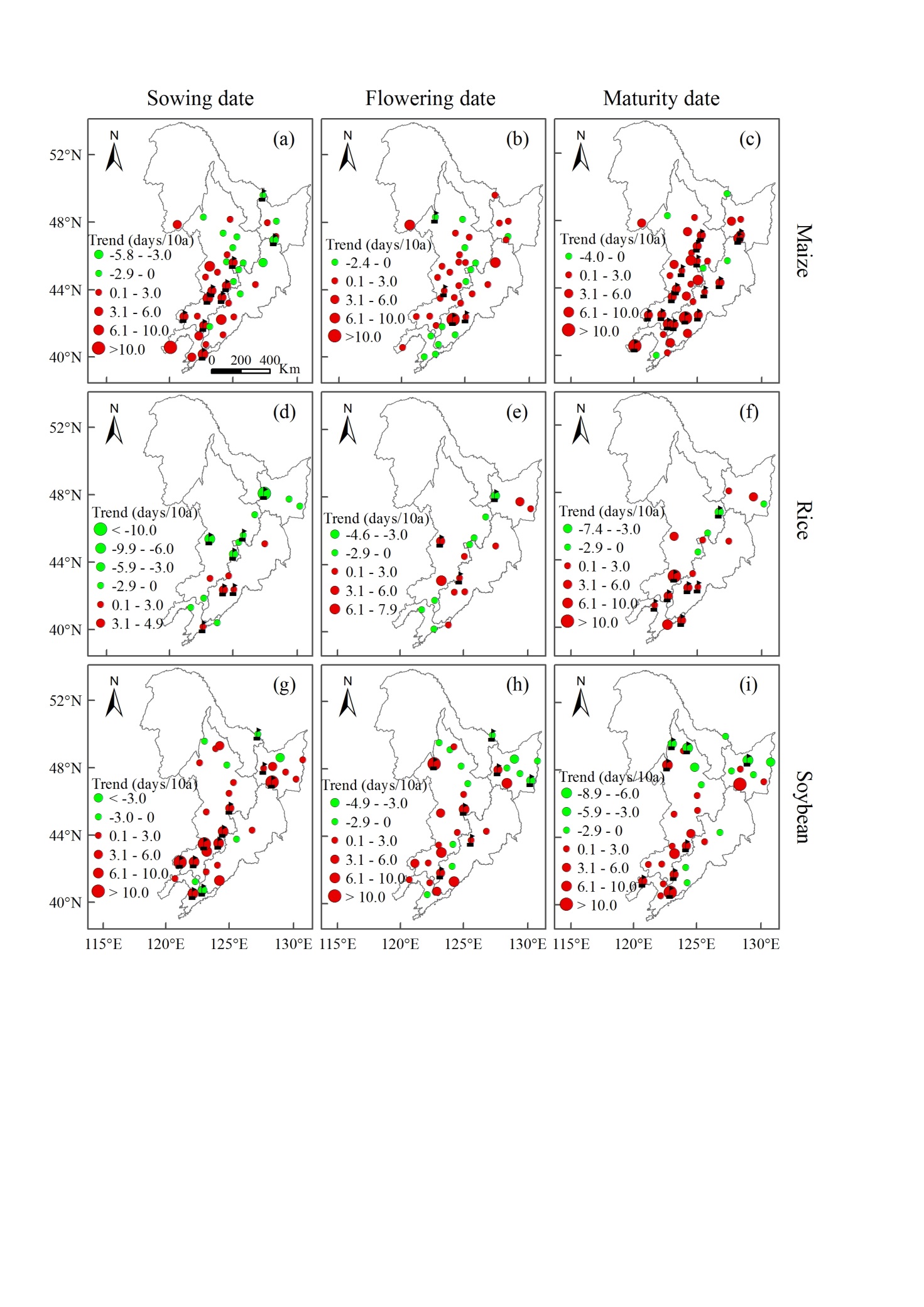
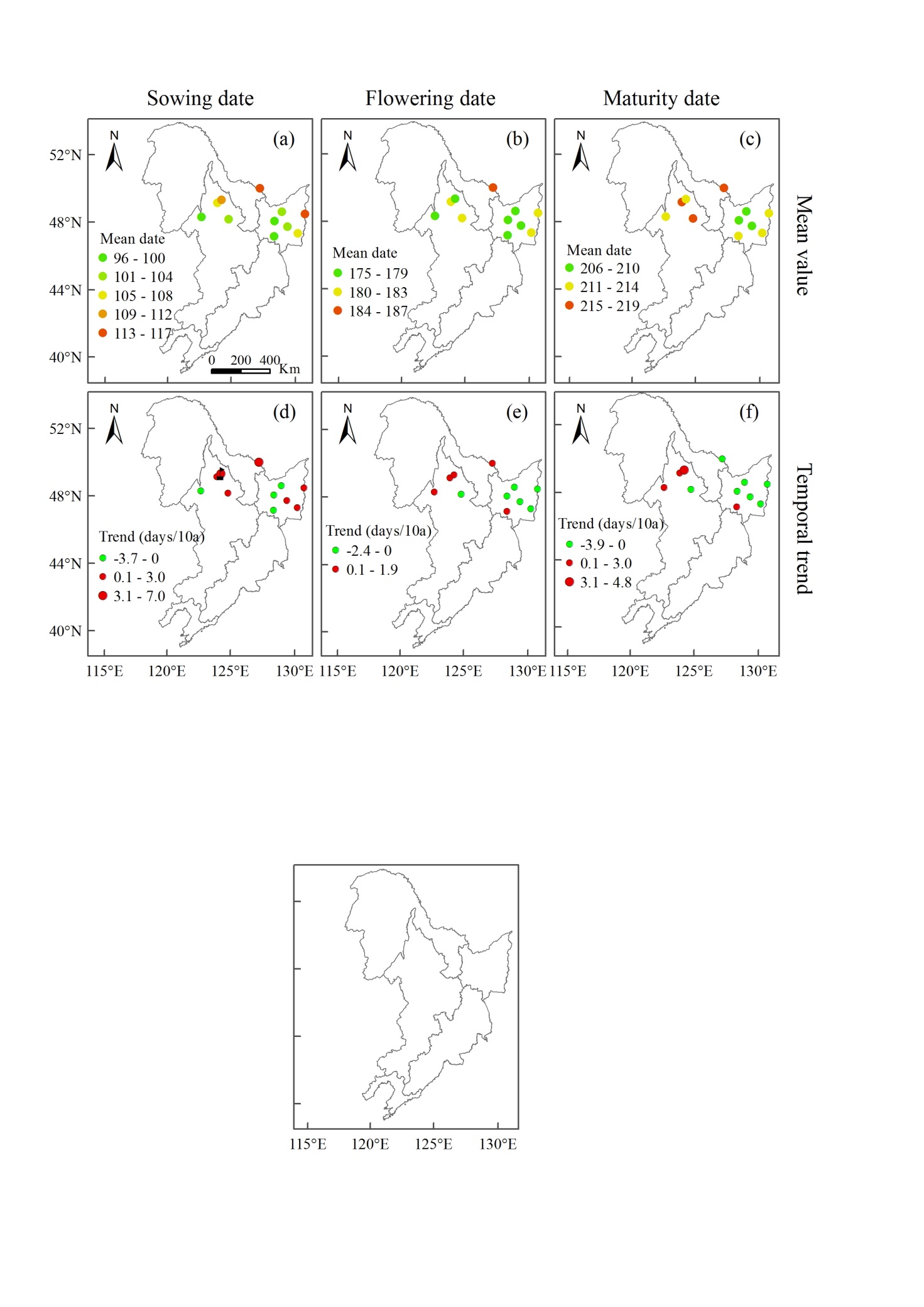
SUPPORT INFORMATION

**Fig. 1S** Temporal trends of dates of sowing, flowering and maturity for maize, rice and soybean in NFR over the period of 1981 to 2010.



**Fig. 2S** Mean and temporal trends of dates of sowing, flowering and maturity for wheat in NFR over the period of 1981 to 2010.

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**Fig. 3S** Spatial variation of average aridity in the pre-flowering, flowering and post-flowering phases for each crop during 1961 and 2010.

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**Fig. 4S** Spatial variation of average HDD in the pre-flowering, flowering and post-flowering phases for each crop during 1961 and 2010. **Table 1S**

The variance inflation factor (VIF) for the climate factors, comprising minimum temperature, radiation, aridity and heat degree days included in each mixed model. The subscript “pre” represents the pre-flowering, “flow” represents the flowering and “post” represents the post-flowering phase.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Maize model | Rice model | Soybean model | Wheat model |
|  | VIF value | VIF value | VIF value | VIF value |
| Year | 1.85 | 1.63 | 1.38 | 1.60 |
| Tminpre | 2.10 | 1.92 | 3.32 | 4.63 |
| Tminflow | 3.21 | 2.77 | 3.87 | 5.60 |
| Tminpost | 2.81 | 1.93 | 2.47 | 5.31 |
| Radiationpre | 1.85 | 1.97 | 1.92 | 2.21 |
| Radiationflow | 1.81 | 1.98 | 2.42 | 2.67 |
| Radiationpost | 1.85 | 1.67 | 1.76 | 2.43 |
| Ariditypre | 2.04 | 2.03 | 2.14 | 2.69 |
| Aridityflow | 6.82 | 5.11 | 7.31 | 12.49 |
| Ariditypost | 1.84 | 1.81 | 2.30 | 2.60 |
| Ariditypre\* Aridityflow | 6.51 | 4.43 | 7.96 | 13.76 |
| Aridityflow\* Ariditypost | 2.09 | 2.41 | 2.41 | 2.98 |
| HDDpre | 1.82 | 1.65 | 1.84 | 2.22 |
| HDDflow | 2.51 | 2.16 | 2.87 | 4.58 |
| HDDpost | 1.55 | 1.46 | 1.60 | 4.56 |

**Table 2S**

The standard error of parameter estimates in the mixed model of crop yield dependent on minimum temperature, radiation, aridity and HDD in the pre-flowering, flowering and post-flowering phases during 1961 and 2010. The subscript “pre” represents the pre-flowering, “flow” represents the flowering and “post” represents the post-flowering phase. The interactions of aridity were measured in the mixed model.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Maize  (kg/ha) | Rice  (kg/ha) | Soybean  (kg/ha) | Wheat  (kg/ha) |
| Intercept | 1121.9 | 1096.0 | 425.5 | 663.1 |
| Year | 11.7 | 11.6 | 4.8 | 5.5 |
| Tminpre (°C) | 40.9 | 42.0 | 14.7 | 21.6 |
| Tminflow (°C) | 31.4 | 28.3 | 13.3 | 22.5 |
| Tminpost (°C) | 32.4 | 28.9 | 16.2 | 24.4 |
| Radiationpre (MJ/m2/d) | 31.1 | 32.9 | 11.3 | 21.4 |
| Radiationflow (MJ/m2/d) | 17.2 | 18.8 | 7.5 | 13.1 |
| Radiationpost (MJ/m2/d) | 31.2 | 28.2 | 13.2 | 13.7 |
| Ariditypre | 189.5 | 185.5 | 71.0 | 146.6 |
| Aridityflow | 311.4 | 224.5 | 106.9 | 197.6 |
| Ariditypost | 160.6 | 127.0 | 88.8 | 113.4 |
| Ariditypre\* Aridityflow | 584.4 | 477.0 | 182.9 | 309.0 |
| Aridityflow\* Ariditypost | 507.4 | 363.7 | 207.2 | 244.0 |
| HDDpre (°C d) | 2.3 | 1.70 | 1.21 | 1.1 |
| HDDflow (°C d) | 5.1 | 4.87 | 1.73 | 1.6 |
| HDDpost (°C d) | 4.8 | 9.15 | 1.43 | 1.7 |