Title: Surface climatology and its variability in enhanced greenhouse warming experiments: results from the models participating in the IPCC diagnostic exercise

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Abstract

We present an analysis of temperature and precipitation change over the South Asia Monsoon (SAM) region for the mid and late 21st century under the IPCC A1B emission scenario from an ensemble of 16 coupled atmosphere ocean climate models. Consistent patterns of model composite regional changes are found for the analysis periods of the 21st century. We find substantial warming over the entire SAM region with most pronounced warming over the central Himalayan range and during winter. Precipitation is projected to increase during the summer monsoon season and decrease during winter thus suggestive of an amplification of the seasonal precipitation cycle and a lengthening and intensification of the monsoon season. Maximum increase in monsoon precipitation is projected in the vicinity of central Himalayan range. Temperature interannual variability in the monsoon and winter seasons remain about the same but precipitation interannual variability in those seasons, as measured by the coefficient of variation, increases over much of the domain with maximum increase over west central and north west peninsular India.

These projected future surface climate changes resulting in enhanced seasonal precipitation cycle with substantial warming will likely produce largely negative impact in the socio-economics of this region. Some of the likely consequences are excessive land slides, accelerated glacier retreats, formation and growth of several glacial lakes with potential of catastrophic outburst floods in mountainous region and frequent flooding in low lands during monsoon but winter drought with major water crisis in the region aggravated by the depletion of glacier due to the warming.