Supplementary Material

S1. Input data

Grid-cell specific input data used in this study are longitude, latitude, soil properties, climate data (precipitation, temperature, cloudiness / radiation), and planting date.

1.1. Soil parameters and data

Soil data is taken from the Harmonized World Soil Database (HWSD) v 1.2 from FAO-IIASA (Nachtergaele *et al* 2012) and the Africa soil profiles database (AfSIS) (Leenaars 2012). These data sets report the percentage sand, clay and loam in each grid cell which is used to derive the soil-type specific crop parameters in Table S3.

FAO/IIASA: For generating the HWSD database four data sets were harmonized: the European Soil Database (ESDB), the China soil map, the regional SOTER databases (SOTWIS) and the Digitized Soil Map of the World (DSMW). For Burkina Faso and all of Western Africa, the data from SOTWIS was used. The World Inventory of Soil Emission Potential database (WISE) with 4.173 African soil profiles in WISE3 (Batjes 2009) has been used to derive topsoil and subsoil parameters from pedotransfer functions. The HWSD data was aggregated to 0.5° x 0.5° resolution and then classified according to the USDA soil classification (Fig. S1). The hydraulic soil parameters from HWSD are derived as in Cosby et al. (1984). The HWSD database was developed for global or continental applications as is assumed to be less detailed than the AfSIS database.

AfSIS: The Africa soil profiles database with > 12,000 soil profiles in sub-Saharan Africa reports ~ 140 soil properties (Leenaars 2012). The AfSIS database used similar data sets as HWSD (SOTER, WISE) but added profiles from regional or national datasets. For Burkina Faso the VALPEDO-VALSOL data set with 308 soil profiles and the PEDI dataset with 227 soil profiles from the northern Sanmatenga province as produced from Wageningen University in 1995 and described in Asten & van de Pol (1996).

The bulk density (Table S3) in APSIM is estimated from the saturated water content for simulations with FAO soils as:

$$BD=(1-SAT)*2.65 \quad \text{Eq.1}$$

and from percentage sand for simulations with AfSIS soils as:

$$BD=1.5+(1{,}79-1{,}5)*\%sand/100 \quad \text{Eq.2}$$

The remaining soil parameters in APSIM and LPJmL are set to default values (Table S1 and Table S2). Many soil parameters compare well with measurements from literature: e.g. bulk densities are reported from Ouattara et al. (2007) and Zougmore et al. (2003) to be 1.53 ± 0.06 and 1.7 for a sandy loam texture (1.50-1.68 in this study) and 1.44 ± 0.99 for a sandy clay loam texture (1.57-1.68 in this study). Further Segda et al. (2004) report 1.2 ± 0.7% total organic carbon for a clay loam textured soil (0.2-0.5% in this study) and 0.9 ± 0.2% for a sandy loam textured soil (0.15-0.25% in this study).

Table S1 Default soil parameters for APSIM simulations.

Parameter / **Soil class**	Clay	Clay loam, Loam	Sandy clay loam, Sandy loam, Loamy sand
Soil organic matter and mineralization [1]			
Carbon nitrogen ratio in the soil) (-)	14.3	13.2	13.8
Proportion of initial organic C assumed to be inert in layer 1 (-)	0.28	0.31	0.42
Proportion of initial organic C assumed to be inert in layer 2 (-)	0.44	0.4	0.53
Proportion of initial organic C assumed to be inert in layer 3 (-)	0.76	0.72	0.78
Soil evaporation and runoff [2]			
CONA = Change in cumulative second stage evaporation against the square root of time (-)	5.0	3.5	3.5
U = Amount of cumulative evaporation before soil supply decreases below atmospheric demand (mm)	8.0	9.6	8.8
CN2 = Runoff response curve for average antecedent rainfall condition curve number (-)	84	72	60
Unsaturated water flow [2]			
Diffusivity constant	40	88	88
Diffusivity slope	16	35	35

[1] APSIM model documentation - Soil Modules Documentation - SoilN
[2] APSIM model documentation - Soil Modules Documentation - SoilWat

Table S2 Default soil parameters for LPJmL simulations: K_s = saturated hydraulic conductivity (mm/h).

Soil class	K_s
Clay	3.5
Clay loam	8.8
Sandy clay loam	16.0
Loam	12.2
Sandy loam	18.8
Loamy sand	50.7

Table S3 Soil parameters for APSIM and LPJmL derived from FAO/IIASA and AfSIS soil data sets: LL15 (mm/mm) = 15Bar lower limit of soil water content, permanent wilting point, DUL (mm/mm) = drained upper limit of soil water content, field capacity, SAT (mm/mm) = saturated water content, OC1 (%) = organic carbon in first layer, OC2 (%)=

organic carbon in second layer, OC3 (%) = organic carbon in third layer, BD (g/cc)= bulk density, AD (g/cc)= absolute density of the solid matter in the soil (AD = LL15 / 3).

Parameter / **Soil class**	% sand	LL15	DUL	SAT	OC1*	OC2*	OC3*	BD*	AD*
FAO									
Clay	20	0.284	0.398	0.468	0.40	0.30	0.25	1.410	0.095
Clay loam	35	0.214	0.345	0.465	0.50	0.35	0.20	1.418	0.071
Sandy clay loam	63	0.143	0.256	0.404	0.25	0.20	0.15	1.579	0.048
Loam	42	0.139	0.292	0.439	0.50	0.35	0.20	1.487	0.046
Sandy loam	65	0.100	0.228	0.434	0.25	0.20	0.15	1.500	0.033
Loamy sand	83	0.060	0.149	0.421	0.25	0.20	0.15	1.534	0.020
AfSIS									
Clay	20	0.155	0.368	0.379	0.40	0.30	0.25	1.558	0.052
Clay loam	35	0.129	0.318	0.364	0.50	0.35	0.20	1.602	0.043
Sandy clay loam	63	0.080	0.217	0.336	0.25	0.20	0.15	1.6827	0.027
Loam	42	0.117	0.293	0.357	0.50	0.35	0.20	1.6218	0.039
Sandy loam	65	0.076	0.210	0.334	0.25	0.20	0.15	1.6885	0.025
Loamy sand	83	0.045	0.140	0.316	0.25	0.20	0.15	1.7407	0.015
* only for APSIM simulations									

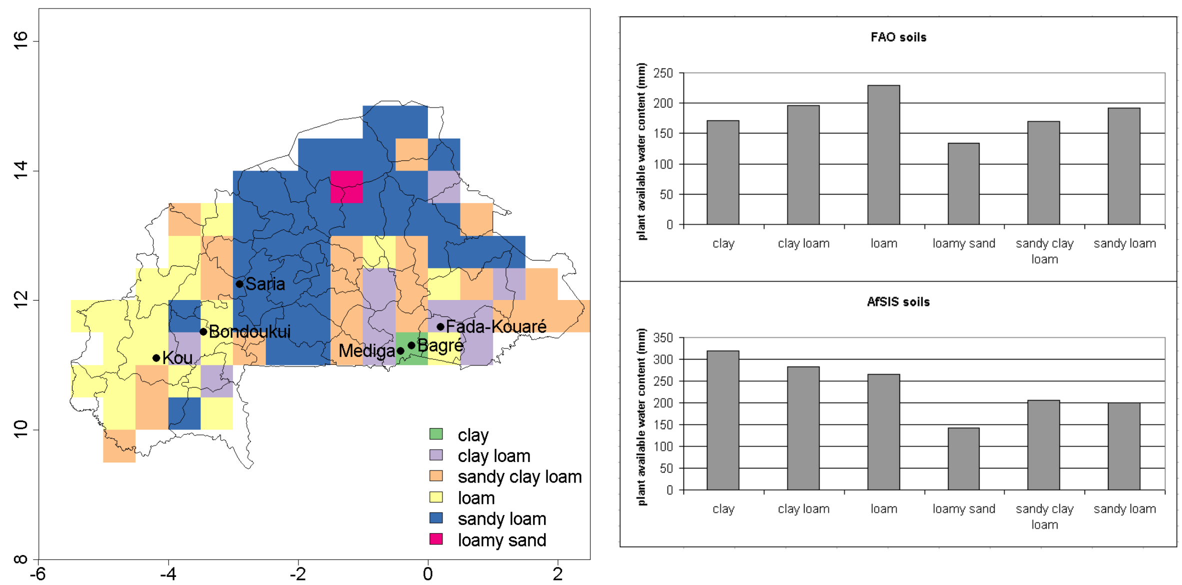


Figure S1 Soil texture classes in Burkina Faso according to the Harmonized World Soil Database (left) and plant available water content in the two soil data sets used (right). In literature a loamy sand textured topsoil was reported in Mediga (Ouedraogo *et al* 2001), a sandy loam textured topsoil in Saria (Zougmore *et al* 2003) and Bondoukui (Ouattara *et al* 2007), a sandy clay loam textured topsoil in Bondoukui and Kou (Wopereis *et al* 1999), a clay loam textured topsoil in Kou and Bagré (Segda *et al* 2004), a clay loam texture topsoil in Bagré and a topsoil with 15% clay in Fada-Kouaré (Buerkert *et al* 2000).

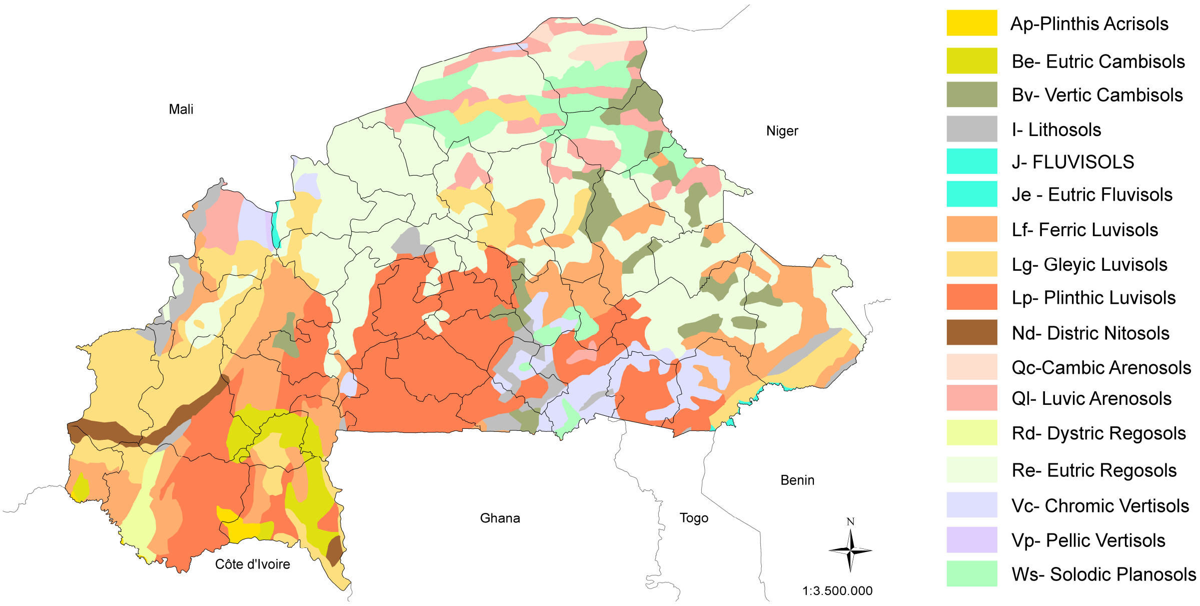


Figure S2 Dominant soil type in soil units over Burkina Faso (FAO-UNESCO Soil Map of the World version 3.6 at 1:5.000.000 scale).

1.2. Sowing dates and crop parameters

MIRCA2000: According to the global crop calendar MIRCA2000 maize in Burkina Faso grows between June and October (Portmann *et al* 2008). Accordingly the sowing date for maize is set to the 15th of June in simulations with fixed sowing dates.

Variable: For a spatial variability in sowing dates we use a sowing date rule following Dodd & Jolliffe´ (2001) conditions a and b in definition 1. Maize is sown between the 1st of May and 30th of June if a period of 5 days with cumulative rainfall of at least 25mm occurs and if the start day and at least two other days in the period are wet (at least 0.1mm rainfall). To avoid crop failure due to too early sowing a third condition is added: the soil has to be wet enough (extractable soil water > 50mm). Maize is sown at the latest on 30th of June if the three conditions above are not fulfilled earlier. This happens in 47% of all years and grid cells with WFD climate and in 50% of all years and grid cells with CRU climate.

For all simulations we aim at simulating a 110-day maize variety which is in line with the length of the growing period reported by the FAO crop calendar for different maize varieties which are grown in different agro-ecological zones in Burkina Faso (75 to 110 days). The average difference between the length of the growing period in APSIM and LPJmL in all grid cells and years is around 2 days. Table S4 shows the crop parameters used in LPJmL and APSIM simulations.

Table S4 Crop variety parameters for maize used in LPJmL: PHU = phenological heat units from sowing to maturity, T_{base} = base temperature, T_{low} and T_{up} = lower and upper limit of temperature optimum for photosynthesis, $fphu_c$: fraction of growing season 1, $flaimax_c$: fraction of plant maximal LAI 1, $fphu_k$: fraction of growing season 2, $flaimax_k$: fraction of plant maximal LAI 2, $fphu_{sen}$: fraction of growing period at which LAI starts decreasing, HI_{opt} = optimum harvest index reached at maturity, HI_{min} = minium harvest index reached at maturity.

LPJmL Parameter	Value	APSIM parameter	Value
PHU (°Cd)	2000	duration from the end of the juvenile stage to initialization (°Cd)	20
T_{base} (°C)	8	Duration from emergence to end of juvenile stage (°Cd)	365
Pathway	C4	Duration from flowering to maturity (°Cd)	740
T_{low}, T_{up} (°C)	21, 26	Head grain no max (-)	650
$fphu_c$ (-)	0.10	Grain gth rate (mm/grain/day)	10.5
$flaimax_c$ (-)	0.05	Duration from flag to flower (°Cd)	10
$fphu_k$ (-)	0.50	Duration from flowering to start grain filling(°Cd)	70
$flaimax_k$ (-)	0.95	Duration from maturity to ripening (°Cd)	1
$fphu_{sen}$ (-)	0.75		
HI_{opt} (-),HI_{min} (-)	0.50, 0.30		

1.3. Climate data

LPJmL requires daily or monthly data for the variables mean temperature, rainfall, number of wet days (monthly), cloudiness or solar radiation. APSIM climate input data is minimum and maximum daily temperatures, daily rainfall, and daily solar radiation.

WFD: The WATCH Forcing data (WFD) 1958-2001 is based on ERA-40 re-analysis data and consists of gridded sub-daily (6-hourly) data for eight variables: rainfall rate, downward longwave radiation flux, downward shortwave radiation flux, air temperature, wind speed, surface pressure, snowfall rate, specific humidity (Weedon *et al* 2011). Monthly data for air temperatures, rainfall rate and downward shortwave radiation from the Climatic Research Unit (CRU) were used for monthly bias correction. We use minimum, maximum (for APSIM) and mean (LPJmL) temperatures, mean rainfall and mean shortwave and longwave radiation as model input.

CRU TS3.0: The Climatic Research Unit (CRU) TS 3.0 data sets are gridded monthly data for the period 1901-2006 (Mitchell & Jones 2005). Daily mean temperatures and daily cloudiness for LPJmL are generated from monthly means by simple linear interpolation. Minimum and maximum temperatures for APSIM are generated using mean temperatures and diurnal temperature variation between minimum and maximum temperatures from WFD data. Daily solar radiation for APSIM is calculated from daily cloudiness. A stochastic weather generator implemented into the LPJmL model distributes monthly rainfall to the prescribed number of wet days based on a first order Markov chain and probabilities of transition between dry and wet days (Gerten *et al* 2004, Geng *et al* 1986).

Figure S2 compares annual and daily climate from CRU and WFD. Rainfall totals are slightly higher in WFD compared to CRU, while mean shortwave radiation is slightly larger in CRU and mean temperatures are very similar in both climate data sets.

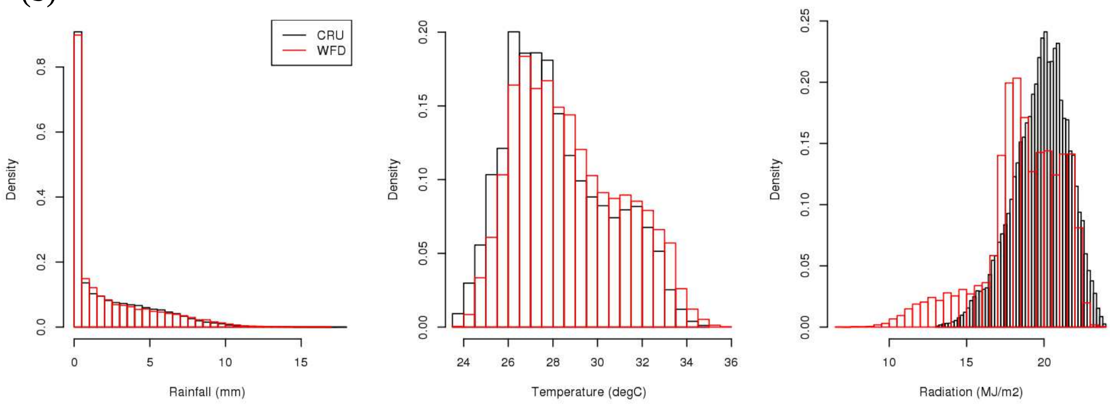
Figure S2 Annual climate (a) and probability densities for daily climate (b) from CRU and WFD climate over 1961 to 2000.

(a)	WFD mean (min-max)	CRU mean (min-max)
Annual precipitation (mm)	795 (395-1194)	777 (385-1130)
Rainy season[1] precipitation (mm)	646 (370-842)	629 (357-852)
Annual mean temperature (°C)	28.8 (27.2-30.1)	28.2 (26.6-29.6)
Annual mean shortwave radiation (MJ/m^2)	18.6 (16.0-20.2)	19.8 (16.7-22.0)[2]

[1] June to September

[2] calculated from cloudiness

(b)



1.4. Spatial and temporal variability of input data

Table S5 Spatial and temporal coefficient of variation of soil, climate and management input data as shown in Fig. 3B and Fig. 5B: PAWC = plant available water capacity (DUL-LL15*1500 mm), OC = organic carbon in the first soil layer, S.date = sowing date, P = precipitation, T = temperature, S = solar radiation.

Data set	FAO		AfSIS		Variable	MIRCA	CRU			WFD		
Variable	PAWC	OC	PAWC	OC	S.date	S.date	P	T	S	P	T	S
Spatial	0.11	0.35	0.16	0.35	0.09	0.00	0.34	0.02	0.07	0.35	0.02	0.05
Temporal	-	-	-	-	0.03	0.00	0.12	0.01	0.01	0.12	0.01	0.01

S2. Agricultural statistics

2.1. Observed temporal and spatial variability in maize yields

FAOstat provides national data on area harvested, yield, production quantity and seed for 252 countries, 172 agricultural goods and 51 years (1961-2011). Maize yields vary around a mean yield of ~0.7t/ha between 1961 and 1983, and then double from 0.74 t/ha in 1987 to

1.68 t/ha in 1991 (Table S6, Figure S3). This step corresponds with an increase of research expenditures between 1987 and 1991 in Burkina Faso (Stads and Kaboré 2010) related to a World Bank funded National Agricultural Research Project which amounted to a five billion CFA loan (~ ten million US $) for the period 1989-94 (Mazzucato 1994). After 1991 maize yield vary around a mean yield of ~1.5 t/ha (Figure S3).

Table S6 Comparison of FAOstat and CountryStat maize yields, production and area in Burkina Faso 1984-2000.

Year	**FaoStat**			**CountryStat** [1]		
	Yield	**Production**	**Area**	**Yield** [2]	**Production**	**Area**
1984	0,64	77399	120783	0,70	82888	118922
1985	0,99	141782	143069	0,96	132724	138079
1986	0,94	154960	165070	0,97	155781	160474
1987	0,74	130502	176156	0,87	191699	221222
1988	0,82	226715	276668	1,08	255762	235991
1989	1,16	256913	221034	1,16	256916	221047
1990	1,46	257900	176500	1,46	257900	176500
1991	1,69	315100	186800	1,69	315100	186800
1992	1,52	342700	224900	1,52	342700	224900
1993	1,37	270723	197298	1,37	270723	197299
1994	1,60	350315	218367	1,60	350314	218367
1995	1,14	212493	185731	1,14	212493	185731
1996	1,55	293707	189235	1,55	293707	189235
1997	1,52	366467	241333	1,52	366467	241333
1998	1,39	377758	271405	1,39	377758	271405
1999	1,62	468948	288745	1,62	468948	288745
2000	1,75	423494	241401	1,31	315773	241401
1991-2000	**1,52**	**342171**	**224522**	**1,47**	**331398**	**224522**

[1] Production statistics on sub-national level are available from 1984-2012 on administrative level 1 (region) and from 1993-2012 on administrative level 2 (province). Area statistics on sub-national level are only available on administrative level 2 from 1993-2012.

[2] Calculated from production and area statistics on administrative level 1 for 1984-1992 and from production and area statistics on administrative level 2 for 1993-2001.

For the whole time series 1961 to 2000 there is a detectable trend (Figure S3) largely induced by gains in the late 1980s/early 1990s but also by long-term changes in technology, management, innovations and policy which are not simulated by the crop models. We remove this trend using singular spectrum analysis (SSA) (Hassani 2007).The R package RSSA (Korobeynikov et al. 2014) provides tools for decomposing a time series into its trend, periodic and noise components. Fitting a non-linear trend to the time series gave slightly better results (sum of squared residuals=1.09) than fitting a linear trend (sum of squared residuals=1.62).

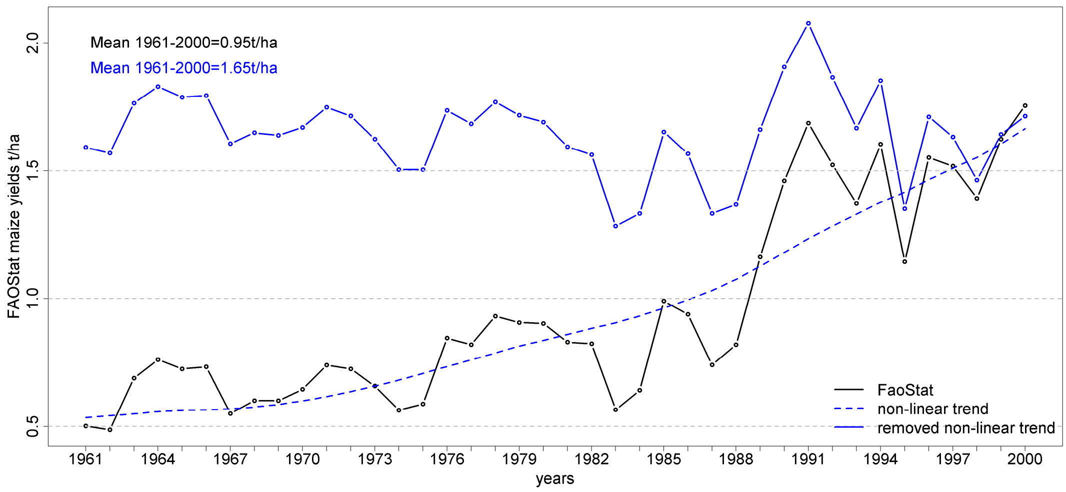


Figure S3 Time series of mean national maize yields in Burkina Faso (black line) and detrended maize yields used for comparison to model simulations (blue line). For calculating the non-linear trend the window length L was set to 20 which is half the length of the time series (N=40).

FAO also provides sub-national agricultural statistics (crop area and production) for the time period 1993 to 2012 (CountrySTAT Burkina Faso 2013b, 2013a) (Table S6, Figure S4).

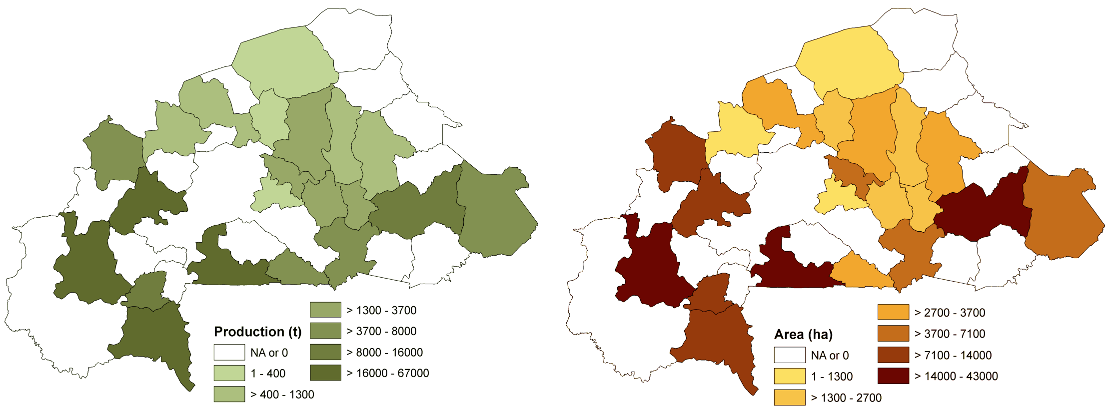


Figure S4 Maps of sub-national maize production (left) and maize area (right) in Burkina Faso in 2000.

For comparison to simulated maize yields from the two crop models we disaggregate province-level rainfed maize areas and production in each year to grid cell production, area and yield. We overlaid a 0.5° x 0.5° grid on the sub-national maize production and maize area maps (Figure S4) using the “extract” function in the R package “raster”. The function returns the fraction $F_{c,p}$ of the grid cell c´s area that is covered by a province p, rounded to two decimal places. A cell is covered if its center lies inside the province.

From $F_{c,p}$ of all grid cells covered by a province p we then determine the fraction $F_{p,c}$ of the grid cells area on the total province area.

$$F_{p,c} = \frac{F_{c,p}}{\sum_{c \in p} F_{c,p}}$$

The grid-cell maize area A_c and grid-cell maize production P_c are calculated from these fractions and the province´ maize area (A_p) and production (P_c) as:

$$A_c = \sum_{p \in c} A_p \times F_{p,c} \text{ and } P_c = \sum_{p \in c} P_p \times F_{p,c}$$

S3. Taylor diagram for temporal variability

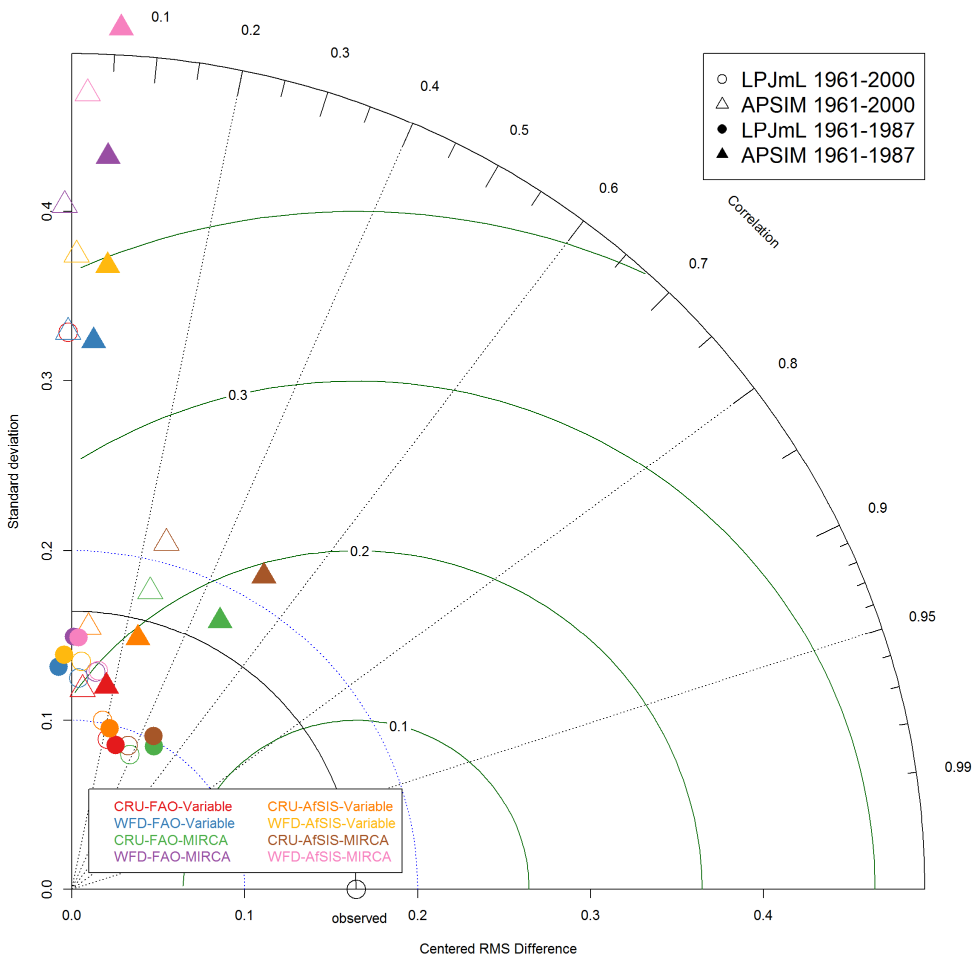


Figure S5 As Figure 6 in the main text but showing all simulations. Taylor diagram displaying a statistical comparison with observations of 16 model estimates (two crop models by eight input data sets) of the mean national maize yields in 1961-2000 (unfilled) and 1961-1987 (filled symbols). The closer the colored symbols to the unfilled circle on the x-axes the higher the correlation and the smaller the root mean square error. The solid green and dotted blue contours indicate the centered root-mean-square (RMS) difference and the standard deviation respectively between simulations and observations.

S4. Simulated national maize yields

Table S7 Simulated national-mean maize yields in Burkina Faso 1961-2000.

	APSIM								LPJmL							
Year	CRU-FAO-Variable	WFD-FAO-Variable	CRU-FAO-MIRCA	WFD-FAO-MIRCA	CRU-AfSIS-Variable	WFD-AfSIS-Variable	CRU-AfSIS-MIRCA	WFD-AfSIS-MIRCA	CRU-FAO-Variable	WFD-FAO-Variable	CRU-FAO-MIRCA	WFD-FAO-MIRCA	CRU-AfSIS-Variable	WFD-AfSIS-Variable	CRU-AfSIS-MIRCA	WFD-AfSIS-MIRCA
1961	1,34	1,35	1,33	1,38	1,63	1,64	1,63	1,63	1,74	1,49	1,70	1,42	1,68	1,47	1,64	1,38
1962	1,44	0,80	1,54	0,96	1,68	0,99	1,80	1,13	1,62	1,27	1,64	1,27	1,52	1,17	1,56	1,19
1963	1,41	0,68	1,23	0,74	1,70	0,88	1,50	0,97	1,64	1,24	1,64	1,40	1,58	1,19	1,55	1,34
1964	1,39	0,89	1,48	1,26	1,68	1,09	1,82	1,51	1,76	1,37	1,81	1,33	1,68	1,31	1,76	1,28
1965	1,19	1,26	1,28	1,28	1,47	1,51	1,55	1,54	1,71	1,48	1,73	1,48	1,62	1,45	1,64	1,45
1966	1,30	0,86	1,25	0,78	1,53	1,00	1,48	0,95	1,54	1,37	1,52	1,40	1,45	1,30	1,44	1,34
1967	1,41	1,31	1,29	0,16	1,67	1,48	1,51	0,23	1,69	1,34	1,61	1,26	1,62	1,29	1,54	1,21
1968	1,20	1,36	1,68	1,71	1,38	1,57	1,97	1,99	1,53	1,42	1,70	1,41	1,43	1,36	1,64	1,37
1969	1,46	0,98	1,25	0,28	1,76	1,21	1,51	0,36	1,68	1,43	1,62	1,37	1,60	1,38	1,54	1,31
1970	1,08	0,59	1,29	0,41	1,36	0,75	1,60	0,49	1,59	1,13	1,62	0,94	1,51	1,09	1,56	0,89
1971	1,31	1,15	1,28	0,13	1,56	1,33	1,51	0,13	1,65	1,23	1,61	1,16	1,57	1,19	1,53	1,11
1972	1,18	0,57	1,54	0,94	1,34	0,73	1,79	1,10	1,55	1,35	1,55	1,33	1,43	1,29	1,46	1,29
1973	1,13	0,40	1,05	0,15	1,33	0,47	1,24	0,19	1,47	1,06	1,44	0,92	1,39	1,03	1,36	0,88
1974	1,31	1,39	1,26	0,40	1,64	1,63	1,53	0,56	1,72	1,49	1,59	1,35	1,66	1,44	1,52	1,29
1975	1,19	0,47	1,34	1,06	1,45	0,70	1,67	1,31	1,69	1,25	1,74	1,36	1,61	1,18	1,67	1,33
1976	1,14	0,57	1,52	0,66	1,37	0,71	1,82	0,75	1,57	1,16	1,68	1,19	1,46	1,08	1,60	1,14
1977	1,10	0,44	1,20	0,68	1,33	0,58	1,43	0,83	1,55	1,15	1,55	1,08	1,47	1,08	1,48	1,02
1978	1,36	0,89	1,61	1,50	1,63	1,00	1,90	1,71	1,58	1,15	1,68	1,26	1,50	1,06	1,63	1,21
1979	1,21	1,05	1,56	1,24	1,45	1,31	1,85	1,59	1,65	1,40	1,71	1,38	1,57	1,34	1,66	1,33
1980	1,27	0,22	1,41	0,25	1,49	0,31	1,67	0,27	1,58	1,10	1,64	0,97	1,50	1,02	1,57	0,94
1981	1,29	0,47	1,43	0,75	1,49	0,53	1,69	0,88	1,59	1,11	1,63	1,14	1,52	1,05	1,57	1,11
1982	1,32	0,85	1,21	1,04	1,49	0,95	1,40	1,14	1,50	1,24	1,48	1,21	1,43	1,20	1,40	1,18
1983	1,41	0,92	1,18	0,91	1,62	1,09	1,32	1,08	1,59	1,36	1,56	1,30	1,52	1,30	1,49	1,25
1984	0,98	0,46	0,94	0,85	1,12	0,52	1,10	0,98	1,39	1,28	1,36	1,28	1,30	1,20	1,28	1,23
1985	1,34	0,79	1,11	1,31	1,63	1,05	1,33	1,57	1,77	1,50	1,70	1,42	1,72	1,47	1,65	1,39
1986	1,18	1,02	1,49	1,22	1,32	1,24	1,78	1,49	1,57	1,43	1,65	1,38	1,47	1,35	1,59	1,33
1987	1,14	0,84	1,07	0,84	1,34	1,00	1,28	0,99	1,56	1,27	1,51	1,26	1,50	1,19	1,45	1,20

	APSIM								LPJmL							
Year	CRU-FAO-Variable	WFD-FAO-Variable	CRU-FAO-MIRCA	WFD-FAO-MIRCA	CRU-AfSIS-Variable	WFD-AfSIS-Variable	CRU-AfSIS-MIRCA	WFD-AfSIS-MIRCA	CRU-FAO-Variable	WFD-FAO-Variable	CRU-FAO-MIRCA	WFD-FAO-MIRCA	CRU-AfSIS-Variable	WFD-AfSIS-Variable	CRU-AfSIS-MIRCA	WFD-AfSIS-MIRCA
1988	1,38	1,43	1,25	1,00	1,66	1,70	1,51	1,19	1,71	1,50	1,64	1,36	1,65	1,48	1,58	1,33
1989	1,25	0,92	0,88	0,37	1,55	1,27	1,08	0,54	1,75	1,41	1,61	1,28	1,71	1,39	1,54	1,24
1990	1,05	0,69	1,34	0,90	1,21	0,81	1,51	1,12	1,53	1,46	1,56	1,35	1,43	1,40	1,49	1,30
1991	1,21	0,86	1,38	0,73	1,35	1,08	1,61	1,03	1,55	1,32	1,64	1,36	1,47	1,23	1,56	1,31
1992	1,15	0,92	1,29	1,34	1,35	1,12	1,56	1,57	1,68	1,41	1,70	1,34	1,59	1,36	1,64	1,30
1993	1,38	0,79	1,23	0,30	1,58	0,96	1,42	0,39	1,63	1,42	1,59	1,32	1,57	1,39	1,53	1,27
1994	1,37	1,49	1,16	1,18	1,69	1,75	1,39	1,43	1,75	1,45	1,65	1,40	1,69	1,42	1,58	1,36
1995	1,08	0,98	1,42	1,16	1,28	1,16	1,65	1,40	1,50	1,37	1,56	1,28	1,40	1,28	1,49	1,21
1996	1,17	0,97	1,22	0,36	1,31	1,16	1,37	0,46	1,55	1,37	1,53	1,27	1,45	1,29	1,43	1,21
1997	1,15	0,69	1,69	1,11	1,34	0,86	1,92	1,27	1,56	1,33	1,62	1,22	1,46	1,25	1,53	1,15
1998	1,14	0,67	1,24	1,21	1,30	0,81	1,47	1,42	1,43	1,25	1,56	1,27	1,35	1,18	1,50	1,23
1999	1,27	1,58	1,14	0,84	1,51	1,82	1,34	1,06	1,60	1,52	1,52	1,38	1,54	1,49	1,46	1,34
2000	1,31	0,52	1,41	0,94	1,54	0,64	1,64	1,14	1,68	1,42	1,72	1,40	1,59	1,36	1,65	1,35
Mean	1,25	0,88	1,31	0,86	1,48	1,06	1,55	1,04	1,61	1,33	1,61	1,29	1,53	1,28	1,54	1,24

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