**Supplementary information**

**Manuscript title:**

**Spatial gathering characteristics of drought in the Qinghai-Tibet Plateau**

Number of pages: 6

Number of Tables: 5

**Table S 1.** Drought classification based on the SPEI value

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| --- | --- |
| **Classification** | **SPEI Value** |
| Extreme drought (ED） | SPEI < -2 |
| Severe drought (SD） | -2 ≤ SPEI < -1.5 |
| Moderate drought (MD) | -1.5 ≤ SPEI < -1 |
| Light drought (LD) | -1 ≤ SPEI < -0.5 |
| Near normal (NN) | -0.5 ≤ SPEI < 0.5 |
| Light wet (LW) | 0.5 ≤ SPEI < 1 |
| Moderate wet (MW) | 1 ≤ SPEI < 1.5 |
| Severe wet (SW) | 1.5 ≤ SPEI ≤ 2 |
| Extreme wet (EW) | SPEI > 2 |

**Table S 2.**The Equations of intensity analysis (Aldwaik and Pontius Jr, 2012; Huang et al., 2012)

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Where *J* = number of categories; *i* = index for a category at the initial time; *j* = index for a category at a subsequent time; *m* = index for the losing category in the transition of interest; *n* = index for the gaining category in the transition of interest; *T* = number of time points; *t* = index for a time point, which ranges from 1 to *T*−1; *Yt* = year at time point t; *Ctij* = number of pixels that transition from category *i* at time *Yt* to category *j* at time *Yt+1*; *S*t = annual intensity of change for time interval [*Yt*, *Yt+1*]; *U* = value of uniform line for time intensity analysis; *Gtj* = annual intensity of gross gain of category j for time interval [*Y*t,*Yt+1*]; L*ti* = annual intensity of gross loss of category *i* for time interval [*Yt*,*Yt+1*]; *Rtin* = annual intensity of transition from category *i* to category n during time interval [*Yt*, *Yt+1*], where *i* ≠*n*; *Wtn* = value of uniform intensity of transition to category n from all non-n categories at time *Yt* during time interval [*Yt*, *Yt+1*]; *Qtmj* = annual intensity of transition from category m to category *j* during time interval [*Yt*, *Yt+1*], where *j* ≠*m*; *Vtm* value of uniform intensity of transition from category m to all non-m categories at time *Yt+1* during time interval [*Yt*, *Yt+1*].

**Table S 3.** Grid counts of drought Transition matrix in time intervals. The top to bottom of the cell is the 1980s, 1990s, 2000s, and 2010s, respectively.

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| --- | --- | --- | --- | --- |
|  |  | **Final year of time interval** | **Initial total** | **Gross loss** |
|  |  | Extremedrought | Severedrought | Moderate drought | Lightdrought | Nearnormal | Lightwet | Moderatewet | Severewet | Extremewet |  |  |
| **Initial****year of time interval** | Extreme drought | 12000 | 10002 | 935154 | 98232230 | 0000 | 212133064 | 119204312 | 84292 | 38000 | 66663119114 | 65463119114 |
| Severe drought | 89440 | 203981435 | 81818561250 | 373185123260 | 0000 | 56710463428 | 34698101262 | 105227035 | 342541 | 25356984901271 | 23326004761236 |
| Moderate drought | 93681191 | 423336177106 | 18889876741309 | 800481544634 | 0000 | 746352513898 | 540197553534 | 29077234250 | 137711726 | 4917250529313758 | 3029151822572449 |
| Light drought | 941021285 | 849464316144 | 1241700651395 | 1111839899815 | 2044259318742130 | 8199387651143 | 674499571741 | 462211406294 | 94229230 | 7388636857025697 | 6277552948034882 |
| Near normal | 11534124231 | 1337917735216 | 3405277225062438 | 1910191320461490 | 4075559746284657 | 1723253319462191 | 1659214414011755 | 1018710618828 | 21593231165 | 15457170201435313771 | 113821142397259114 |
| Light wet | 1549487 | 234318164122 | 393675538351 | 6657801016556 | 1592207625151941 | 8277981113923 | 669693953657 | 353209225460 | 1004394126 | 4848564166665143 | 4021484355534220 |
| Moderate wet | 618139 | 20103115134 | 0000 | 298505829416 | 1070109915551402 | 732449558757 | 763268634612 | 26370207386 | 4077382 | 3192251939843798 | 2429225133503186 |
| Severe wet | 00212 | 095084 | 2277222149 | 74207365172 | 351425556692 | 209181151494 | 2778764297 | 46715148 | 120324 | 99199314282072 | 94598614131924 |
| Extreme wet | 0000 | 116341330267 | 00199 | 5154618 | 50344971 | 1911882 | 210140 | 13009 | 1000 | 225391463496 | 224391463496 |
| **Final****total** |  | 42458255665 | 3192258619011110 | 7860540146864905 | 5334494858904391 | 9182115241117710893 | 5854536951576980 | 5068400643214910 | 2634130817842412 | 671174664454 | 40219358983613636120 | 31293276042815927621 |
| **Gross****gain** |  | 41258255665 | 2989248818871075 | 5972441440123596 | 4223410949913576 | 5107622765496236 | 5027457140446057 | 4305373836874298 | 2588130117692264 | 670174664454 | 31293276042815927621 |  |
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**Table S 4.** The first 5 modes of EOF eigenvectors.

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| **Mode** | **Variance contribution rate (%)** | **Cumulative sums of contribution rate (%)** |
| 1 | 23.3 | 23.3 |
| 2 | 20.1 | 43.4 |
| 3 | 14.2 | 57.6 |
| 4 | 8.5 | 66.2 |
| 5 | 4.7 | 70.8 |

**Table S 5.** The contribution rate of first 3 modes of EOF eigenvectors for P, PET, and T.

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| --- | --- | --- | --- |
| **Tape** | **Mode1** | **Mode2** | **Mode3** |
| P | 58.5% | 8.5% | 6.4% |
| PET | 24.4% | 14.9% | 9.6% |
| T | 54.5% | 9.5% | 7.7% |