Supplementary Material for "Assessing the hillslope-channel contributions to the catchment sediment balance under climate change"

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Text S1: Compound Manning roughness

The compound Manning roughness was obtained with the Lotter method, which is described as follows:

$$n_{\text{compound}} = \frac{PR^{5/3}}{2\frac{P_{\text{fp}}R_{\text{fp}}^{5/3}}{n_{\text{fp}}} + \frac{P_{\text{ch}}R_{\text{ch}}^{5/3}}{n_{\text{ch}}}} \tag{S1}$$

Where $P = 2h + W_{\text{fp}}$ is the wetter perimeter of the compound cross-section, $R = A/P$ is the hydraulic radius of the compound cross-section, with $A = D_{\text{ch}*W_{\text{ch}}+(h-D_{\text{ch}})*W_{\text{fp}}}$, $P_{\text{fp}} = 2(h-D_{\text{ch}})+(W_{\text{fp}}-W_{\text{ch}})/2$ the wetter perimeter of the floodplain cross-section, $R_{\text{fp}} = A_{\text{fp}}/P_{\text{fp}}$ is the hydraulic radius of the floodplain cross-section, with $A_{\text{fp}} = (h-D_{\text{ch}})*(W_{\text{fp}}-W_{\text{ch}})/2$, $P_{\text{ch}} = 2h+W_{\text{ch}}$ the wetter perimeter of the channel cross-section and $R_{\text{ch}} = A_{\text{channel}}/P_{\text{ch}}$ is the hydraulic radius of the channel cross-section, with $A_{\text{ch}} = hW_{\text{ch}}$.

Figures

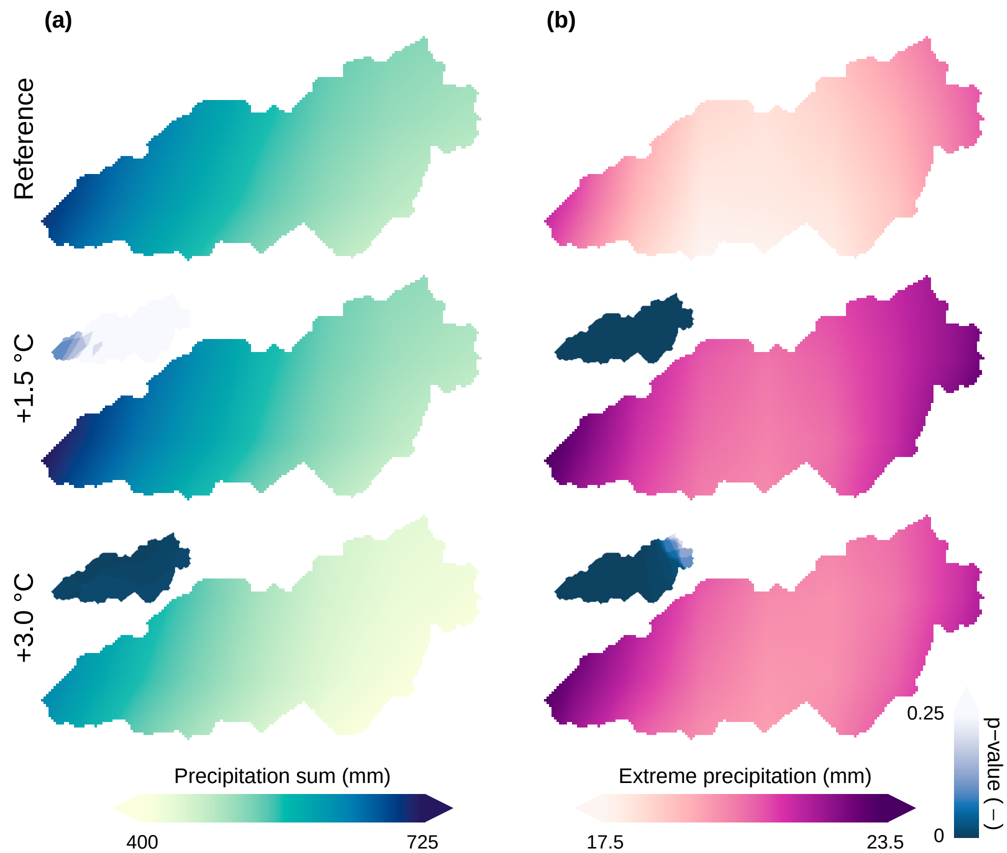

Figure S1: Precipitation projections for the Taibilla catchment, for the reference (1991-2020) scenario (upper row), the +1.5 °C scenario (middle row) and the +3.0 °C scenario (lower row). (a) Annual precipitation sum (mm) and (b) extreme precipitation (mm), as defined by the 95th percentile of daily precipitation, considering only rainy days (>1 mm day^{-1}; Jacob et al., 2014).

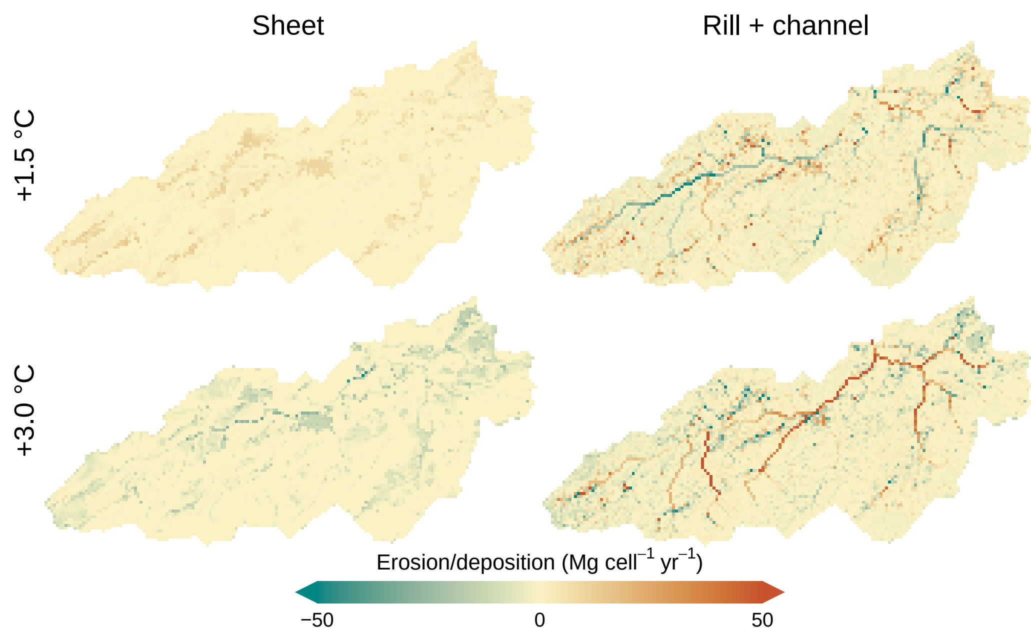

Figure S2: Model results for the Taibilla catchment, for the +1.5 °C scenario (upper row) and the +3.0 °C scenario (lower row), showing the difference between the future climate change scenarios and the reference scenario for sheet erosion (left) and rill and channel change (right; Mg cell^{-1} yr^{-1}), where blue colors indicate a decrease and red colors an increase.

Tables

Table S1: Climate model characteristics, including their corresponding future periods per temperature scenario and the nine GCM/RCM combinations.

GCM	Climate scenarios		RCM				
	+1.5 °C	+3.0 °C	CCLM[a]	HIRHAM5[b]	RACMO[c]	RCA[d]	WRF[e]
CNRM-CM5	2015-2044	2052-2081	×			×	
EC-EARTH	2012-2041	2052-2081	×	×	×	×	
IPSL-CM5A-MR	2007-2036	2039-2068					×
MPI-ESM-LR	2013-2042	2052-2081	×			×	

[a] Climate Limited-area Modelling-Community (CLMcom)

[b] Danish Meteorological Institute (DMI)

[c] Royal Netherlands Meteorological Institute (KNMI)

[d] Swedish Meteorological and Hydrological Institute (SMHI)

[e] Institut Pierre Simon Laplace (IPSL)

Table S2: Climate and hydrological indicators for the two considered periods in the Rogativa subcatchment. Extreme precipitation is defined as the 95th percentile of daily precipitation, considering only rainy days (>1 mm day^{-1}; Jacob et al., 2014). The maximum discharge is defined as the average yearly maximum discharge (m^{3}s^{-1}).

Climate/hydrological indicator	1953-1982	1991-2020
Precipitation sum (mm)	540.5	495.5 (-8.3%)
Extreme precipitation (mm)	18.8	18.6 (-0.8%)
Average discharge (m^{3}s^{-1})	0.03	0.01 (-45.2%)
Maximum discharge (m^{3}s^{-1})	0.57	0.36 (-36.6%)

References

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