Project: **981**

Project title: **Sensitivity and Response of the Treeline Ecotone in Rolwaling Himal, Nepal, to Climate Warming (TREELINE)**

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Report period: **2016-01-01 to 2017-03-31**

As detailed in submitted research plans, a fully-compressible non-hydrostatic, Weather Research and Forecasting (WRF) model in its latest version (3.8.1) has been compiled in DKRZ HPC Mistral. It is a widely used model for meso/micro-scale climate simulations due to its features to use large number of physical parameterizations for downscaling climate variables across a variety of horizontal and vertical scales.

Utilizing both the existing WRF setup in DKRZ as well as the old set up in University of Hamburg, Regionales Rechenzentrum (rrz) server, we completed the one year simulations in three nested domain D1, D2 and D3 configured at 25, 5 and 1 km horizontal grid spacing (with default land use and topography), respectively using ERA Interim forcing in 2016 (Figure 1). The **simulation results are already submitted in the form of a research article in the Journal Earth System Dynamics (Karki et al. 2017, http://www.earth-syst-dynam-discuss.net/esd-2017-31/ , under review) now. Some of the figures from the publication area included here too (Figure 1 and 2).**

As the land use/land cover and topography are the crucial factors for climate modelling, **the number of sensitivity runs utilizing new Shuttle Radar Topography Mission (SRTM) digital elevation model (DEM in 30m, as the default topography is over smoothed and limited to 30 arc second only) and modified land use (glacier area is highly underestimated in default)** data set were also tested in the new WRF setup. These sensitivity tests further motivated us for the planed WRF run in sub-kilometer scale with more realistic representations of topography and land use to better understand the physical processes in the complex mountain terrains of Nepal. **The future planned research works are detailed in request document.**

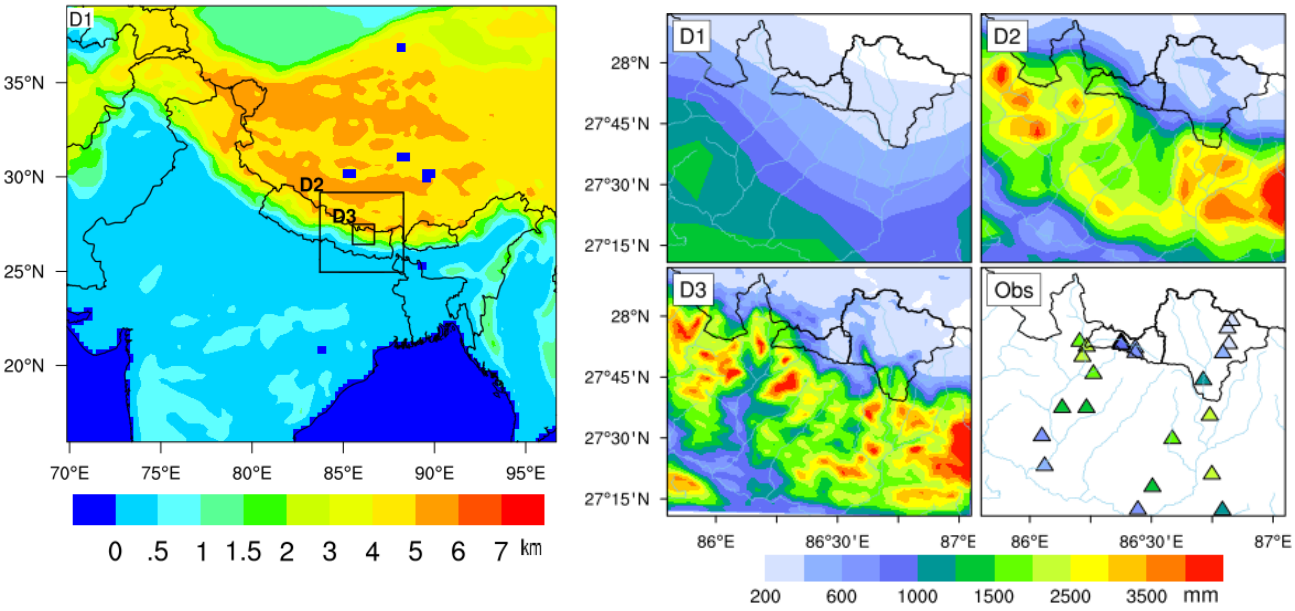

Figure 1: Domain setup for WRF (left panel) and monsoonal preciptation (2015) distribution in the target area of Nepal in different WRF resolutions and observation.

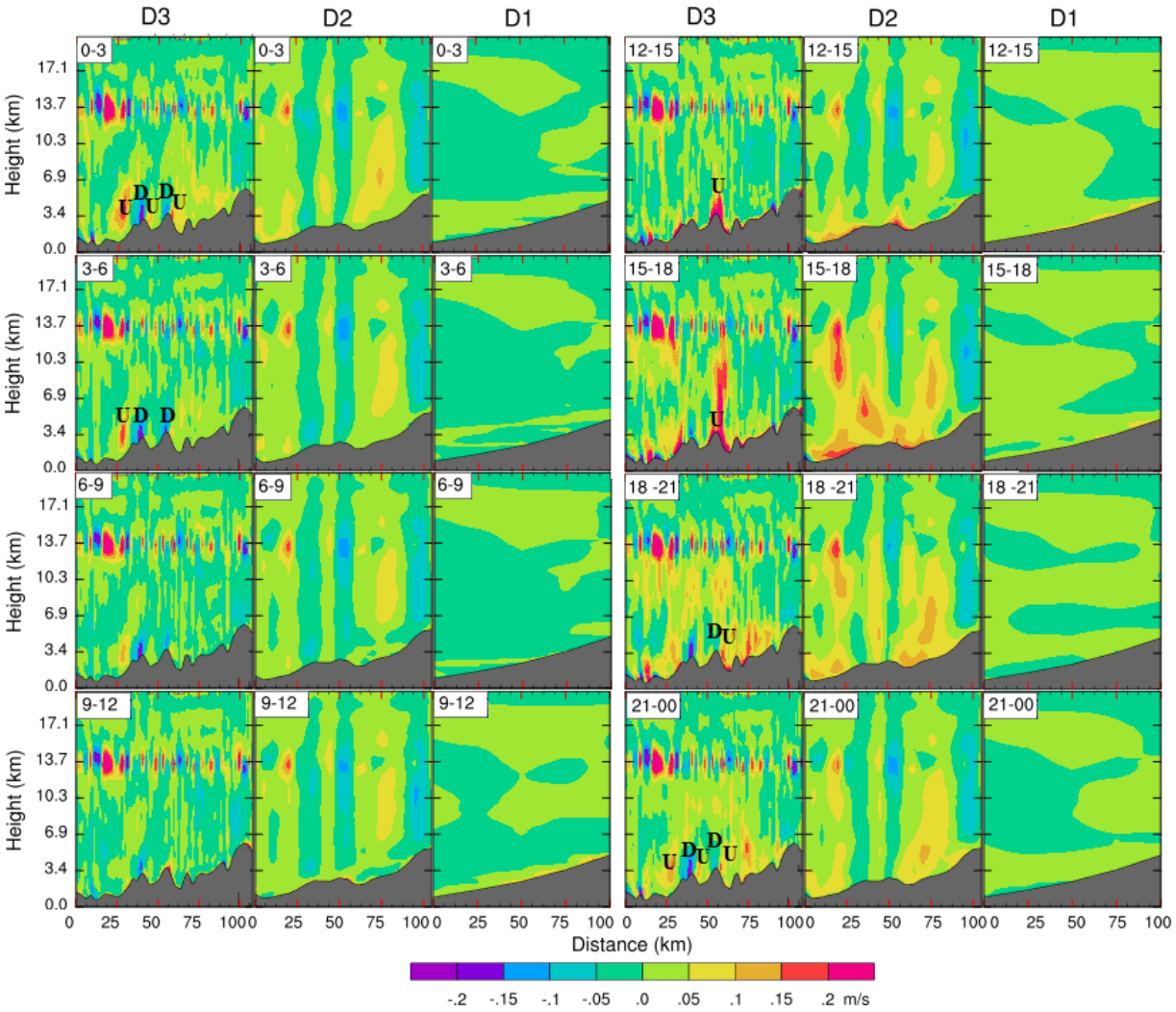

Figure 2: Three hourly (local hour) monsoon season average vertical velocity (m/s) in all three WRF resolutions along the AB section with topography shaded in gray color. Few points of upward and downward flows are also marked as U and D, respectively.