Climate Change Projections of Terrestrial Primary Productivity over the Hindu Kush Himalayan Forests

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Introduction

Net Biome Productivity (NBP) is an important measurement of flux which assesses if the region is acting a net sink or net source of carbon. Simulated NBP by IPSL-C5A-MR reveals an increasing trend for the period 1951 to 2005 with a mean NBP of 0.0035±0.018 kg C m^{-2} yr^{-1}. The NBP of future scenario under RCP2.6 was estimated to be 0.0029±0.05 kg C m^{-2} yr^{-1} and 0.0039±0.07 kg C m^{-2} yr^{-1} under RCP8.5 (Figure S1). For MPI-ESM-LR, a similar trend was also observed, with average NBP of 0.02±0.04 kg C m^{-2} yr^{-1} and 0.04±0.06 kg C m^{-2} yr^{-1} under RCP2.6 and RCP8.5 respectively (Figure S2). Most of the carbon sink capacity in the HKH rises in the Tibetan region of China where mostly grasslands are located. With increasing CO_2 concentration, the CO_2 fertilization
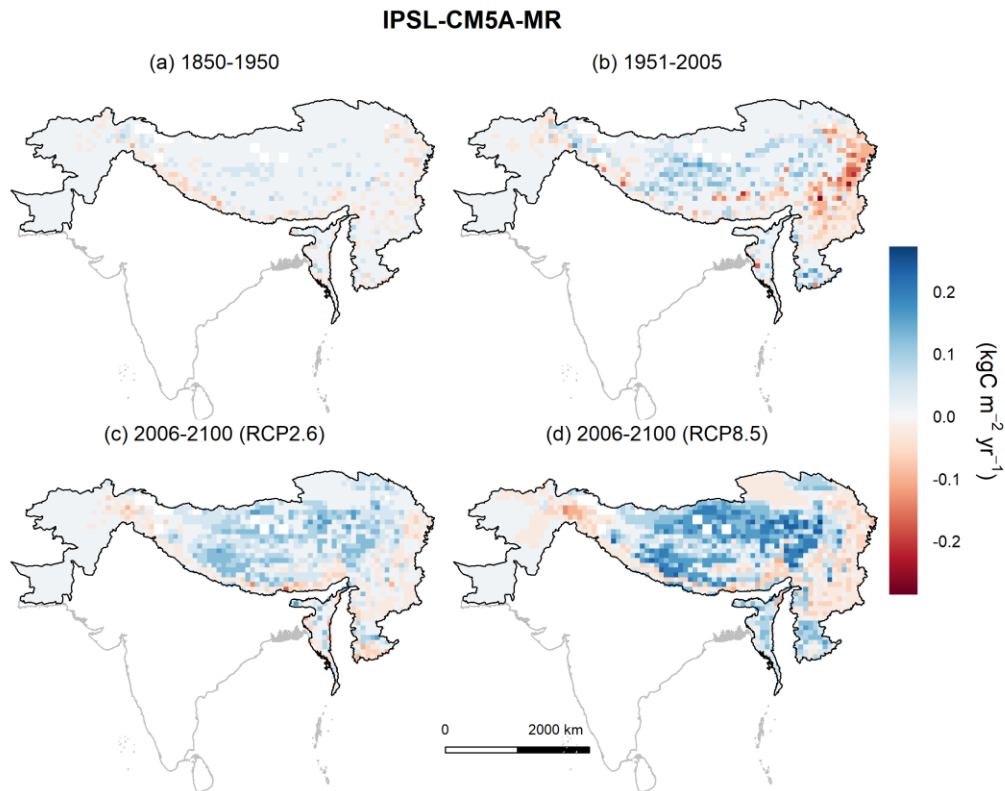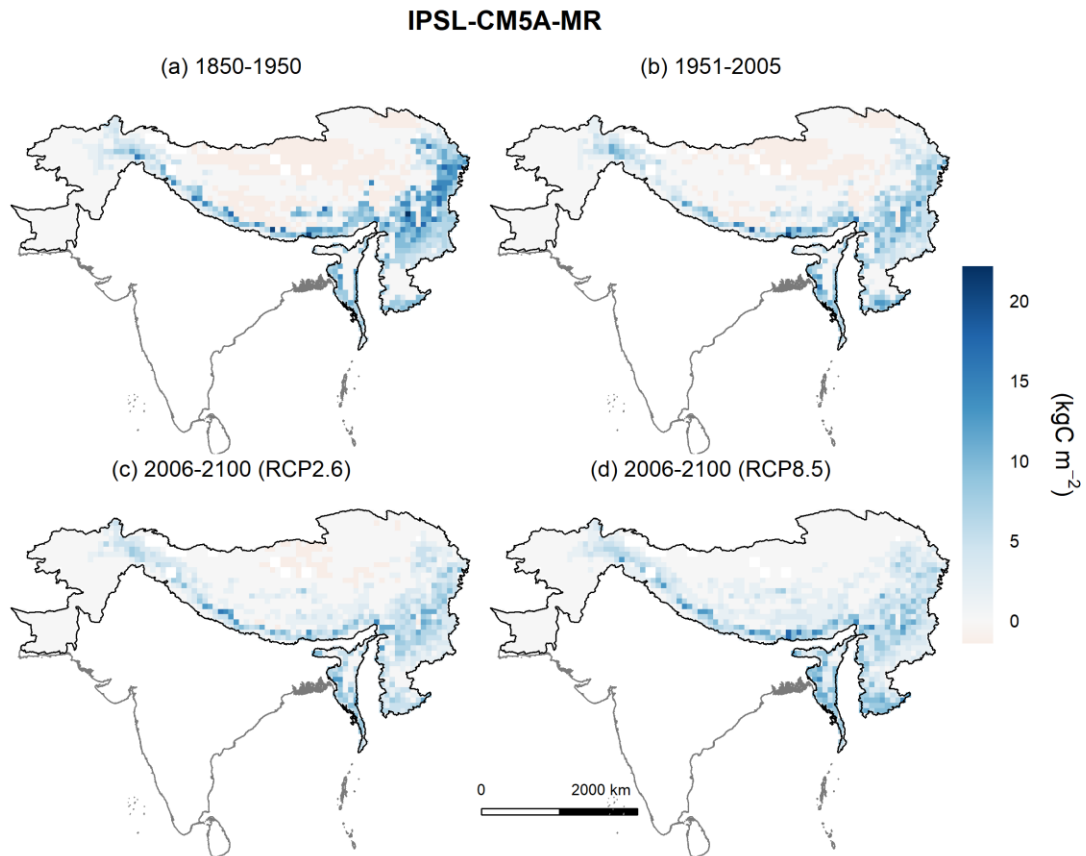

Figure S1: LPJ-GUESS simulated distribution by IPSL-CM5A-MR on NBP in HKH region under a) past period (1850-1950) b) present period (1951-2005) and future scenario under c) RCP2.6 scenario and d) RCP8.5.

MPI-ESM-LR

(a) 1850-1950   (b) 1951-2005

(c) 2006-2100 (RCP2.6)   (d) 2006-2100 (RCP8.5)
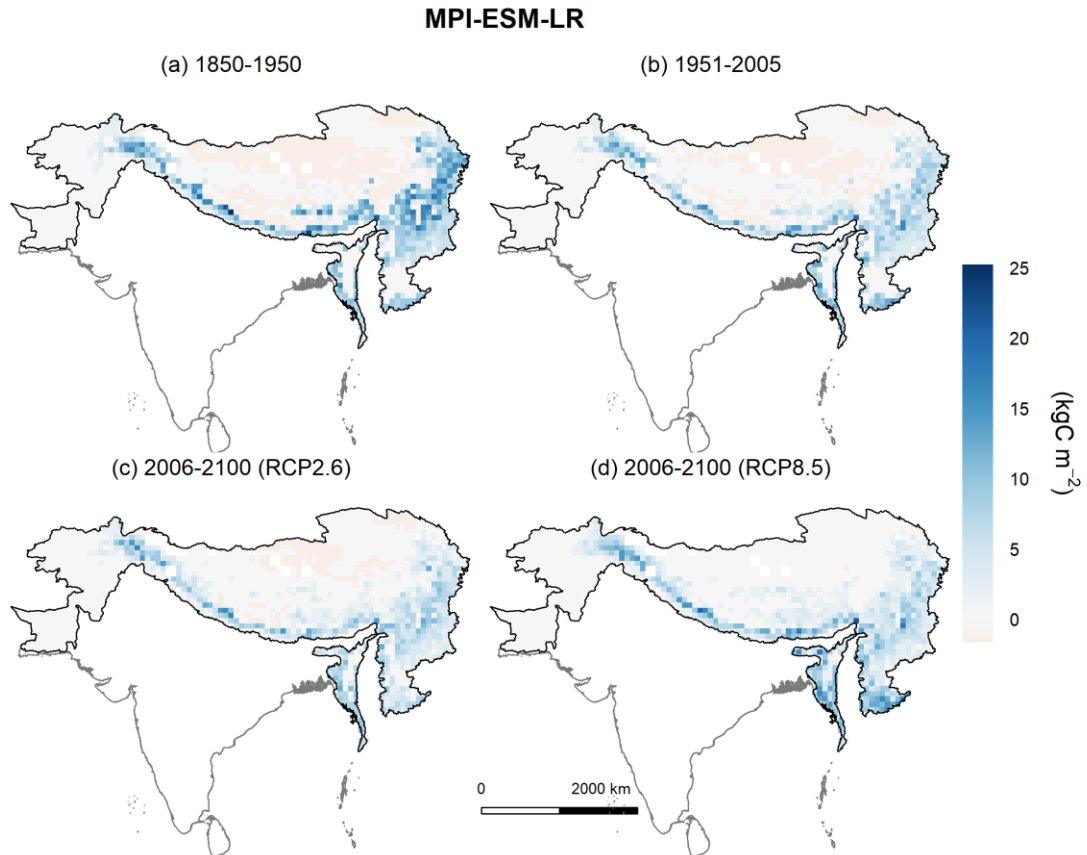
$(kgC\ m^{-2}\ yr^{-1})$
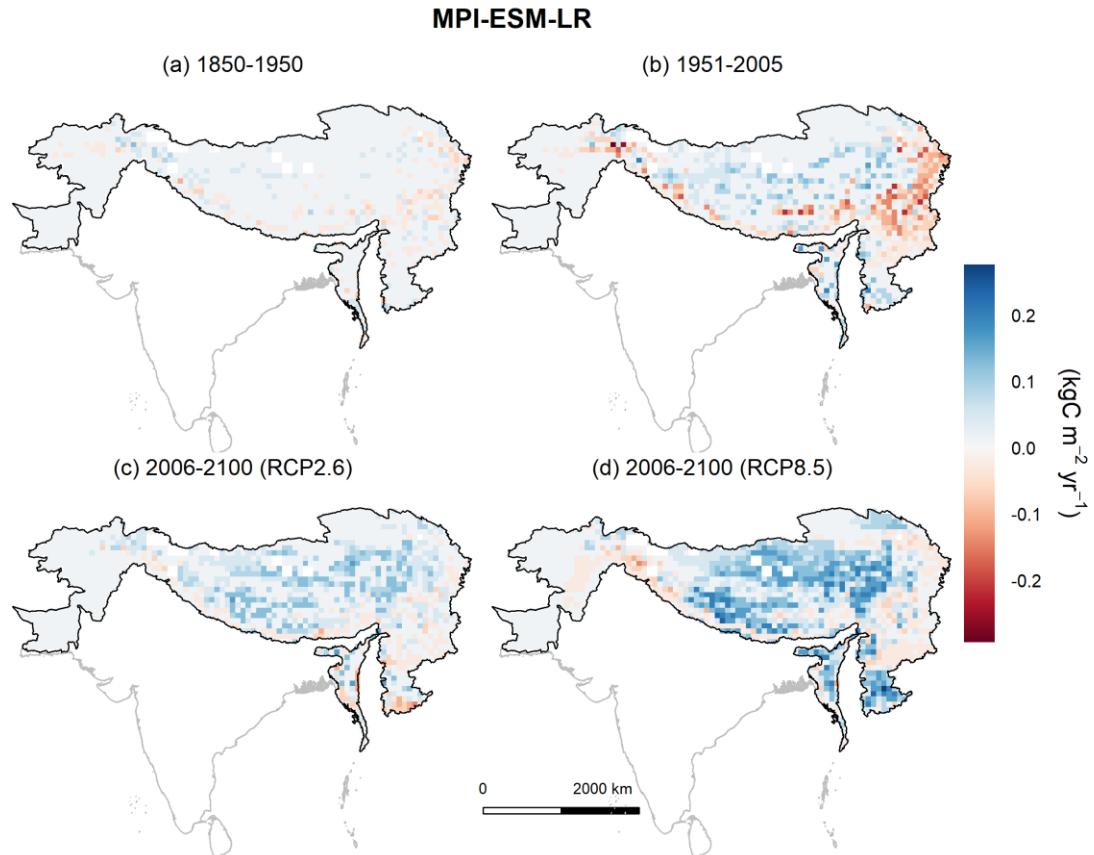
Figure S2: LPJ-GUESS simulated distribution by MPI-ESM-LR on NBP in HKH region under a) past period (1850-1950) b) present period (1951-2005) and future scenario under c) RCP2.6 scenario and d) RCP8.5.

The mean spatial VegC for IPSL-CM5A-MR was estimated to be 2.61 kg C m^{-2} from 1850-1950, and 2.10 kg C m^{-2} from 1951-2005. Under the future scenarios RCP2.6 and RCP8.5 the VegC was estimated to be 2.12 kg C m^{-2} and 2.61 kg C m^{-2} respectively (Figure S3). Furthermore, for MPI-ESM-LR, the VegC was estimated to be 2.83 kg C m^{-2} from 1850-1950 and reducing to 2.22 kg C m^{-2} from 1951-2005. Under the RCP2.6 the VegC is predicted to be 2.24 kg C m^{-2} and 2.80 kg C m^{-2} under RCP8.5 scenario.

IPSL-CM5A-MR

Figure S3. LPJ-GUESS simulated distribution by IPSL-CM5A-MR of VegC in HKH region under a) past period (1850-1950) b) present period (1951-2005) and future scenario under c) RCP2.6 scenario and d) RCP8.5.

MPI-ESM-LR

Figure S4. LPJ-GUESS simulated distribution by MPI-ESM-LR of VegC in HKH region under a) past period (1850-1950) b) present period (1951-2005) and future scenario under c) RCP2.6 scenario and d) RCP8.5.