Supplemental Material

Journal of Hydrometeorology
Development of a Daily Multilayer Cropland Soil Moisture Dataset for China Using Machine Learning and Application to Cropping Patterns
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Supplemental Material

Title: Development of a daily multi-layer cropland soil moisture dataset for China using machine learning and application to cropping patterns

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This Supplemental Material includes five supporting figures.

1 Supplemental figures

Figure S1 Distribution of agro-meteorological stations with different cropping patterns (1: winter wheat + fallow, 2: winter wheat + maize, 3: winter wheat + cotton, 4: winter wheat + rapeseed/potato/soybean, 5: spring wheat + potato/cotton/fallow, 6: spring maize + soybean, 7: spring maize + cotton/potato/fallow, 8: rapeseed + cotton/potato/fallow, 9: pasture, 10: fallow + maize, 11: fallow + soybean, 12: fallow + potato/cotton, 13: sugarcane + fallow, 14: fallow, 0: others).

Figure S2 Area fraction of rainfed cropland in each of 0.25-degree pixel, and that of each main crop in their total rainfed cropland area: a) rainfed cropland area fraction per pixel; b) rainfed area fraction of the six main crops (wheat, maize, soybean, potato, rapeseed and cotton) out of all crops; c) area fraction of wheat out of the six main crops; d) area fraction of maize out of the six main crops; e) area fraction of soybean out of the six main crops; f) area fraction of potato out of the six main crops; g) area fraction of rapeseed out of the six main crops; h) area fraction of cotton out of the six main crops. Note that the red dots on top of the map represent the areas where cropland area fraction is larger than 0.5.

Figure S3 Cropping pattern-specific annual SM trend during 1981-2013 for 0-10cm soil layer (ww = winter wheat, fl = fallow, mz = maize, sw = spring wheat, ct = cotton, pt = potato, rs = rapeseed, sb = soybean). Note that the number of N on top of each box indicates the total number of agro-meteorological stations for each cropping pattern in our collected measurements.

Figure S4 Spatial pattern of magnitude and trend of annual precipitation and air temperature during 1981-2013: a) annual precipitation; b) trend of annual precipitation; c) annual air temperature; and d) trend of annual air temperature.

Figure S5 Spatial distribution of soil properties across the cropland of China: a) PH; b) sand percentage; c) silt percentage; d) clay percentage; e) bulk density; and f) porosity.

Figure S1

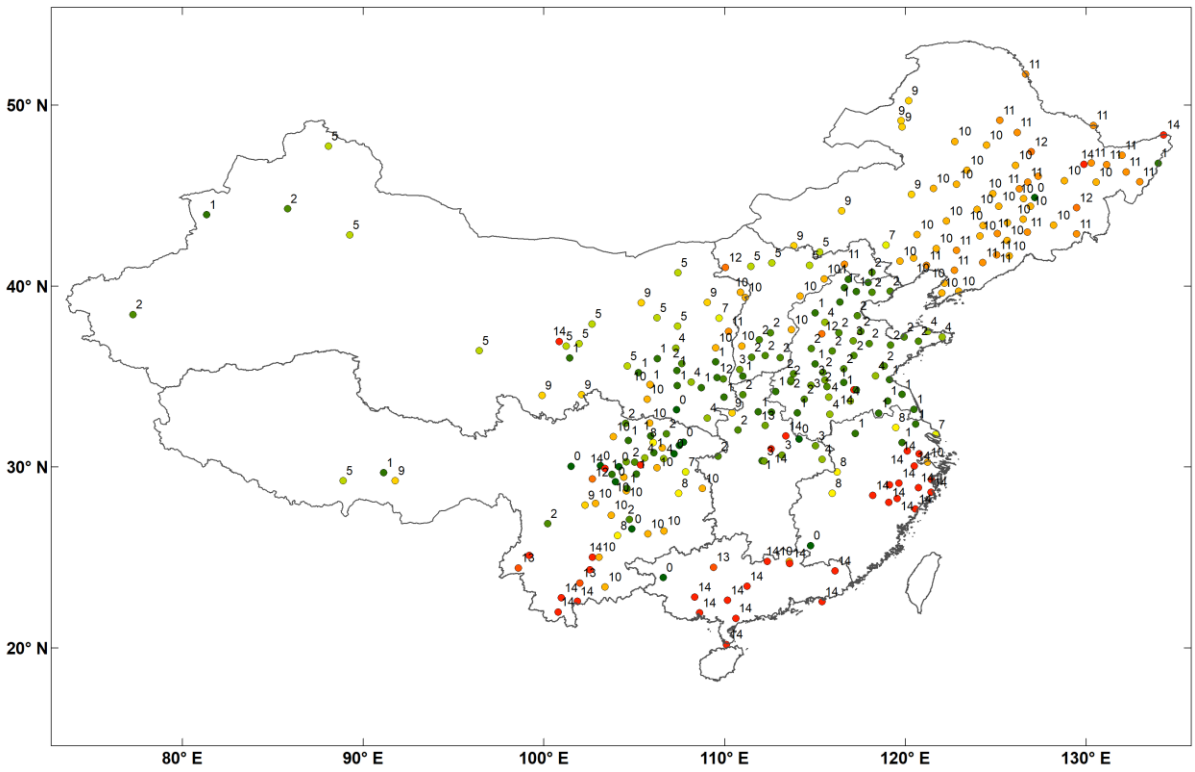


Figure S2

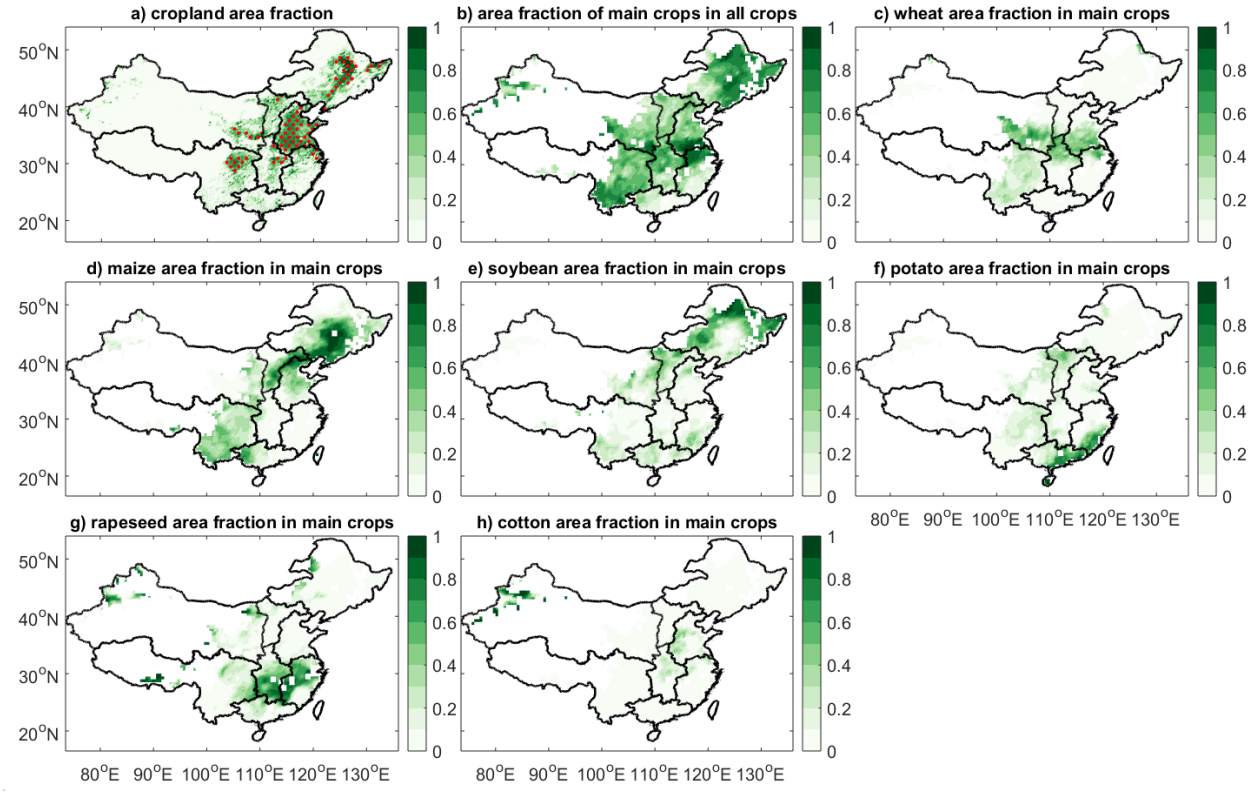

a) cropland area fraction
b) area fraction of main crops in all crops
c) wheat area fraction in main crops
d) maize area fraction in main crops
e) soybean area fraction in main crops
f) potato area fraction in main crops
g) rapeseed area fraction in main crops
h) cotton area fraction in main crops
50°N
40°N
30°N
20°N
80°E 90°E 100°E 110°E 120°E 130°E
1
0.8
0.6
0.4
0.2
0

Figure S3

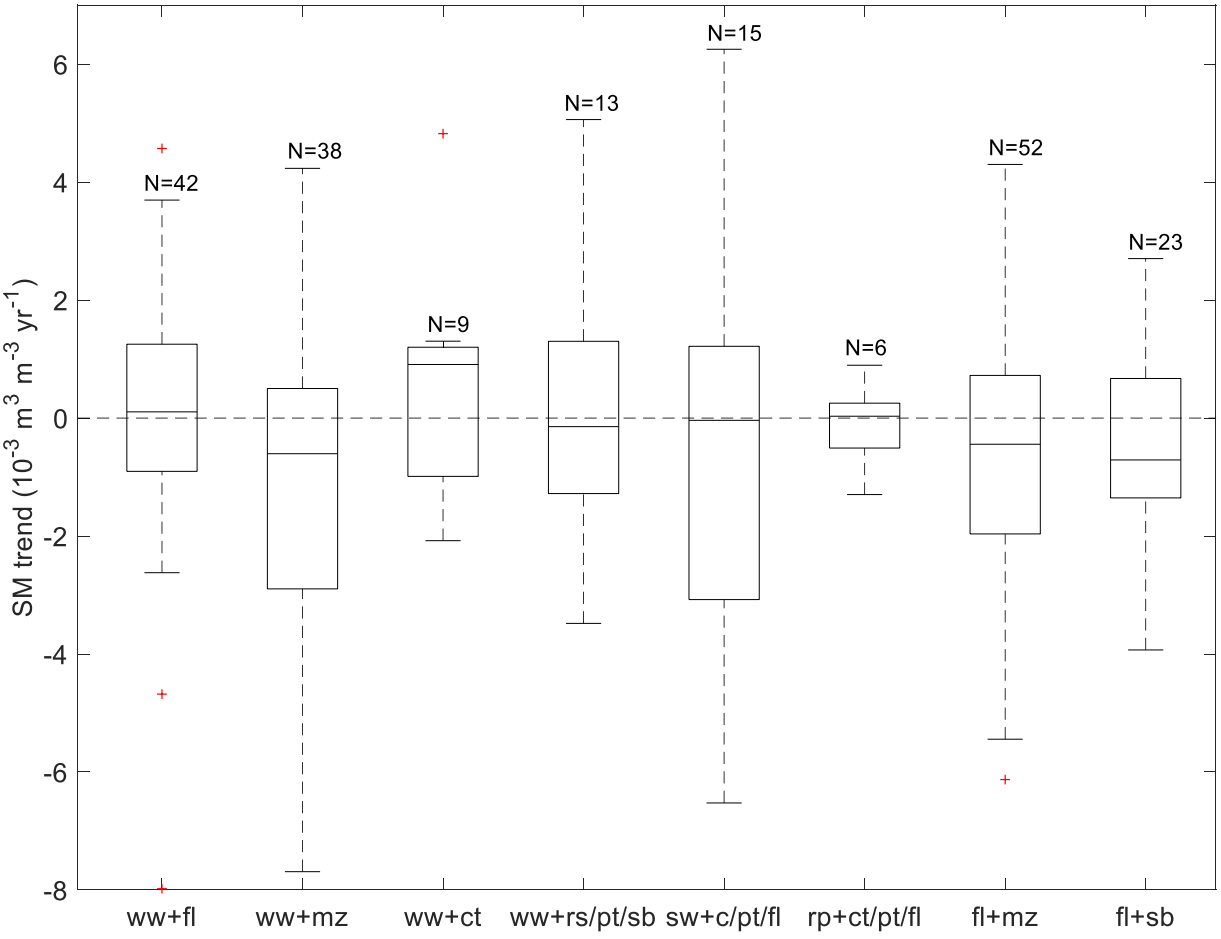

N=42
N=38
N=9
N=13
N=15
N=6
N=52
N=23
6
4
2
0
-2
-4
-6
-8
SM trend (10^{-3} m^3 m^{-3} yr^{-1})
ww+fl
ww+mz
ww+ct
ww+rs/pt/sb
sw+c/pt/fl
rp+ct/pt/fl
fl+mz
fl+sb

Figure S4

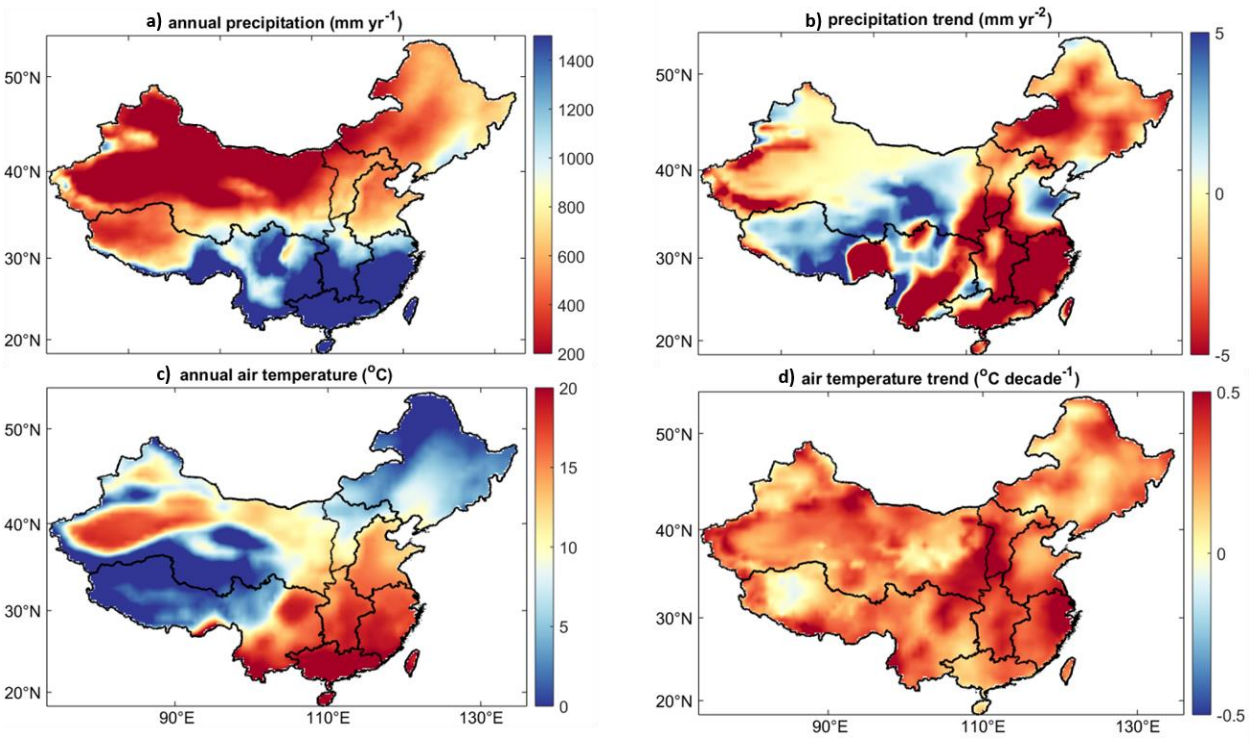
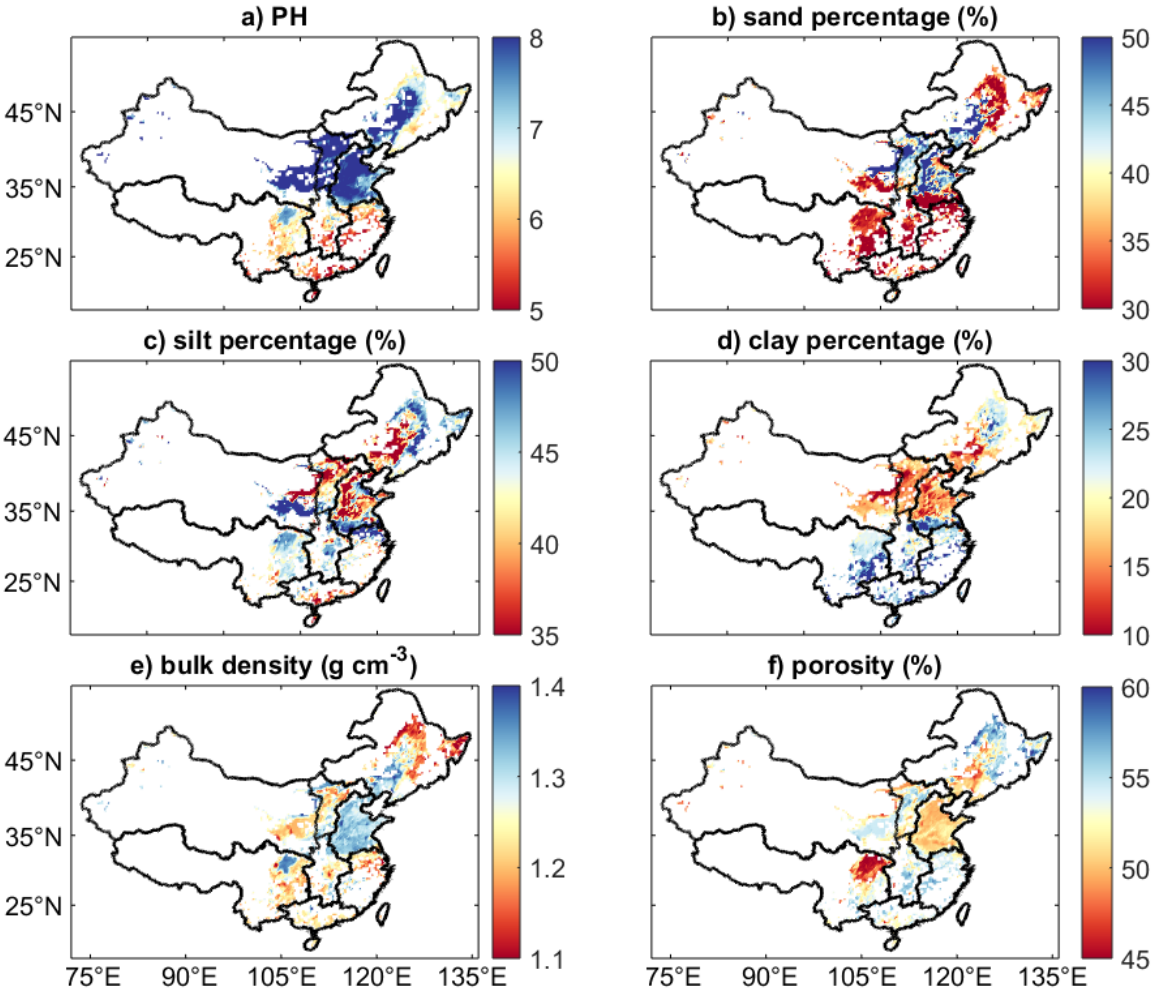

a) annual precipitation (mm yr-1)
b) precipitation trend (mm yr-2)
c) annual air temperature (°C)
d) air temperature trend (°C decade-1)
50°N
40°N
30°N
20°N
90°E
110°E
130°E
1400
1200
1000
800
600
400
200
5
0
-5
20
15
10
5
0
0.5
0
-0.5

Figure S5


a) PH
b) sand percentage (%)
c) silt percentage (%)
d) clay percentage (%)
e) bulk density (g cm-3)
f) porosity (%)
45°N
35°N
25°N
75°E
90°E
105°E
120°E
135°E
8
7
6
5
50
45
40
35
30
25
20
15
10
1.4
1.3
1.2
1.1
60
55