch-Partenkirchen, Germany
- 2 IHP/HWRP Secretariat, Federal Institute of Hydrology, Koblenz, Germany
- 3 Vietnam Institute of Meteorology, Hydrology and Environment (IMHEN), Hanoi, Vietnam
- 4 Cologne University of Applied Sciences, Institute for Technology and Resources Management in the Tropics and Subtropics (ITT), Cologne, Germany

Contact details:  
Dr. Patrick Laux



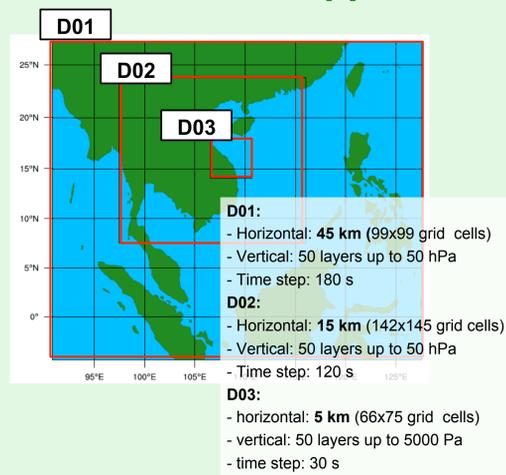
## Motivation and Objectives

- Complex climate in Central Vietnam: monsoonal flows, cold air penetrations from north, tropical cyclones, and complex orography
  - Sparse observation network of hydrometeorological data, i.e. few stations which are located in lowlands only
  - The expected impacts of future climate change need to be assessed for climate impact studies
- Generation of **high-resolution hydrometeorological data for climate impact modelers**

### Impacts of *Climate Change (CC)* on hydrometeorological variables (→ *Poster 1*)

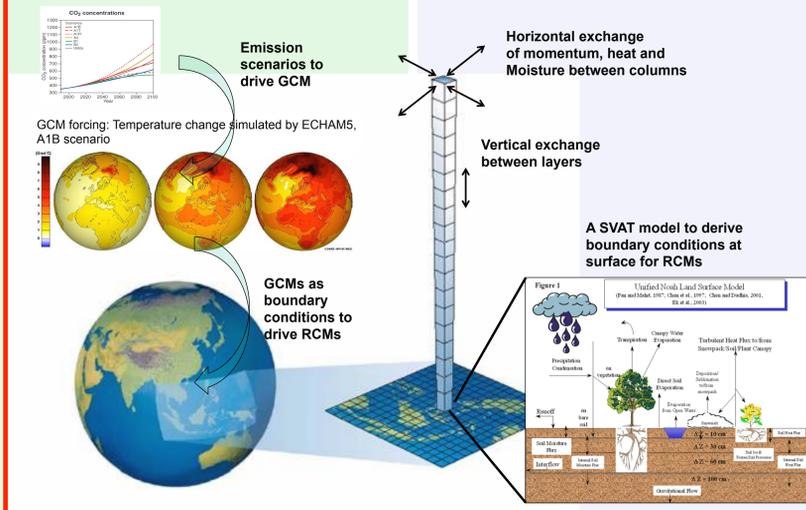
- Parameterization experiments (Laux et al., 2012).
- Long-term climate projections based on WRF default LU data (Laux et al., 2013)
- Analysis of climate extremes

### WRF nested approach:



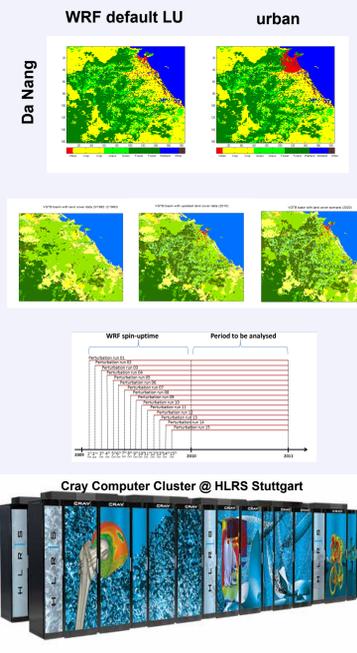
ca. 2.4 Mio. CPU hours computing time used

### Regional Climate Projections using WRF



### Impacts of *Land Use Change (LUC)* on hydrometeorological variables (→ *Poster 2*)

- LULCC sensitivity simulations (what-if scenarios: artificial LU conversion).
- Signal-to-noise separation
- Improved long-term climate projections using observed LU data



### Data produced (default *Land Use*):

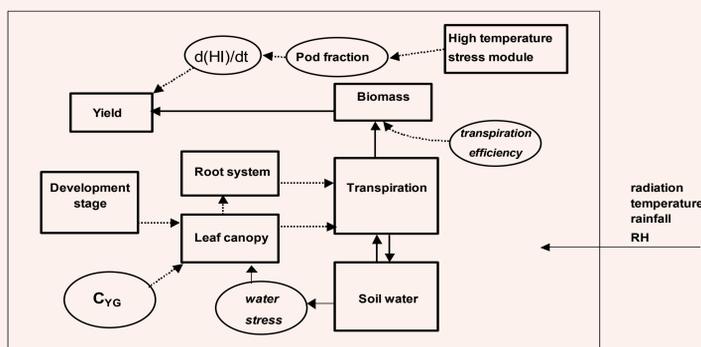
- WRF-ERA40 (1971-2000) for D01, D02, D03
- WRF-ECHAM5-CTRL (1971-2000) for D01, D02, D03
- ECHAM5-A1B & B1 (2001-2050) for D01, D02, D03

### Data produced (observed and artificial *Land Use*):

- WRF-ERA-interim (2001-2010) for D01, D02, D03
- WRF-ERA-interim (2001, 2010) for D01, D02, D03 (artificial LU)
- WRF-ECHAM5-A1B (2001-2020) for D01, D02, D03

## Agricultural (→ *Poster 3*) and economic-hydrological (→ *Poster 4*) impact modelling based on produced climate data for the VGTB basin

- Calibration of the process-based crop model GLAM based on WRF-ERA40 data (200x-200y)
- Climate change impact analysis based on WRF-ECHAM5-A1B and B1
- Fully-distributed water balance simulations (WaSim-ETH)
- Manual and automatic (PEST method) calibration of WaSim-ETH using reanalysis data
- Optimization of irrigation schedules & techniques using an economic model (GAMS)



Relational diagram of GLAM, Leeds University (GLAM technical description, V2)

