

Figure S1. Comparison of Max (blue), Spline (green) and Night (red) method to filter raw data (black).

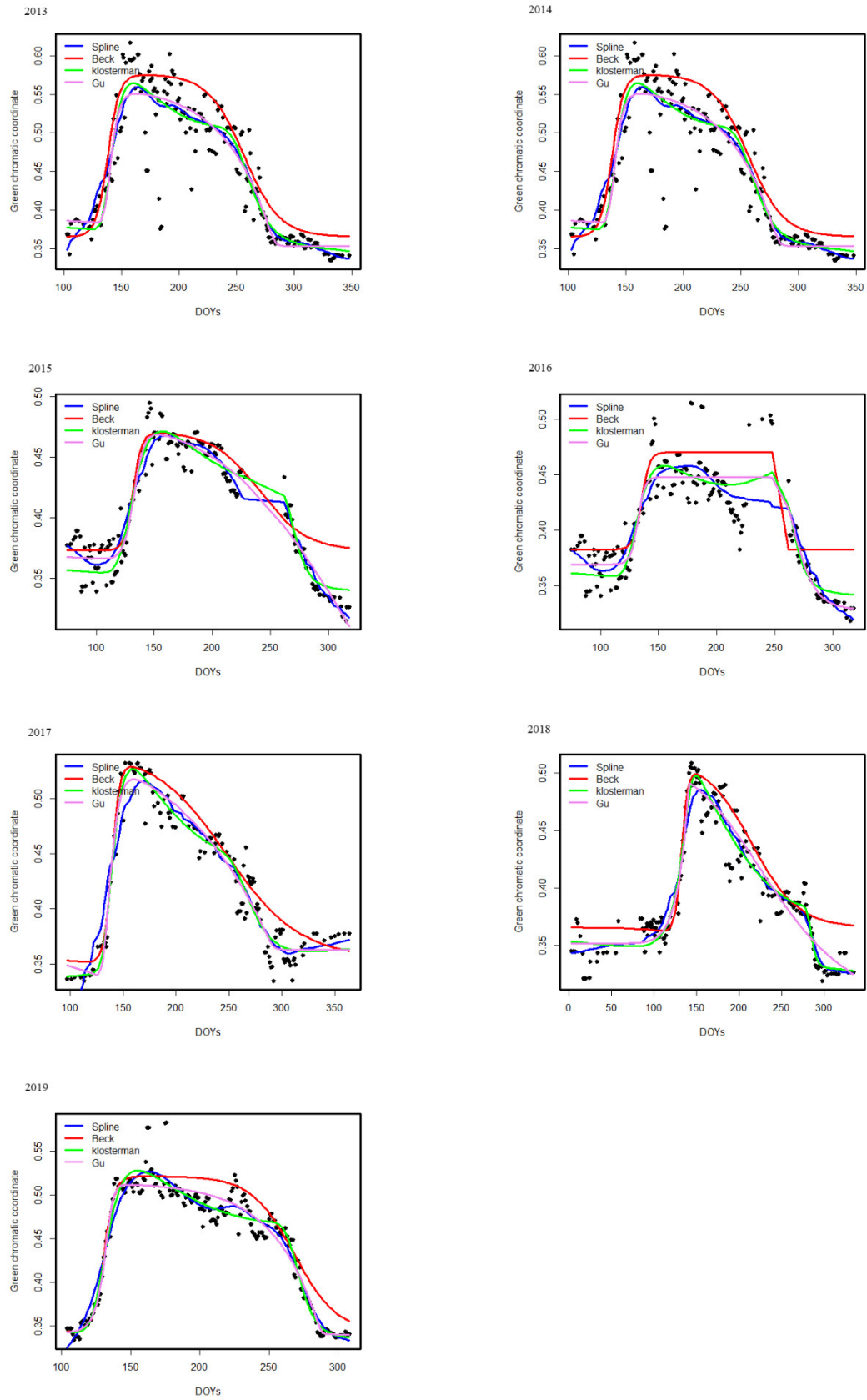


Figure S2. Comparison of 4 growth curve fitting methods 2013–2019.

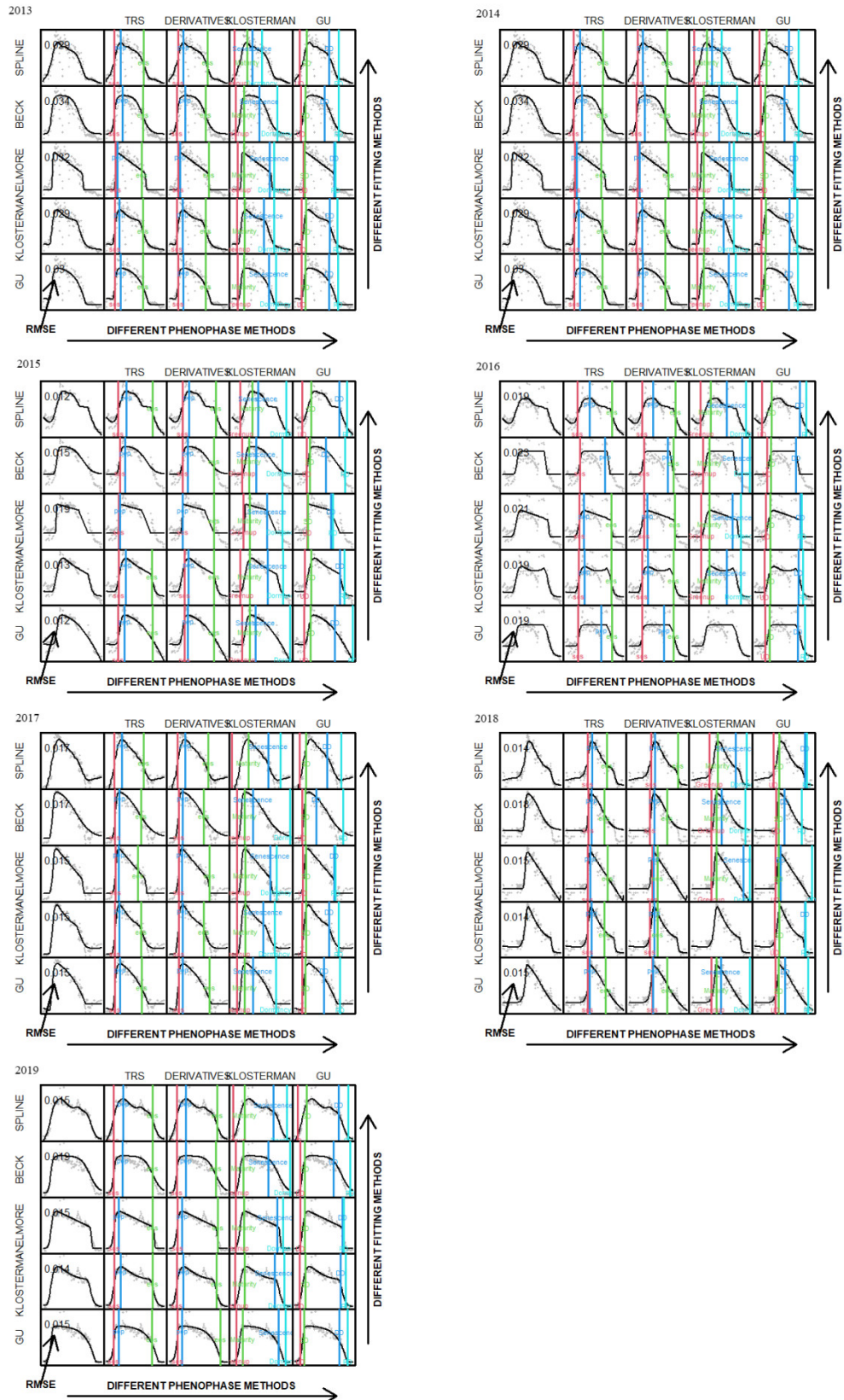


Figure S3. Comparison of 4 growth curve fitting methods and parameter extraction methods 2013–2019.

Table S1. Meteorological factors used for analysis.

| month-year | Mean temperature | T max | T min | precipitation | sunshine duration |
|-------------------|-----------------------------|--------------|--------------|----------------------|------------------------------|
| | | | -16.548 | | |
| Jan-2013 | -11.2774 | -5.6323 | 4 | 0.1903 | 4.0032 |
| | | | -13.271 | | |
| Feb-2013 | -8.5071 | -3.6857 | 4 | 1.3325 | 3.8786 |
| Mar-2013 | 4.6226 | 11.0613 | -0.8742 | 1.0165 | 5.5968 |
| Apr-2013 | 14.3200 | 19.5833 | 10.3333 | 4.1440 | 3.5567 |
| May-2013 | 20.7387 | 27.0129 | 15.7935 | 3.2423 | 6.3323 |
| Jun-2013 | 20.3833 | 25.4167 | 16.3333 | 4.2037 | 4.9200 |
| Jul-2013 | 16.4935 | 22.3419 | 12.3226 | 3.0129 | 4.9871 |
| Aug-2013 | 13.5290 | 20.7419 | 7.3774 | 3.6068 | 6.4129 |
| Sep-2013 | 5.8867 | 12.0600 | 0.1967 | 1.3133 | 6.5100 |
| Oct-2013 | -1.0871 | 5.1355 | -7.0065 | 0.4581 | 7.0484 |
| | | | -17.390 | | |
| Nov-2013 | -10.9800 | -4.0900 | 0 | 0.4003 | 7.1067 |
| | | -10.509 | -22.277 | | |
| Dec-2013 | -16.8258 | 7 | 4 | 0.6358 | 6.4161 |
| | | | -16.429 | | |
| Jan-2014 | -11.0581 | -4.4613 | 0 | 0.4745 | 4.9258 |
| Feb-2014 | -4.5643 | 0.6464 | -8.7571 | 0.4646 | 4.5179 |
| Mar-2014 | 5.1645 | 12.1903 | -0.8516 | 0.7423 | 6.7097 |
| Apr-2014 | 13.7933 | 21.2833 | 8.2600 | 0.1900 | 7.5733 |
| May-2014 | 19.1000 | 23.9774 | 15.8742 | 5.5710 | 3.5032 |
| Jun-2014 | 20.3100 | 26.3533 | 15.4767 | 4.2073 | 6.7533 |
| Jul-2014 | 17.3935 | 23.6935 | 12.6129 | 3.6100 | 5.6839 |
| Aug-2014 | 12.5032 | 19.2548 | 6.8484 | 3.4487 | 6.8613 |
| Sep-2014 | 6.9167 | 14.1400 | -0.2267 | 1.2040 | 7.6800 |
| Oct-2014 | -0.3258 | 6.4419 | -6.5097 | 0.4806 | 7.6581 |
| | | | -14.003 | | |
| Nov-2014 | -8.1533 | -1.5700 | 3 | 0.6773 | 6.5033 |
| | | | -18.512 | | |
| Dec-2014 | -13.5129 | -6.7065 | 9 | 0.0710 | 4.7613 |
| | | | -19.122 | | |
| Jan-2015 | -14.7097 | -9.4258 | 6 | 0.7684 | 3.9000 |
| Feb-2015 | -1.6964 | 4.8250 | -7.2536 | 0.1968 | 6.2000 |
| Mar-2015 | 5.6129 | 12.4065 | -0.5839 | 1.9939 | 5.4194 |
| Apr-2015 | 12.6333 | 20.0833 | 6.7100 | 1.7503 | 6.7567 |
| May-2015 | 19.0968 | 25.0161 | 14.3774 | 2.8871 | 7.2742 |
| Jun-2015 | 20.8500 | 26.7933 | 16.3400 | 4.0703 | 6.8433 |
| Jul-2015 | 17.8903 | 23.8161 | 13.2419 | 2.4300 | 6.4065 |

| | | | | | |
|----------|----------|---------|---------|--------|--------|
| Aug-2015 | 12.6774 | 18.8516 | 7.6290 | 4.2171 | 4.0097 |
| Sep-2015 | 8.1267 | 15.7367 | 0.8000 | 0.5170 | 7.7633 |
| Oct-2015 | -1.6032 | 4.3806 | -7.1871 | 0.2452 | 7.2903 |
| | | | -18.020 | | |
| Nov-2015 | -11.7600 | -4.6367 | 0 | 0.2473 | 6.7800 |
| | | | -21.571 | | |
| Dec-2015 | -16.1645 | -9.0677 | 0 | 0.0232 | 5.5871 |
| | | | -17.706 | | |
| Jan-2016 | -12.9032 | -7.1065 | 5 | 0.3068 | 5.0226 |
| Feb-2016 | -2.2793 | 2.9690 | -6.6862 | 2.8145 | 3.9724 |
| Mar-2016 | 6.2742 | 13.0710 | 0.0839 | 1.0394 | 6.2516 |
| Apr-2016 | 13.4267 | 20.5200 | 7.9767 | 1.0333 | 7.5867 |
| May-2016 | 20.4484 | 26.0194 | 16.4419 | 3.9329 | 6.3839 |
| Jun-2016 | 20.4433 | 25.2900 | 17.0200 | 5.0100 | 5.3300 |
| Jul-2016 | 18.4323 | 24.7000 | 13.3806 | 3.2265 | 6.7742 |
| Aug-2016 | 13.1194 | 20.5645 | 7.0355 | 2.2271 | 6.4290 |
| Sep-2016 | 3.0800 | 8.7733 | -1.9200 | 0.9617 | 6.4767 |
| | | | -10.148 | | |
| Oct-2016 | -4.6742 | 1.0258 | 4 | 0.6755 | 6.7387 |
| | | | -19.206 | | |
| Nov-2016 | -13.6900 | -7.4633 | 7 | 0.2720 | 5.8000 |
| | | -10.525 | -22.822 | | |
| Dec-2016 | -17.2839 | 8 | 6 | 0.0752 | 5.3387 |
| | | -10.535 | -20.551 | | |
| Jan-2017 | -16.0774 | 5 | 6 | 0.5203 | 5.2194 |
| Feb-2017 | -3.7250 | 0.4643 | -7.1000 | 1.5725 | 2.8179 |
| Mar-2017 | 5.1226 | 11.4968 | -0.5161 | 2.3490 | 6.2968 |
| Apr-2017 | 14.4633 | 20.1000 | 10.3333 | 5.0303 | 5.0367 |
| May-2017 | 19.2968 | 24.6419 | 15.1032 | 4.2229 | 5.3613 |
| Jun-2017 | 20.2800 | 25.5200 | 16.1433 | 3.8603 | 5.8367 |
| Jul-2017 | 16.4226 | 22.0290 | 11.9968 | 1.2590 | 5.6645 |
| Aug-2017 | 13.3548 | 19.9968 | 7.2000 | 1.8916 | 7.3935 |
| Sep-2017 | 5.0133 | 11.9100 | -1.3233 | 1.7610 | 7.1500 |
| Oct-2017 | -3.9226 | 1.8194 | -9.6258 | 0.7232 | 6.0065 |
| | | | -19.246 | | |
| Nov-2017 | -13.3367 | -6.6000 | 7 | 0.2743 | 6.2333 |
| | | -10.887 | -24.087 | | |
| Dec-2017 | -18.3194 | 1 | 1 | 0.0035 | 6.2581 |
| | | | -21.122 | | |
| Jan-2018 | -15.7129 | -8.8290 | 6 | 0.0077 | 6.1581 |
| Feb-2018 | -3.6571 | 2.4536 | -9.0857 | 1.0539 | 5.2536 |
| Mar-2018 | 5.6774 | 13.3419 | -0.8516 | 0.4265 | 6.0194 |
| Apr-2018 | 13.3233 | 20.7533 | 6.7333 | 0.3473 | 7.5433 |
| May-2018 | 19.8355 | 25.7161 | 15.2226 | 2.3648 | 6.2484 |

| | | | | | |
|----------|----------|---------|---------|--------|--------|
| Jun-2018 | 20.4267 | 25.4033 | 16.2967 | 0.8407 | 6.4233 |
| Jul-2018 | 17.2452 | 22.9484 | 12.5065 | 2.8877 | 5.4129 |
| Aug-2018 | 11.0774 | 17.0613 | 5.8129 | 2.6784 | 6.1774 |
| Sep-2018 | 5.2433 | 11.6367 | -1.0333 | 1.0180 | 6.7333 |
| Oct-2018 | -3.8710 | 1.8290 | -9.5097 | 0.0671 | 7.1000 |
| | | | -14.560 | | |
| Nov-2018 | -8.4867 | -1.6200 | 0 | 0.0350 | 7.4233 |
| | | -12.151 | -22.845 | | |
| Dec-2018 | -17.8935 | 6 | 2 | 0.0081 | 6.0387 |
| | | | -19.154 | | |
| Jan-2019 | -14.5129 | -8.6161 | 8 | 0.3919 | 3.9677 |
| Feb-2019 | -3.3393 | 2.1286 | -7.6500 | 0.7289 | 5.0714 |
| Mar-2019 | 4.4806 | 10.7710 | -0.5355 | 2.3297 | 5.9323 |
| Apr-2019 | 13.9600 | 20.7733 | 8.6433 | 0.4603 | 7.1467 |
| May-2019 | 19.9226 | 25.2452 | 15.4710 | 2.8903 | 6.5000 |
| Jun-2019 | 20.5667 | 24.9700 | 17.4500 | 3.3667 | 5.0800 |
| Jul-2019 | 20.7323 | 27.2581 | 14.6968 | 1.2590 | 8.3677 |
| Aug-2019 | 13.2387 | 19.4774 | 7.4645 | 3.1471 | 5.2548 |
| Sep-2019 | 3.0933 | 8.2033 | -1.2633 | 1.5443 | 5.8333 |
| | | | -12.225 | | |
| Oct-2019 | -6.4097 | -0.6871 | 8 | 0.8139 | 6.2871 |
| | | | -17.966 | | |
| Nov-2019 | -12.4633 | -6.4033 | 7 | 0.7117 | 6.4267 |
| | | | -21.625 | | |
| Dec-2019 | -15.9581 | -8.9710 | 8 | 0.0229 | 6.0581 |

Table S2. Number of images and videos collected of Siberian roe deer.

| Year | Total photos | Effective photos | Total videos | Effective videos | Effective molting events |
|-------|--------------|------------------|--------------|------------------|--------------------------|
| 2013 | 600 | 179 | 153 | 134 | 48 |
| 2014 | 1099 | 225 | 288 | 62 | 58 |
| 2015 | 1822 | 196 | 400 | 151 | 64 |
| 2016 | 1965 | 256 | 597 | 171 | 87 |
| 2017 | 2036 | 215 | 530 | 138 | 84 |
| 2018 | 3047 | 260 | 612 | 117 | 80 |
| 2019 | 1878 | 160 | 339 | 143 | 88 |
| Total | 12447 | 1491 | 2919 | 916 | 509 |

Table S3. Data of Siberian roe deer molting events in study area.

| Season | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|--------|------|------|------|------|------|------|------|
| Spring | 25 | 25 | 30 | 48 | 51 | 43 | 49 |
| Autumn | 23 | 33 | 34 | 39 | 33 | 37 | 39 |

Table 4. Length of period (LP) of forest leaf phenology (FLP).

| Forest Leaf Phenology | Meteorological Factors | Length of Optimal Period (Day) | R | p |
|-------------------------|------------------------|--------------------------------|-------|--------|
| Start of growing season | Mean temperature | 42 | 0.73 | < 0.01 |
| | Sunshine duration | 82 | 0.23 | < 0.05 |
| | precipitation | 25 | 0.26 | > 0.05 |
| End of growing season | Mean temperature | 76 | -0.65 | < 0.01 |
| | Sunshine duration | 16 | 0.21 | > 0.05 |
| | precipitation | 132 | 0.25 | < 0.05 |