



## **Role of land cover / land use change in montane mainland Southeast Asia in altering regional climate**

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The primary objective of this study was to simulate how future land cover / land use (LCLU) change in montane mainland Southeast Asia (MMSEA) could affect local and regional energy and moisture fluxes, and the consequences of those changes for continental-scale atmospheric circulation and climate. By deploying the regional climate model (RegCM3) of International Centre of Theoretical Physics in Italy, the following sets of simulations were carried out to accomplish this objective:

1. Control simulation with MMSEA's present LCLU (mostly forest based on MODIS 2000-2001 observations)
2. Sensitivity simulation with MMSEA's present LCLU replaced with "irrigated crop"
3. Sensitivity simulation with MMSEA's present LCLU replaced with "short grass"
4. Sensitivity simulation with MMSEA's projected 2050 LCLU (obtained using CLUE (Changing Land Use and its Effects) model)

Each set of these simulations was carried out for the hydrologically active periods (between April 15 and October 30) of the 5 years from 1998 and 2002. The initial and boundary conditions in these simulations were derived from NCEP/NCAR reanalysis data. The performance of RegCM3 was assessed based on its ability to simulate precipitation in both tropical (mainly Indochina Peninsula) and mid-latitude areas (mainly eastern China). Modeled precipitation matches well with observed precipitation over China. However, the model somewhat systematically underestimates precipitation in the Indochina Peninsula. The simulations yield different responses to different LCLU

perturbations. When the MMSEA's present LCLU is replaced with "irrigated crop", precipitation slightly increases in the Indochina Peninsula, but substantially decreases in the southeastern China. Precipitation of South China Sea significantly increases in response to this perturbation. When the MMSEA's present LCLU is replaced with "short grass", precipitation substantially decreases in MMSEA, but it changes little elsewhere. The realistically projected 2050 LCLU simulation indicates little change in the climate of the region.