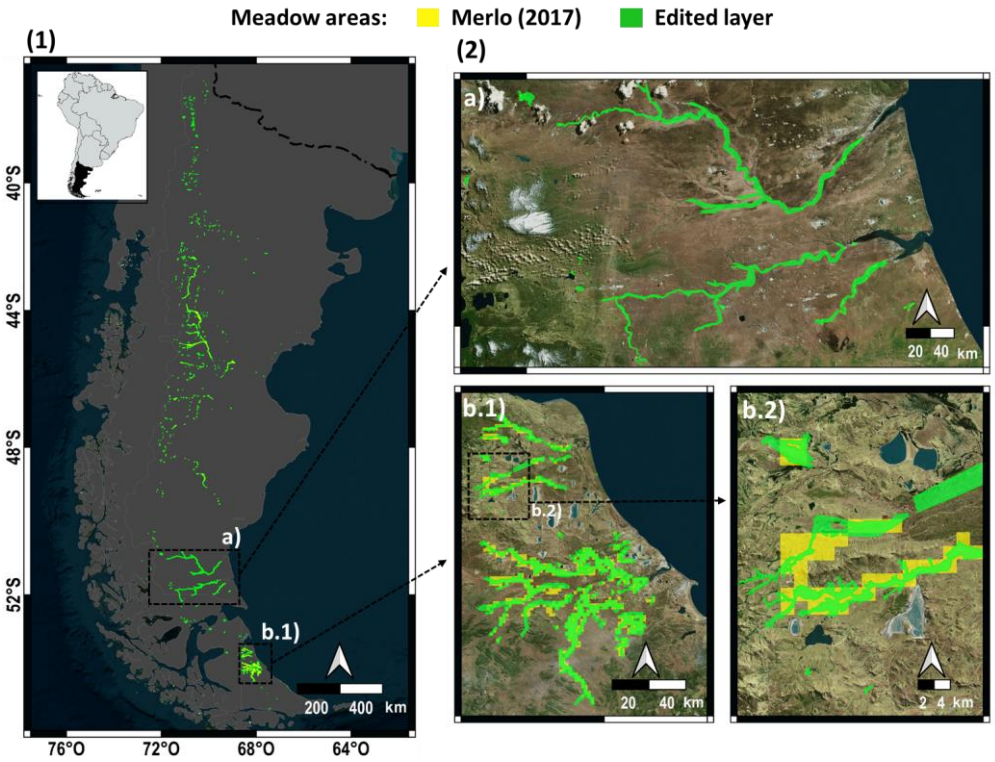


**Figure S1.** Comparison between the layer of meadow areas created by Merlo (2017; yellow polygons) [40], based on a previous classification carried out by Crego et al. (2014) [41], and the layer resulting from our edition (green polygons). Differences between both layers in Patagonia (panel 1) are exemplified in the Argentine province of Santa Cruz (panel 2, **a**), showing the incorporation of new meadow areas based on literature, and Tierra del Fuego (panel 2, **b.1** and **b.2**), showing the contrast between both layers. Boxes with dotted line correspond to areas represented in greater detail, on a smaller scale. The dashed black line in panel 1 corresponds to the Colorado River.

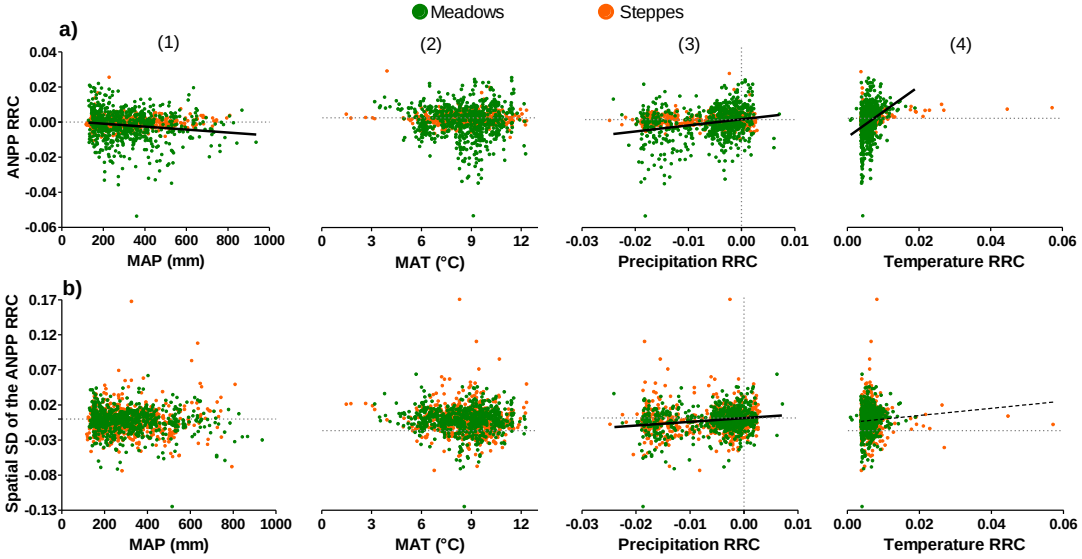


**Figure S2.** Relative rate of change (RRC) of aboveground net primary productivity (ANPP) (**a**) and RRC of spatial standard deviation of the ANPP (**b**) as a function of (**1**) mean annual precipitation (MAP); (**2**) mean annual temperature (MAT);(**3**) precipitation RRC; and (**4**) temperature RRC, in

meadows (green dots) and steppes (orange dots). Each point corresponds to an area of meadow or steppe evaluated, for the period between 2000 and 2019. The black lines represent the fit of a statistically significant linear model ($p$ value < 0.05) for meadows or both (thin dashed line means no difference between their slopes). For more detail on the models represented in this figure, see table S1. Panels **a.1**, **a.3** and **a.4** are the same ones represented in figure 5.

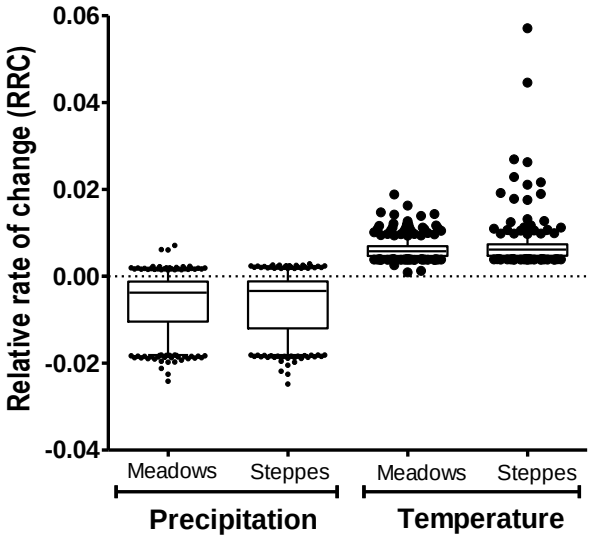


**Figure S3.** Box plot of the relative rate of change (RRC) of the precipitation and temperature registered in meadow and steppe areas for the period 2000-2019.

**Table S1.** Multiple regression models of (a) the relative rate of change (RRC) of the mean annual aboveground net primary productivity (ANPP) and (b) the RRC of the spatial standard deviation (SD) of the ANPP, depending on the type of vegetation (TVeg, either meadow or steppe), of the environmental controls, mean annual precipitation (MAP) and mean annual temperature (MAT), and their respective RRC ($RRC_{MAP}$ and $RRC_{MAT}$). The first column indicates the three types of models evaluated, from which it is represented the association of said dependent variables (a and b) with the TVeg and: (1) the MAP; (2) the MAT; (3) both standardized environmental controls (MAP_st and MAT_st); (4) the $RRC_{MAP}$; (5) the $RRC_{MAT}$; (6) with both RRC ($RRC_{MAP}$ and $RRC_{MAT}$). Models (1), (2), (4) and (5) are those represented graphically in Figure S2. For each dependent variable included in the models, the estimators, the standard error, the *p* value and the adjusted $R^2$ are informed. The intercept refers to steppe areas with no effect of the independent variables. Significant effects (*p* value < 0.05) are indicated in bold.

| Model | Independent variable | a) RRC mean annual ANPP | | | | b) RRC spatial SD ANPP | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Estimator | Standard error | *p* value | $R^2$ aj. | Estimator | Standard error | *p* value | $R^2$ aj. |
| (1) Y f MAP * TVeg | Intercept | -0.000774 | 0.000641 | 0.228 | 0.03 | -0.004181 | 0.001781 | **0.019** | 0.002 |
| | MAP | 0.000002 | 0.000002 | 0.421 | | 0.000003 | 0.000005 | 0.555 | |
| | TVeg_Meadow | 0.001664 | 0.000893 | 0.063 | | 0.004740 | 0.002482 | 0.056 | |
| | MAP * TVeg_Meadow | -0.000010 | 0.000003 | **0.000** | | -0.000014 | 0.000007 | 0.055 | |
| (2) Y f MAT * TVeg | Intercept | 0.000023 | 0.001600 | 0.989 | 0.01 | 0.003873 | 0.004409 | 0.380 | 0.0005 |
| | MAT | -0.000038 | 0.000182 | 0.835 | | -0.000819 | 0.000501 | 0.103 | |
| | TVeg_Meadow | -0.000777 | 0.002111 | 0.713 | | -0.003304 | 0.005817 | 0.570 | |
| | MAT * TVeg_Meadow | -0.000089 | 0.000241 | 0.712 | | 0.000416 | 0.000664 | 0.532 | |
| (3) Y f MAP * MAT * TVeg | Intercept | -0.000272 | 0.000270 | 0.314 | 0.05 | -0.003190 | 0.000755 | **0.000** | 0.007 |
| | MAP_st | 0.000178 | 0.000320 | 0.578 | | 0.000370 | 0.000894 | 0.679 | |
| | MAT_st | -0.000001 | 0.000308 | 0.999 | | -0.001369 | 0.000861 | 0.112 | |
| | TVeg_Meadow | -0.002435 | 0.000393 | **0.000** | | -0.000763 | 0.001099 | 0.488 | |
| | MAP_st * MAT_st | 0.000208 | 0.000410 | 0.612 | | -0.000352 | 0.001145 | 0.759 | |
| | MAP_st * TVeg_Meadow | -0.000709 | 0.000336 | **0.035** | | -0.000664 | 0.000939 | 0.479 | |
| | MAT_st * TVeg_Meadow | -0.000879 | 0.000417 | **0.035** | | -0.000352 | 0.001167 | 0.763 | |
| | MAP_st * MAT_st * TVeg_Meadow | -0.000487 | 0.000427 | 0.255 | | -0.000564 | 0.001193 | 0.636 | |
| (4) Y f $RRC_{MAP}$ * TVeg | Intercept | -0.000340 | 0.000356 | 0.340 | 0.06 | -0.002611 | 0.001000 | **0.009** | 0.02 |
| | $RRC_{MAP}$ | -0.005739 | 0.040068 | 0.886 | | 0.102268 | 0.112580 | 0.364 | |
| | TVeg_Meadow | 0.000448 | 0.000496 | 0.367 | | 0.002735 | 0.001393 | **0.050** | |
| | $RRC_{MAP}$ * TVeg_Meadow | 0.342818 | 0.056813 | **0.000** | | 0.417705 | 0.159628 | **0.009** | |
| (5) Y f $RRC_{MAT}$ * TVeg | Intercept | -0.000561 | 0.000562 | 0.319 | 0.09 | -0.006496 | 0.001613 | **0.000** | 0.01 |
| | $RRC_{MAT}$ | 0.039750 | 0.077686 | 0.609 | | 0.508699 | 0.222815 | **0.023** | |
| | TVeg_Meadow | -0.009847 | 0.001003 | **0.000** | | -0.003184 | 0.002877 | 0.269 | |
| | $RRC_{MAT}$ * TVeg_Meadow | 1.358374 | 0.150748 | **0.000** | | 0.600986 | 0.432369 | 0.165 | |
| (6) Y f $RRC_{MAP}$ * $RRC_{MAT}$ * TVeg | Intercept | -0.000738 | 0.000993 | 0.458 | 0.1 | -0.007068 | 0.002851 | **0.013** | 0.0001 |
| | RRCMAP | -0.024111 | 0.202306 | 0.905 | | -0.197426 | 0.580609 | 0.734 | |
| | RRCMAT | 0.055110 | 0.147957 | 0.710 | | 0.631104 | 0.424630 | 0.137 | |
| | TVeg_Meadow | -0.007043 | 0.001661 | **0.000** | | 0.007260 | 0.004767 | 0.128 | |
| | $RRC_{MAP}$*$RRC_{MAT}$ | 2.105369 | 40.608732 | 0.959 | | 44.541787 | 116.545281 | 0.702 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| $RRC_{MAP}$ * TVeg_Meadow | 0.195890 | 0.255047 | 0.443 | 1.213986 | 0.731973 | 0.097 |
| $RRC_{MAT}$ * TVeg_Meadow | 1.083903 | 0.246622 | **0.000** | -0.706574 | 0.707796 | 0.318 |
| $RRC_{MAP}$ * $RRC_{MAT}$ * TVeg_Meadow | -0.553675 | 50.07192 | 0.991 | -153.9343 | 143.7042 | 0.284 |