



*Supplement of*

## **Snowmelt onset over Arctic sea ice from passive microwave satellite data: 1979–2012**

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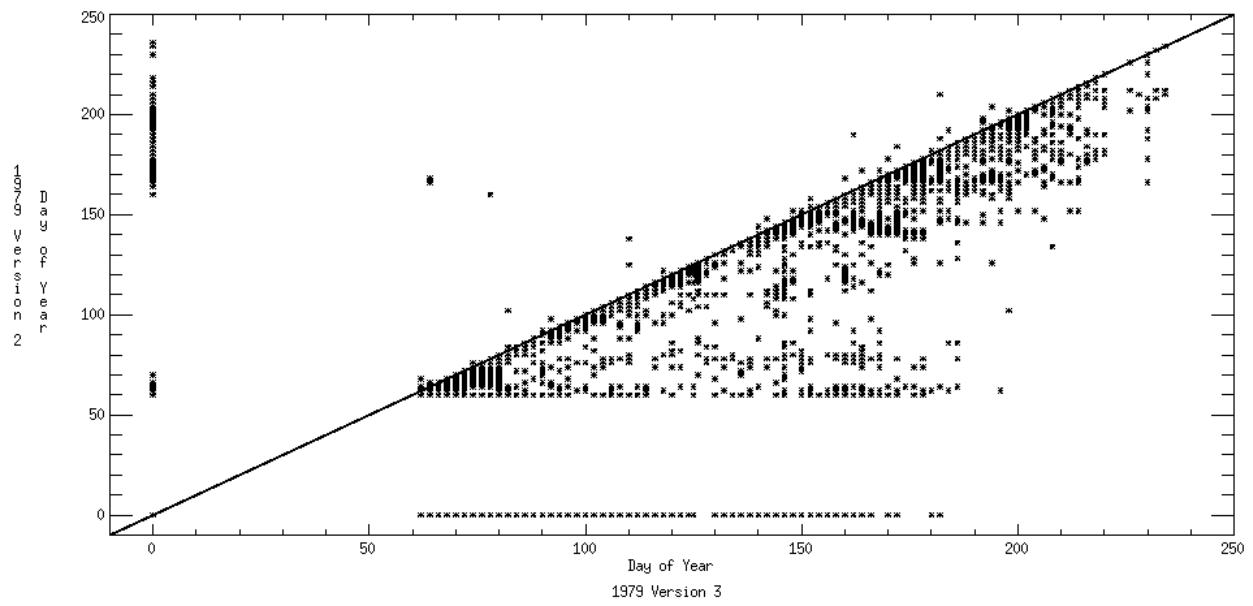


Figure S1. Scatter plot of V3 MO dates versus V2 MO dates for 1979 with 1:1 line.

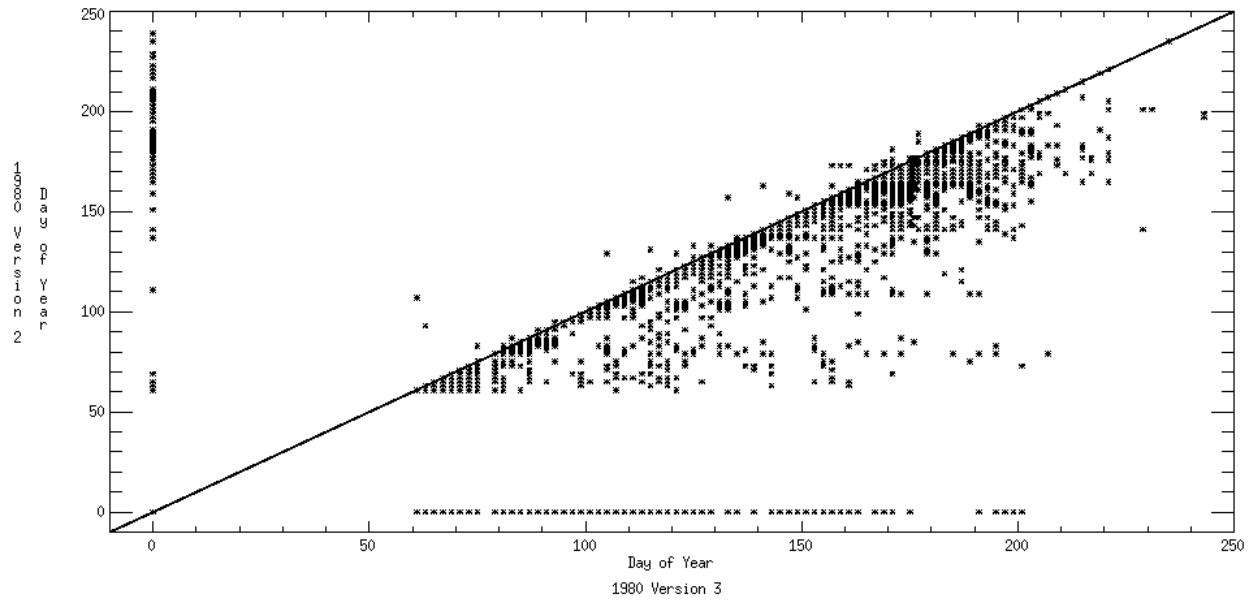


Figure S2. Scatter plot of V3 MO dates versus V2 MO dates for 1980 with 1:1 line.

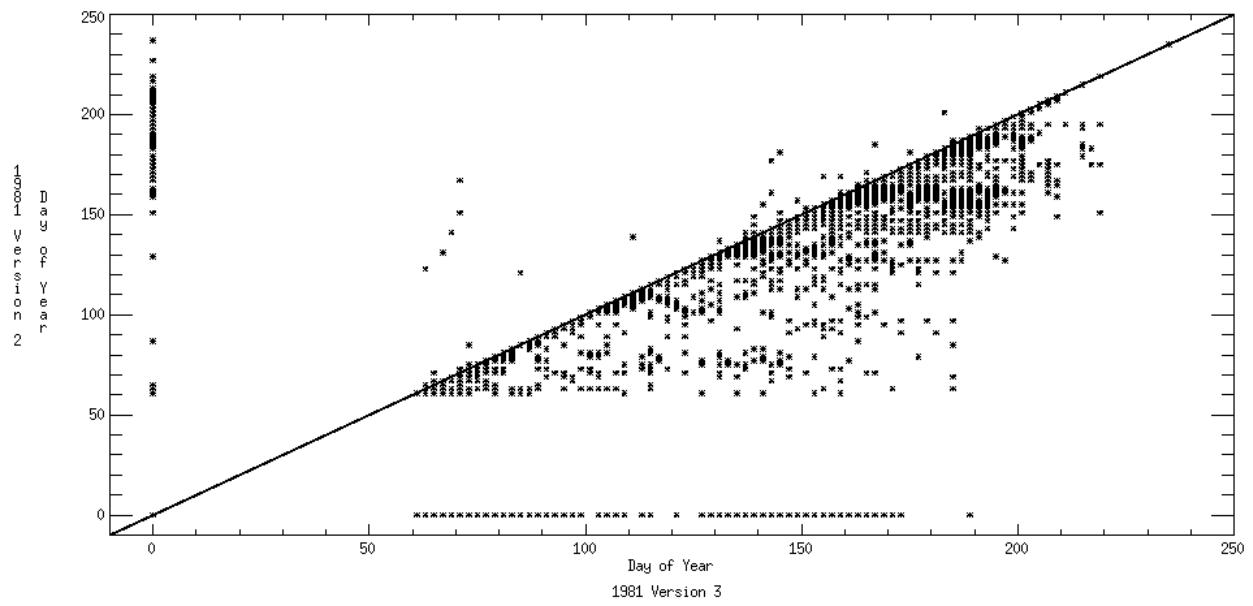


Figure S3. Scatter plot of V3 MO dates versus V2 MO dates for 1981 with 1:1 line.

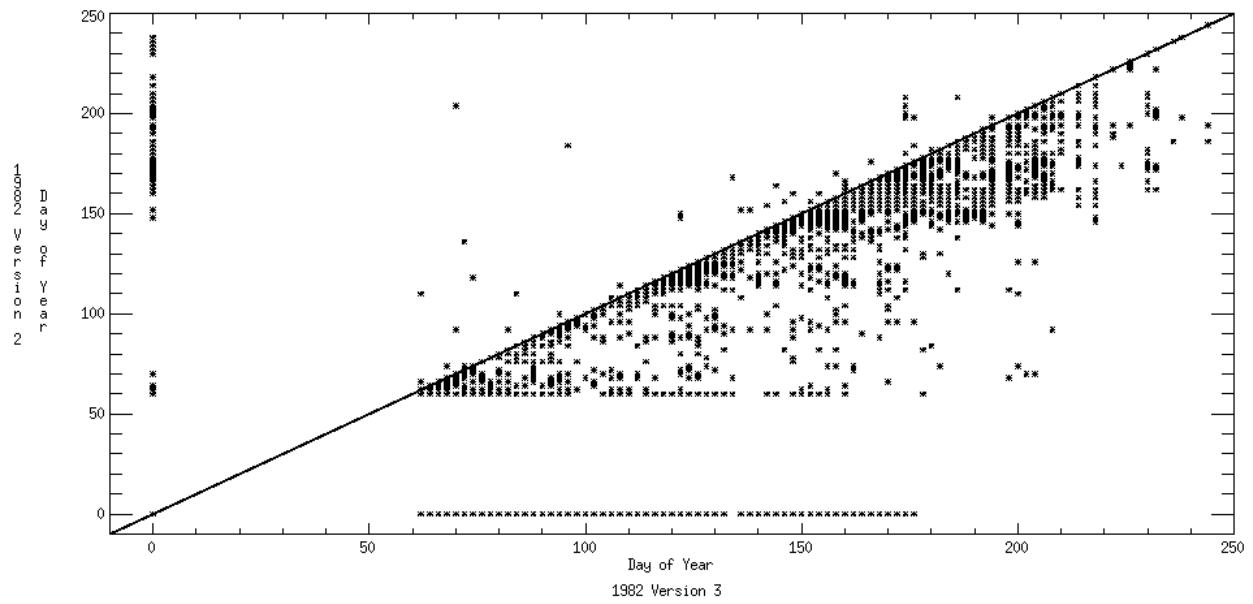


Figure S4. Scatter plot of V3 MO dates versus V2 MO dates for 1982 with 1:1 line.

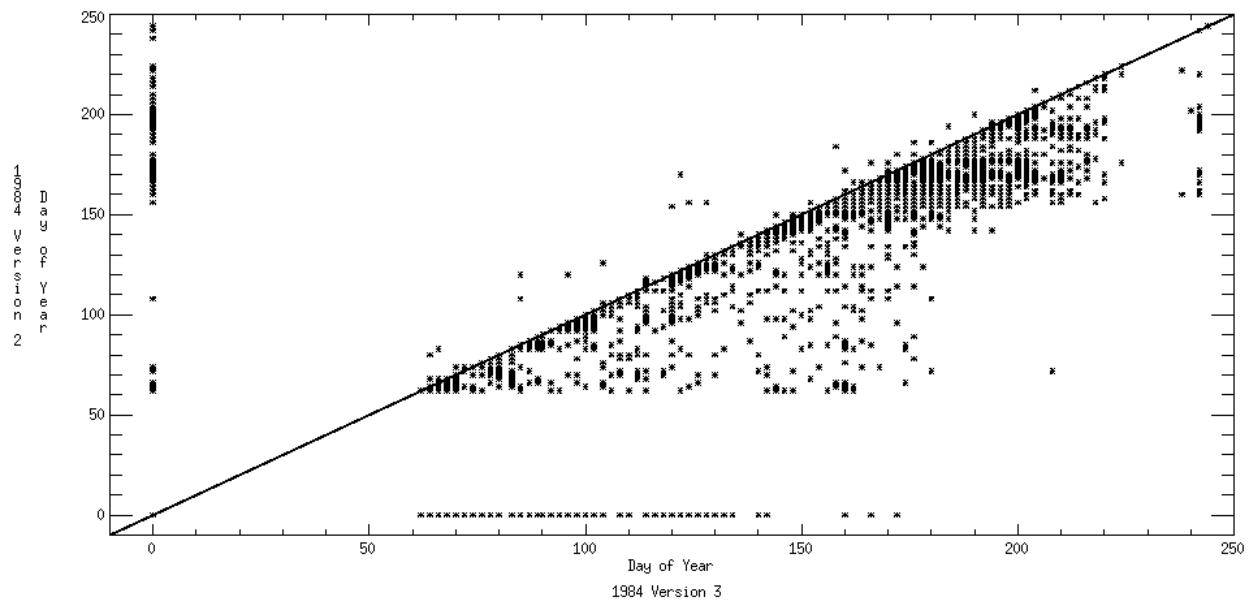


Figure S5. Scatter plot of V3 MO dates versus V2 MO dates for 1984 with 1:1 line.

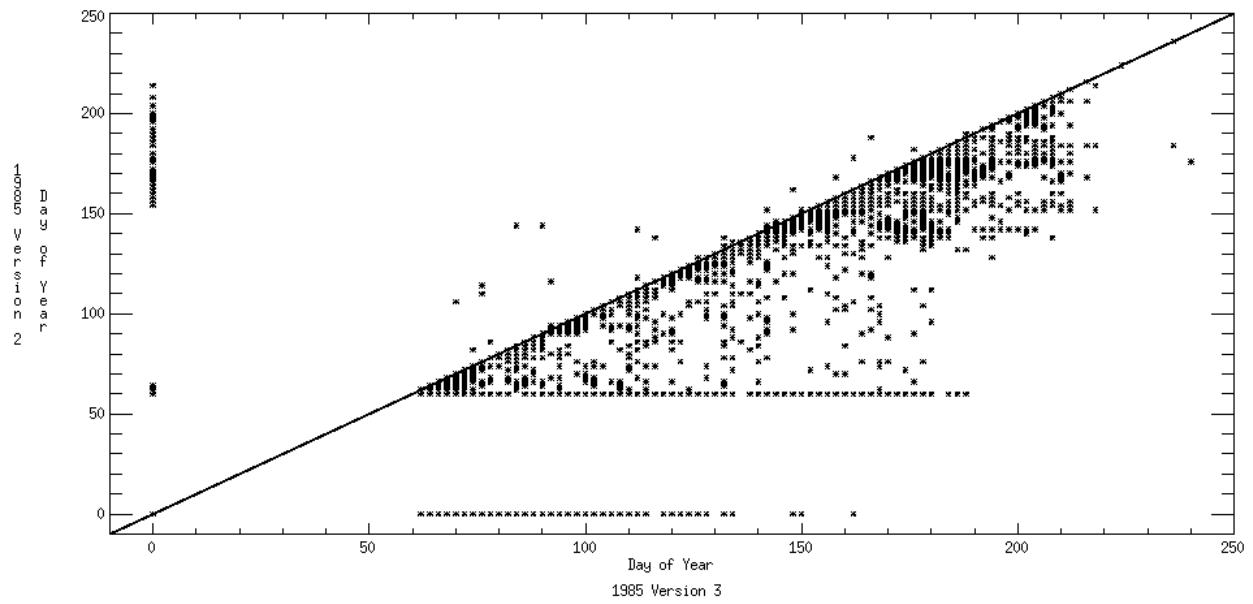


Figure S6. Scatter plot of V3 MO dates versus V2 MO dates for 1985 with 1:1 line.

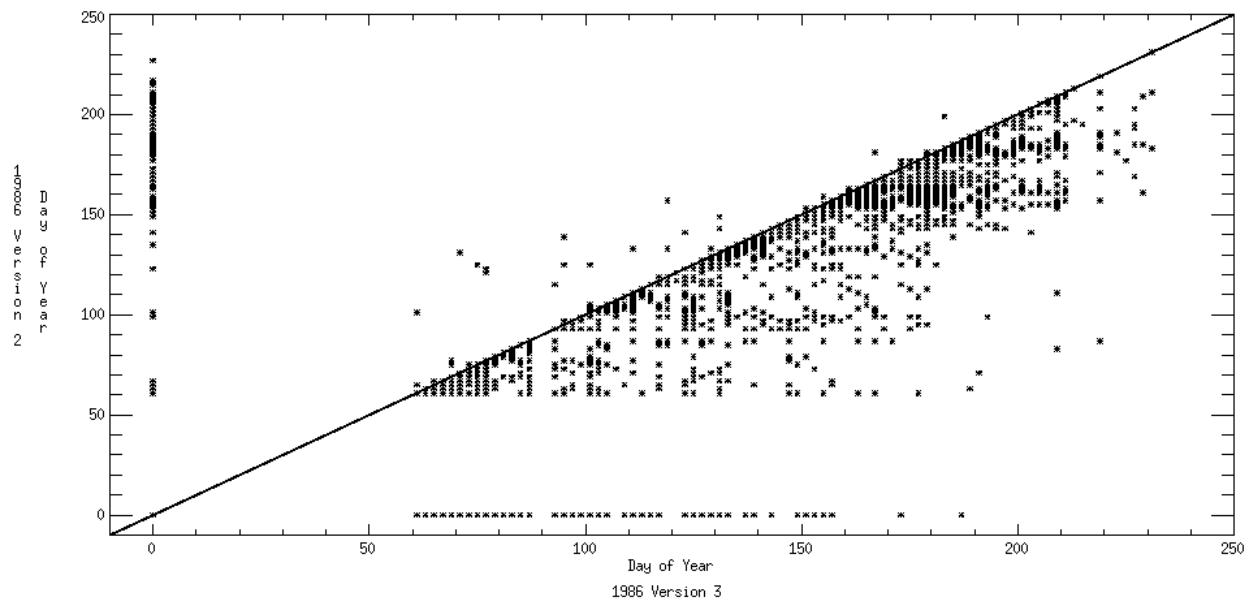


Figure S7. Scatter plot of V3 MO dates versus V2 MO dates for 1986 with 1:1 line.

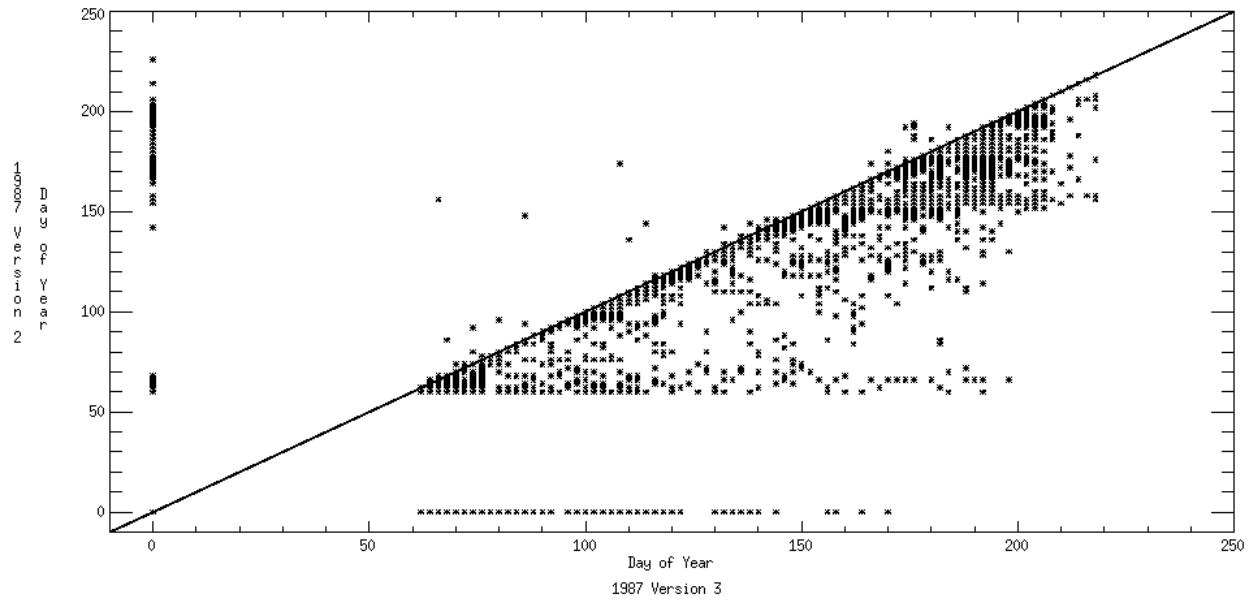


Figure S8. Scatter plot of V3 MO dates versus V2 MO dates for 1987 with 1:1 line.

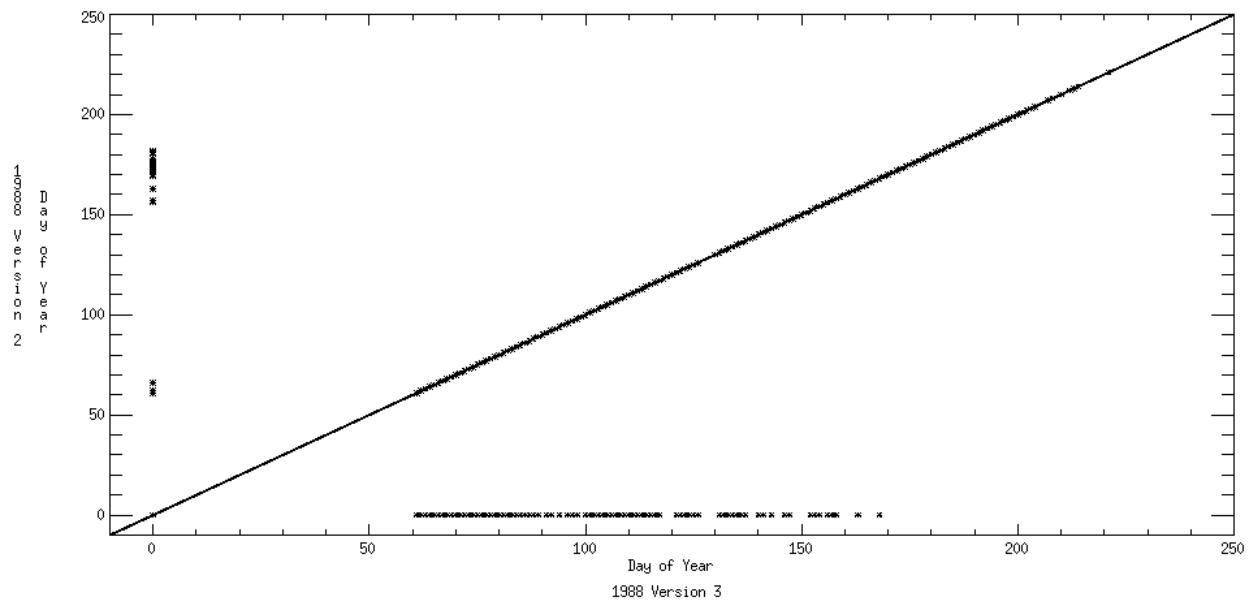


Figure S9. Scatter plot of V3 MO dates versus V2 MO dates for 1988 with 1:1 line.

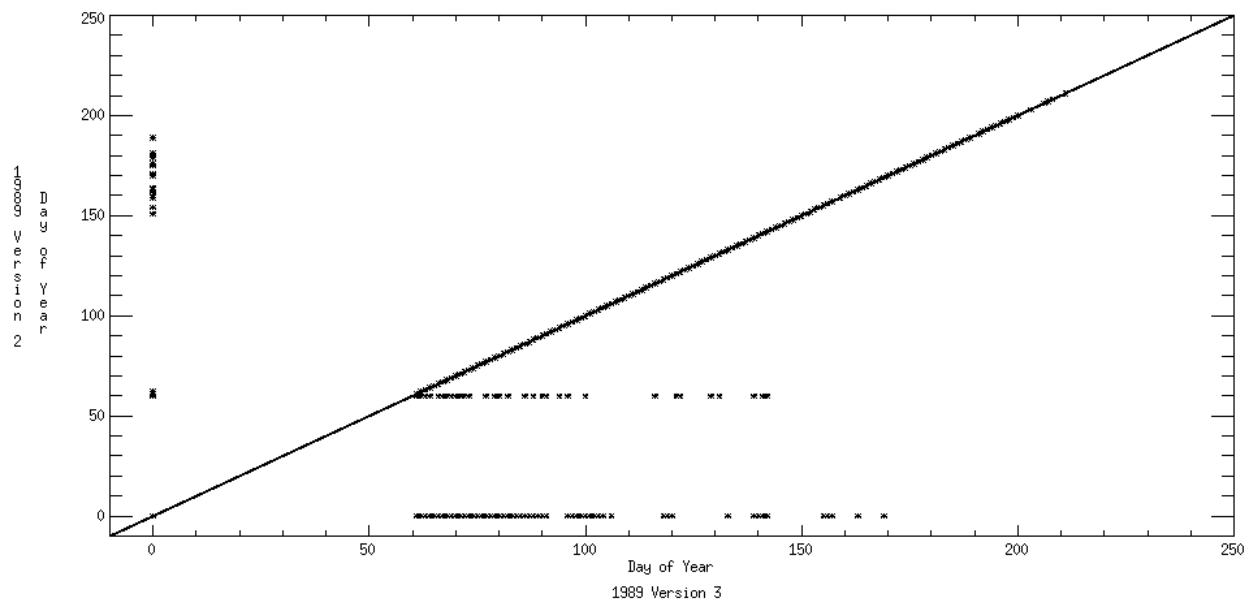


Figure S10. Scatter plot of V3 MO dates versus V2 MO dates for 1989 with 1:1 line.

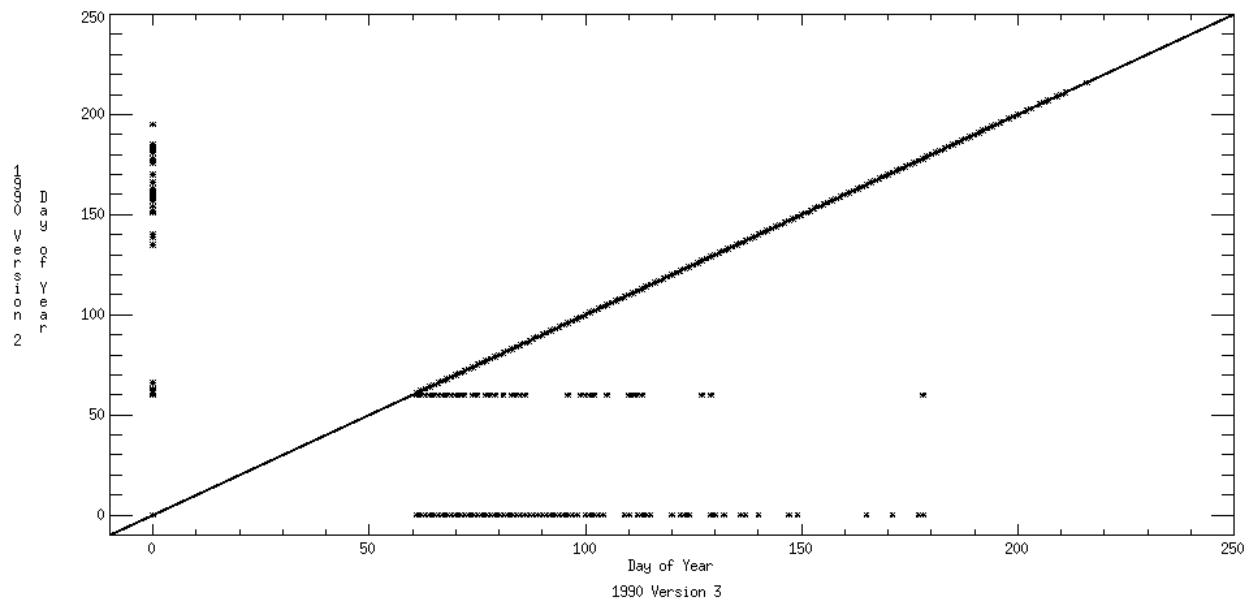


Figure S11. Scatter plot of V3 MO dates versus V2 MO dates for 1990 with 1:1 line.

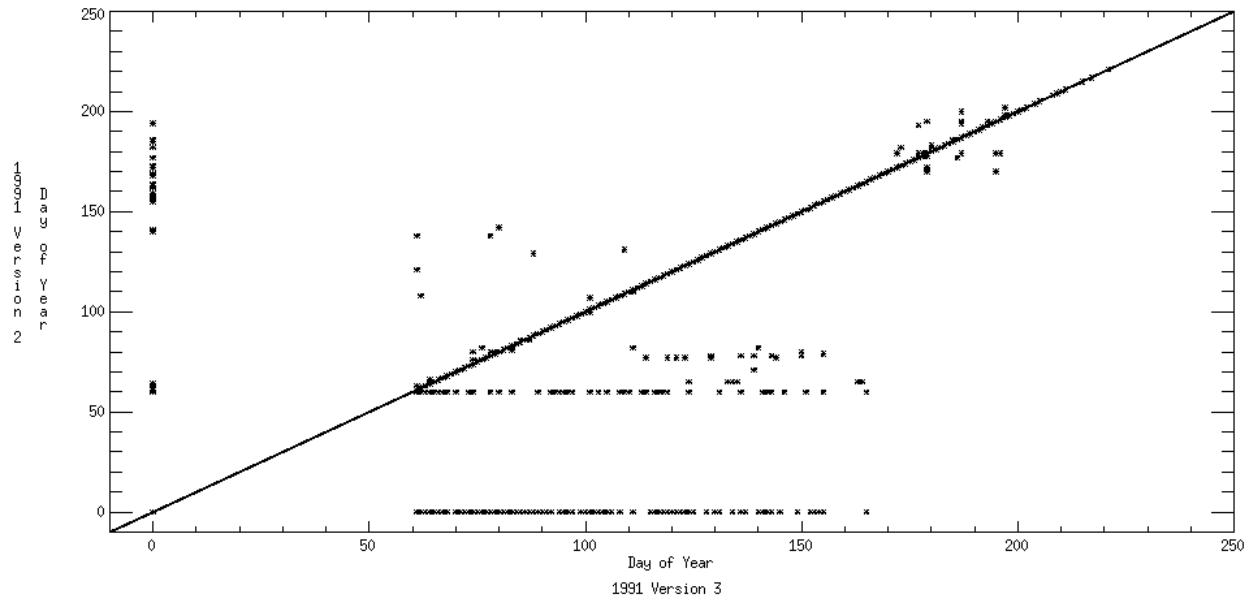


Figure S12. Scatter plot of V3 MO dates versus V2 MO dates for 1991 with 1:1 line.

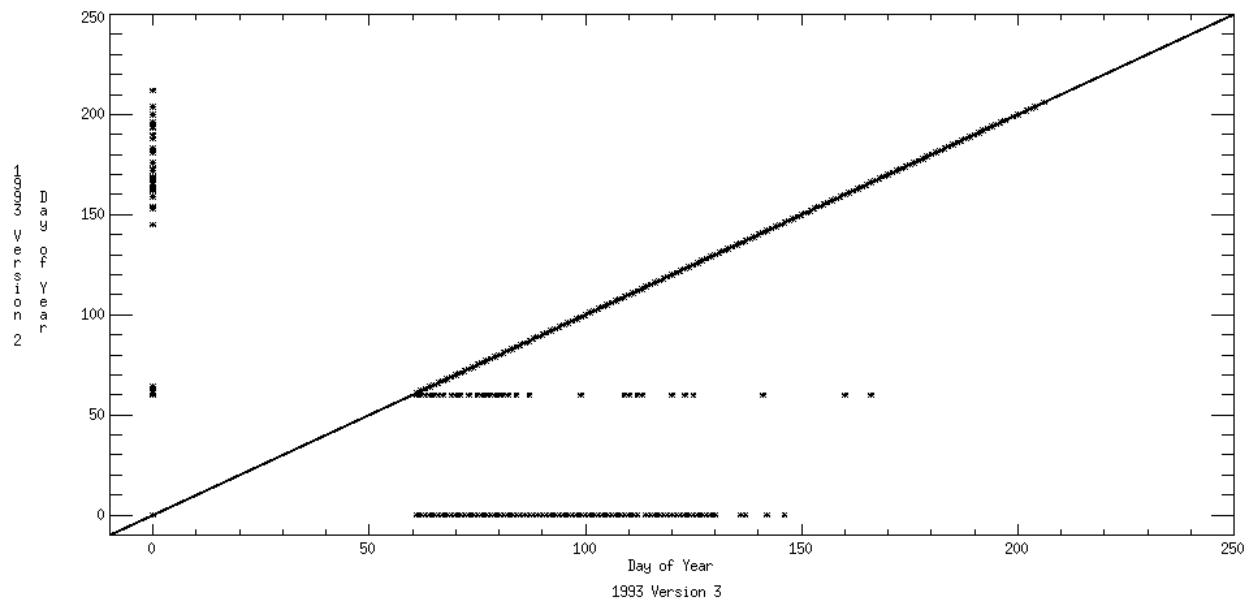


Figure S13. Scatter plot of V3 MO dates versus V2 MO dates for 1993 with 1:1 line.

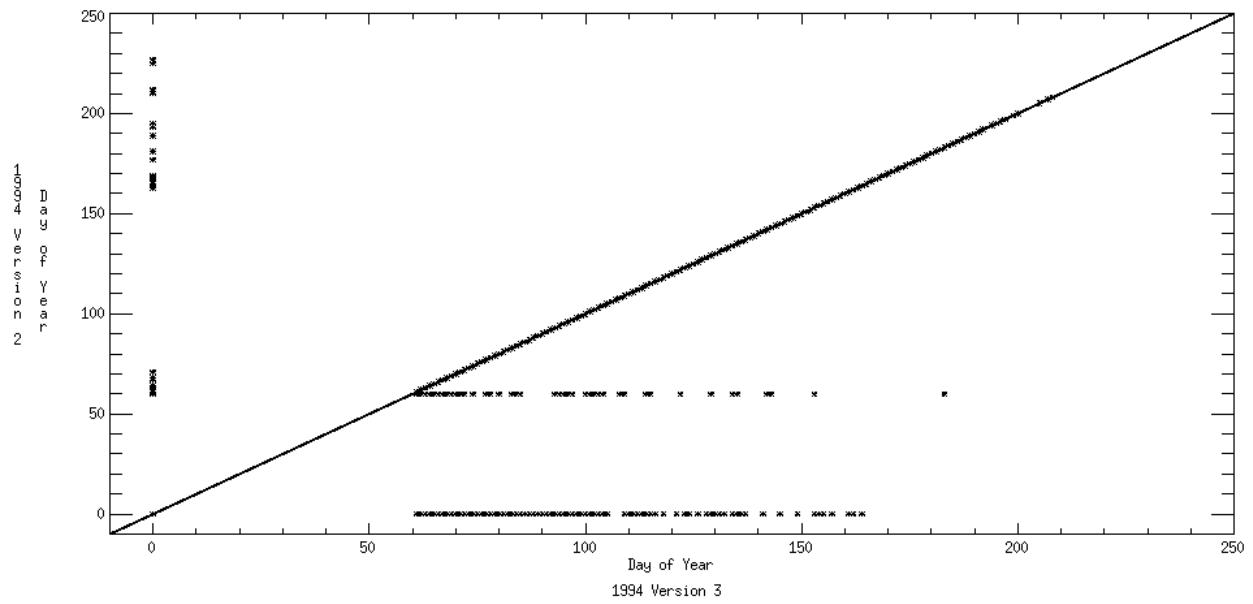


Figure S14. Scatter plot of V3 MO dates versus V2 MO dates for 1994 with 1:1 line.

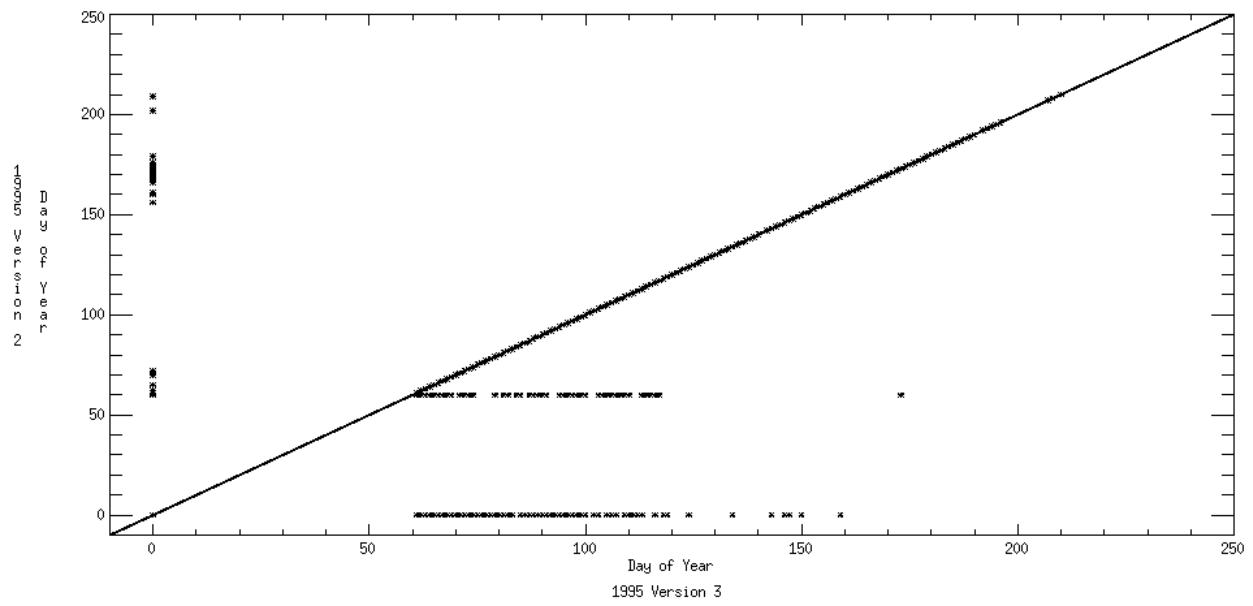


Figure S15. Scatter plot of V3 MO dates versus V2 MO dates for 1995 with 1:1 line.

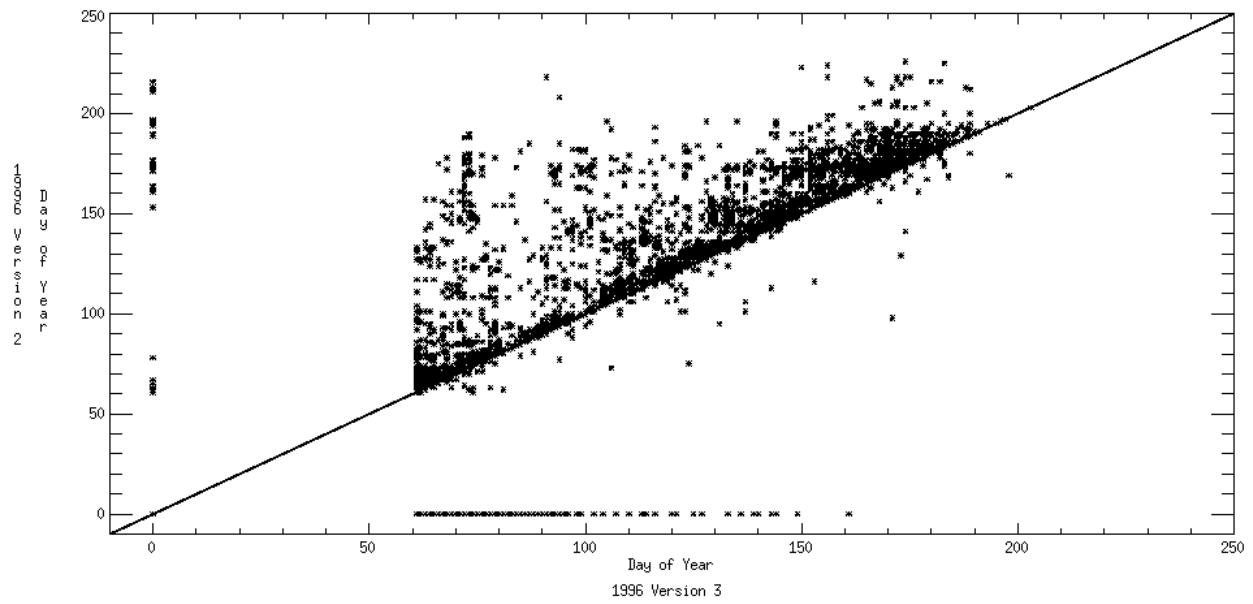


Figure S16. Scatter plot of V3 MO dates versus V2 MO dates for 1996 with 1:1 line.

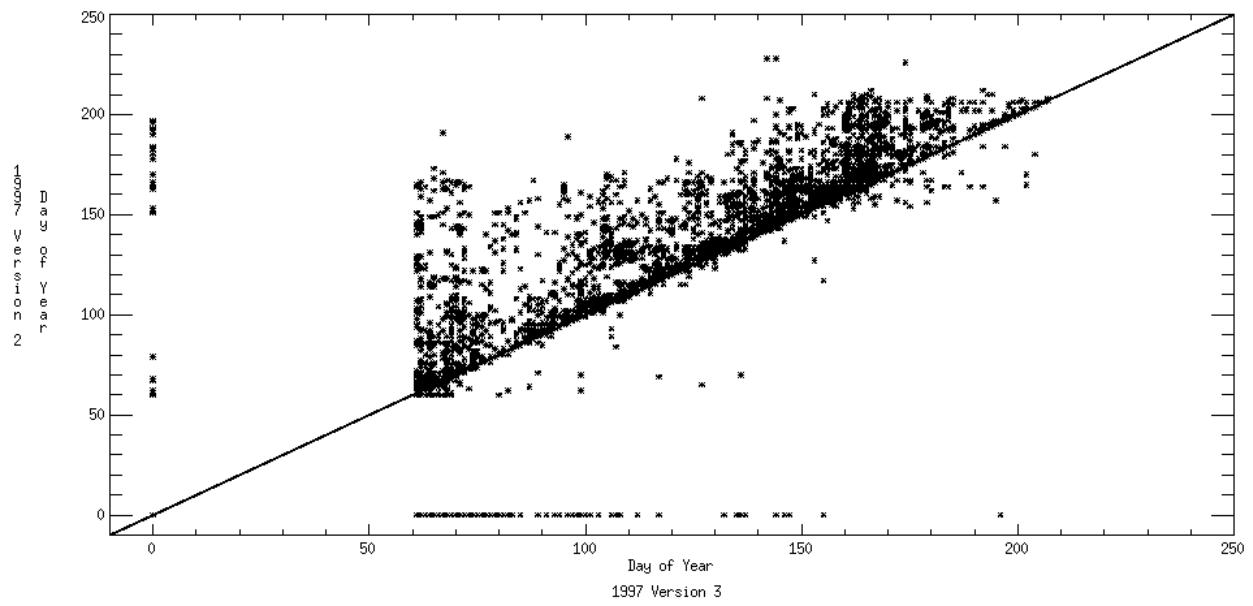


Figure S17. Scatter plot of V3 MO dates versus V2 MO dates for 1997 with 1:1 line.

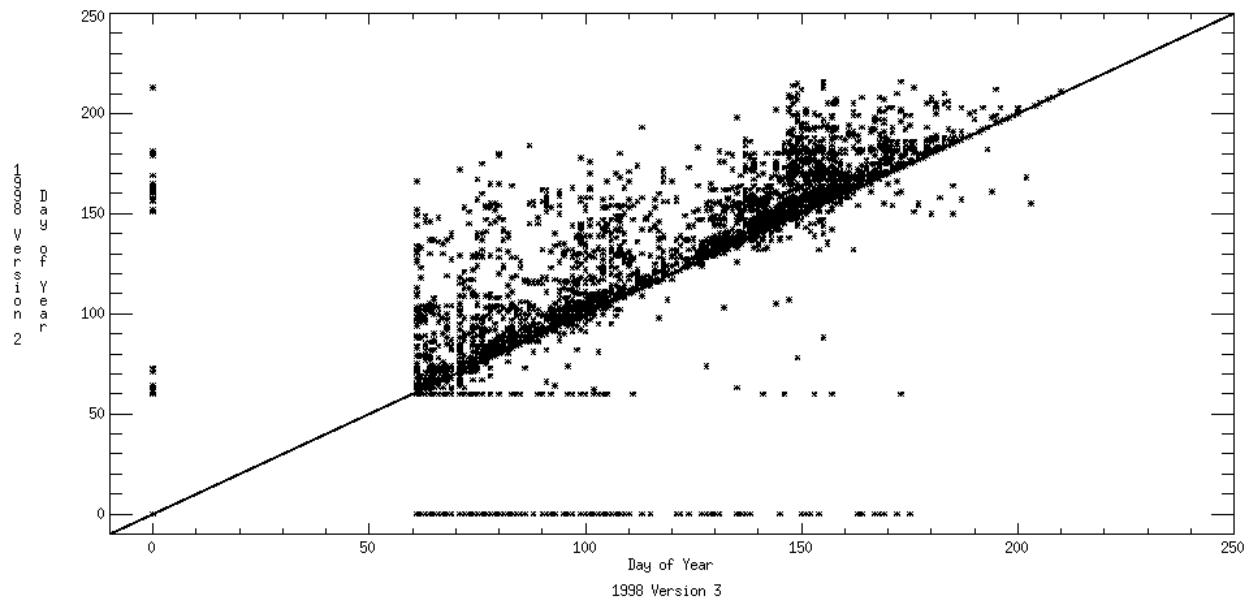


Figure S18. Scatter plot of V3 MO dates versus V2 MO dates for 1998 with 1:1 line.

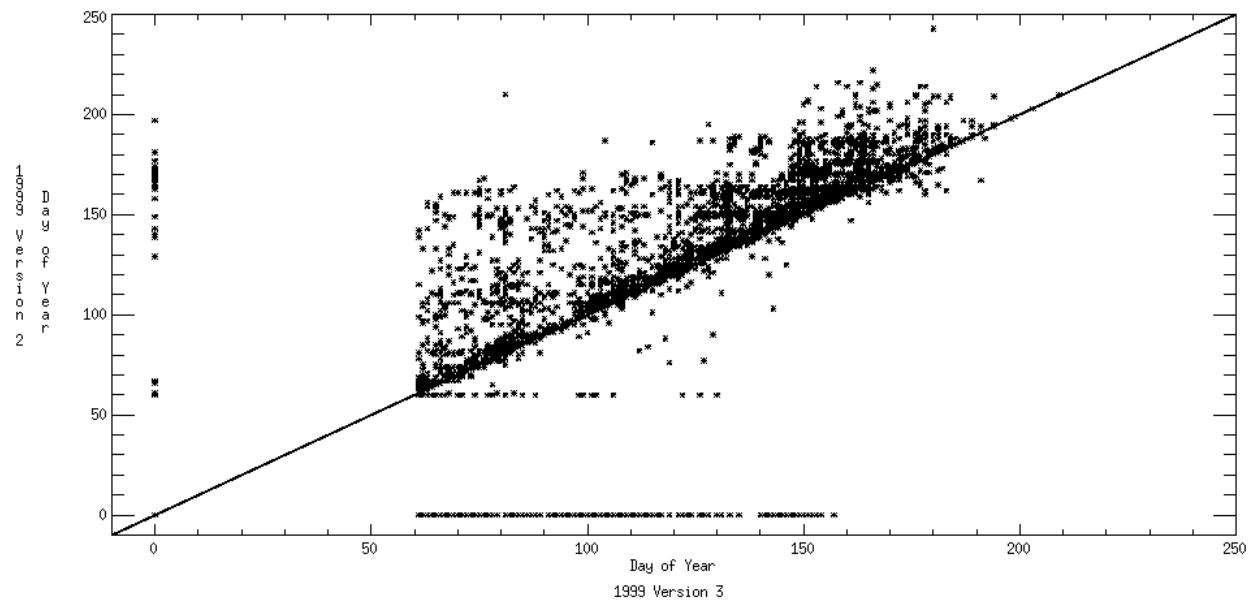


Figure S19. Scatter plot of V3 MO dates versus V2 MO dates for 1999 with 1:1 line.

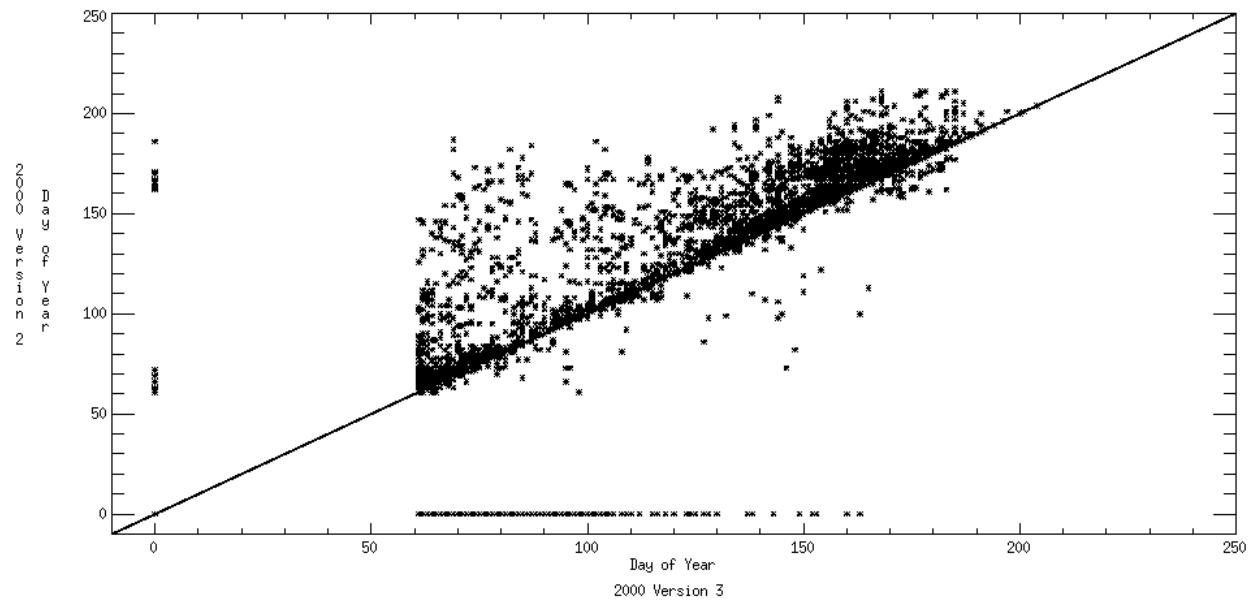


Figure S20. Scatter plot of V3 MO dates versus V2 MO dates for 2000 with 1:1 line.

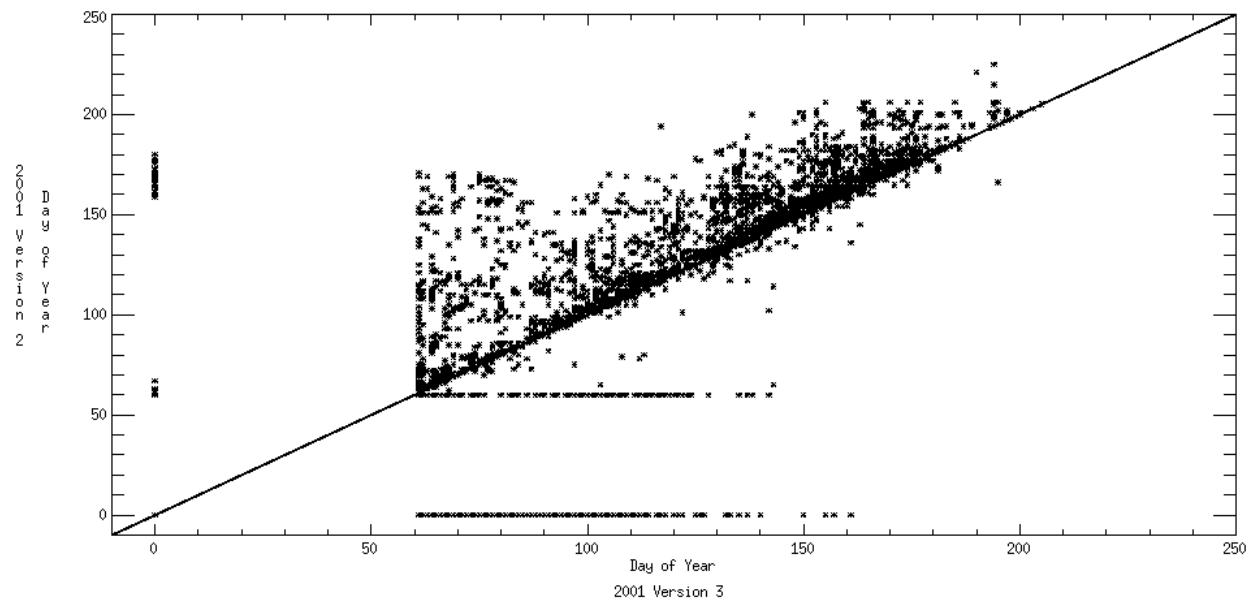


Figure S21. Scatter plot of V3 MO dates versus V2 MO dates for 2001 with 1:1 line.

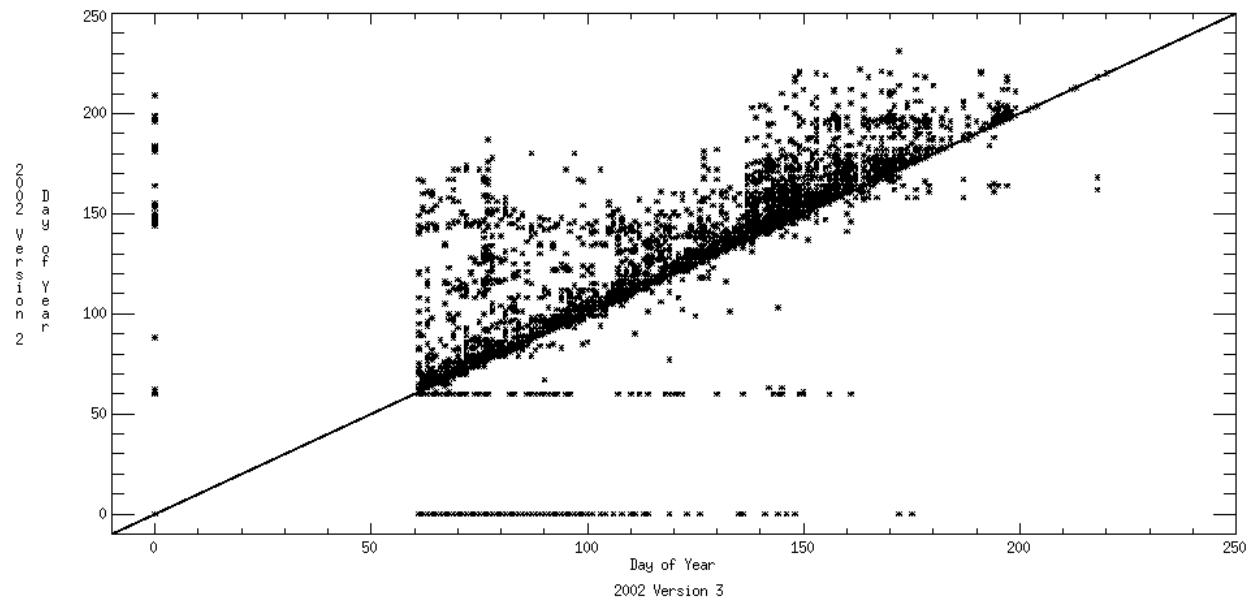


Figure S22. Scatter plot of V3 MO dates versus V2 MO dates for 2002 with 1:1 line.

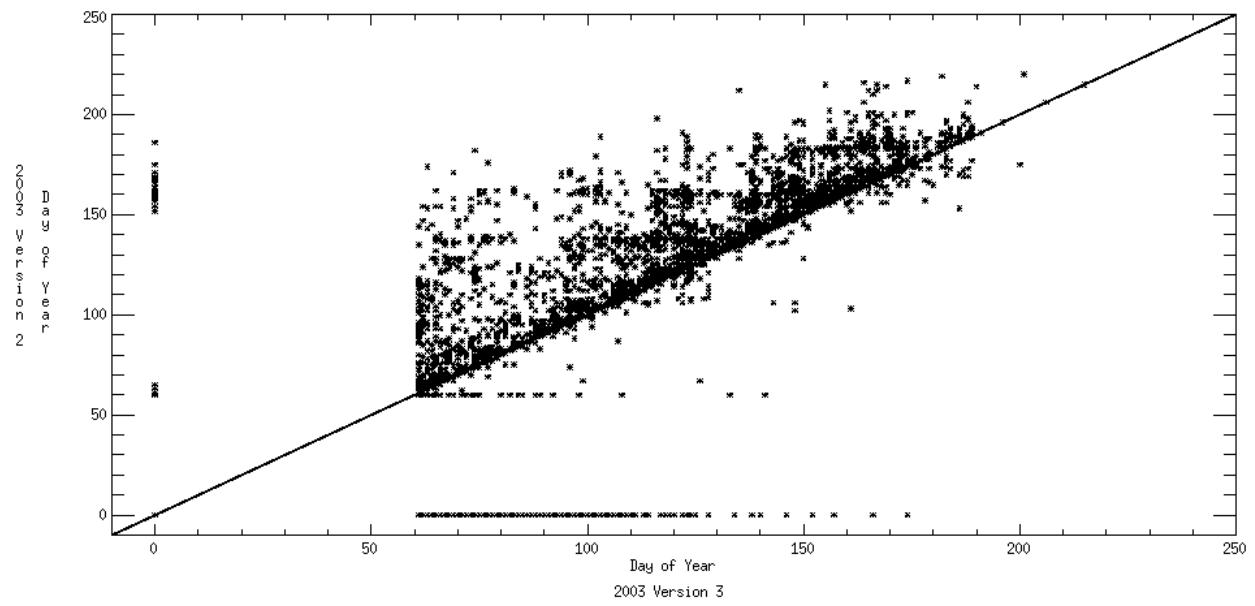


Figure S23. Scatter plot of V3 MO dates versus V2 MO dates for 2003 with 1:1 line.

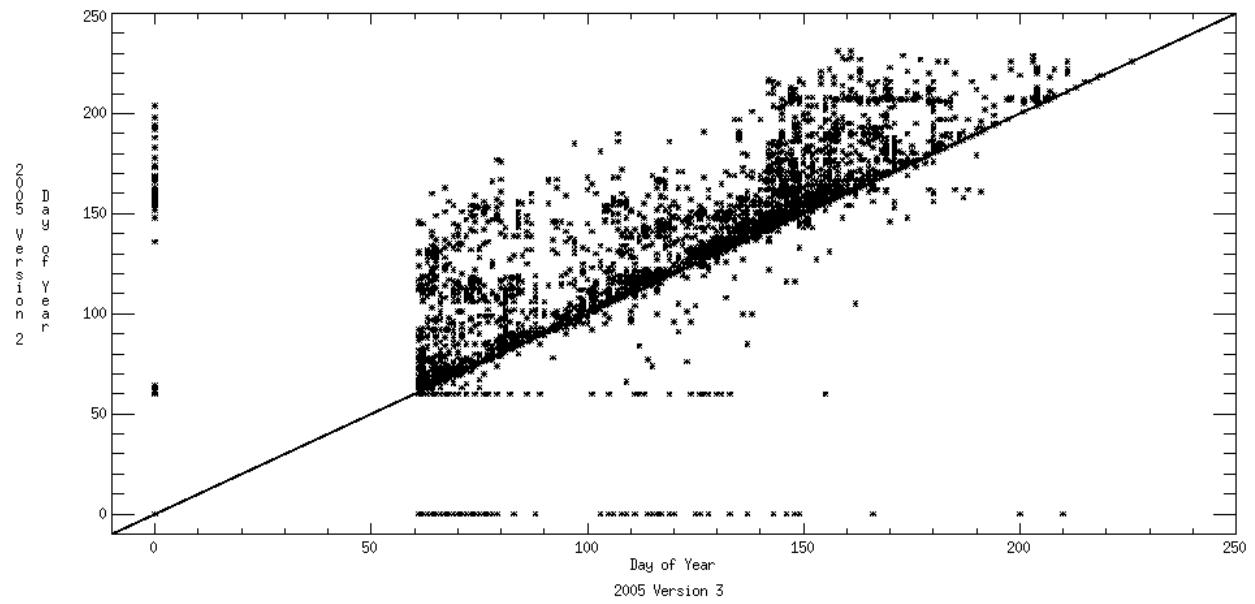


Figure S24. Scatter plot of V3 MO dates versus V2 MO dates for 2005 with 1:1 line.

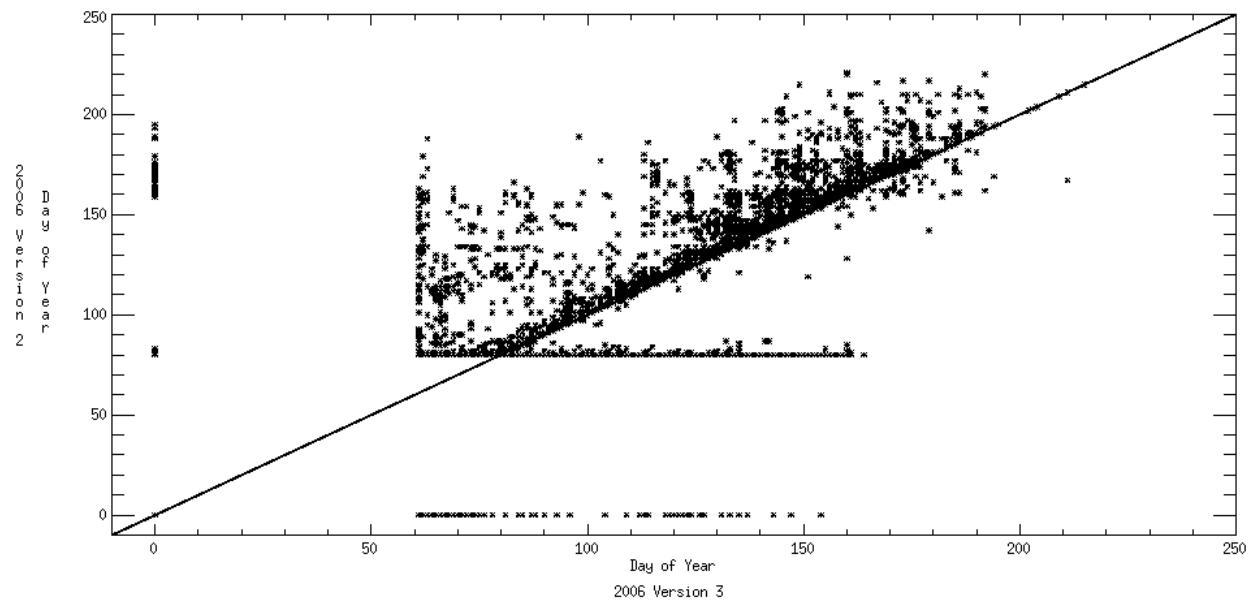


Figure S25. Scatter plot of V3 MO dates versus V2 MO dates for 2006 with 1:1 line.

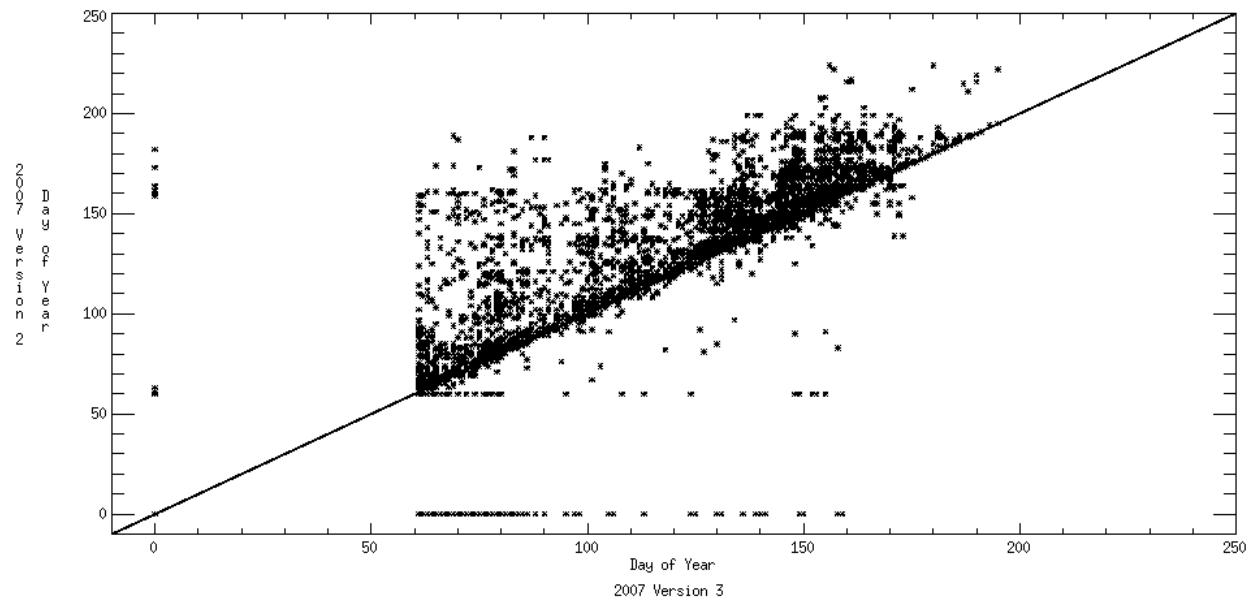


Figure S26. Scatter plot of V3 MO dates versus V2 MO dates for 2007 with 1:1 line.

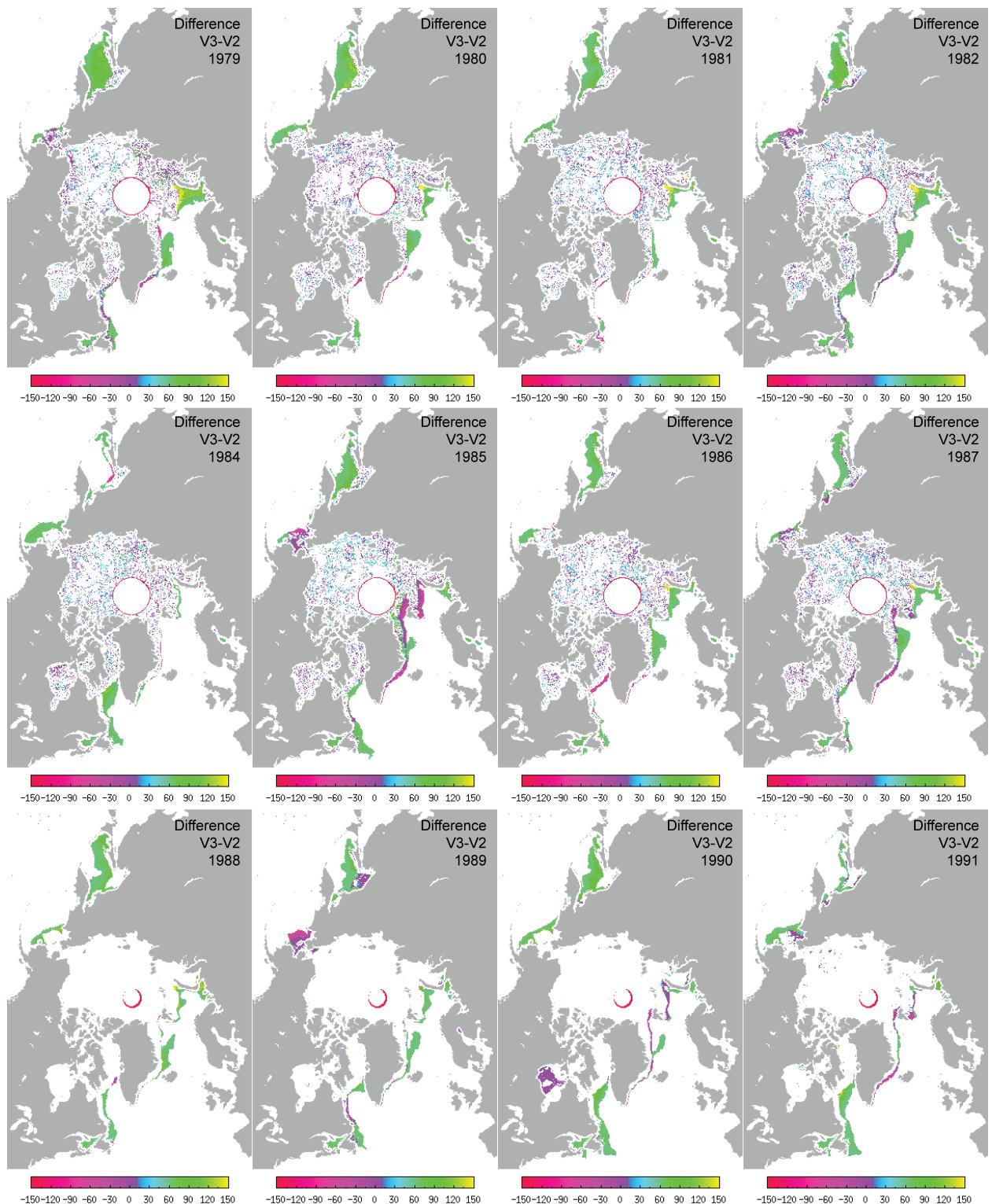


Figure S27. Difference maps for years 1979-1982, 1984-1991, 1992-2003, and 2005-2007.  
Maps show V2 MO dates subtracted from V3 MO dates.

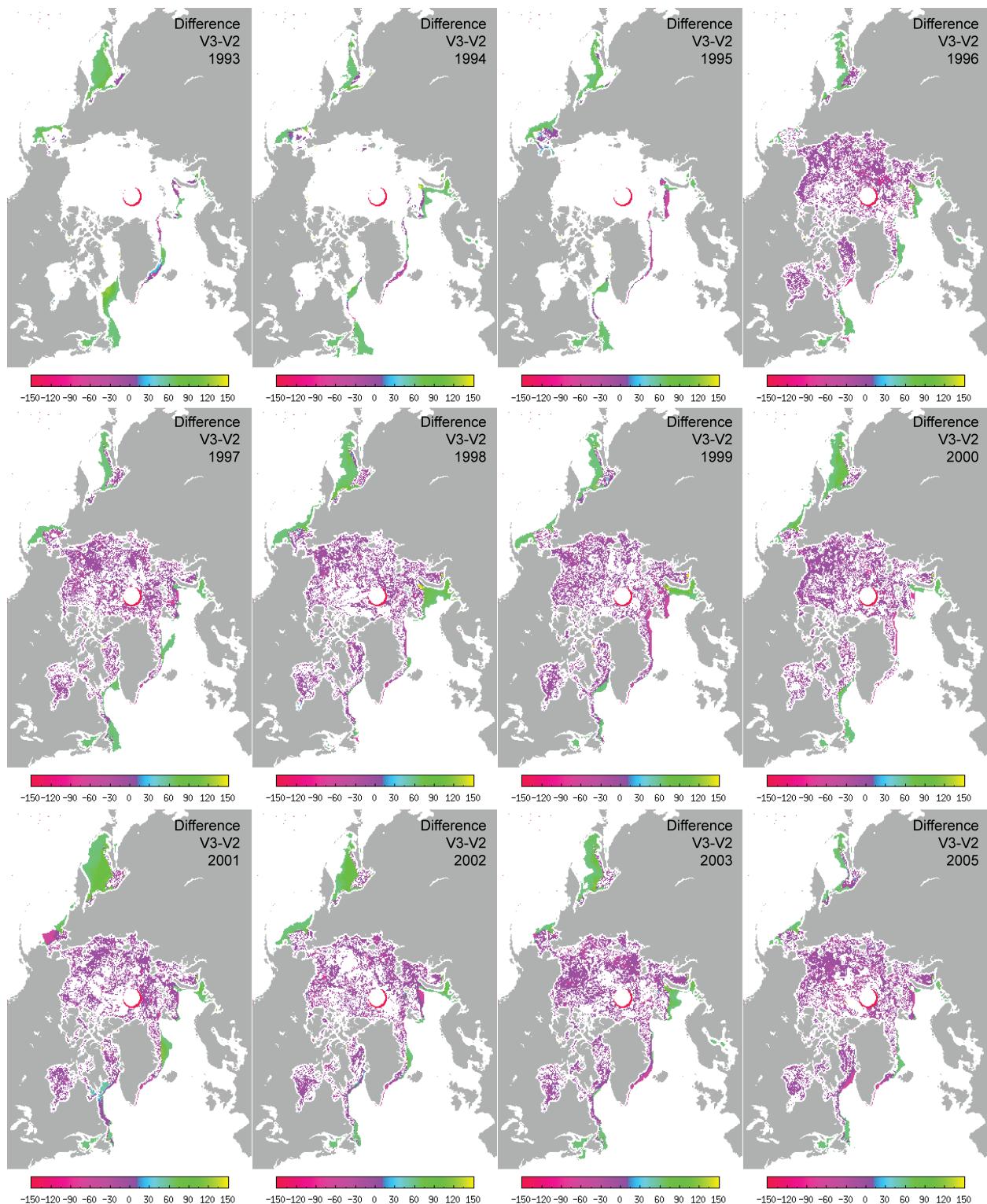


Figure S27. Difference maps for years 1979-1982, 1984-1991, 1992-2003, and 2005-2007.  
Maps show V2 MO dates subtracted from V3 MO dates. (Cont.)

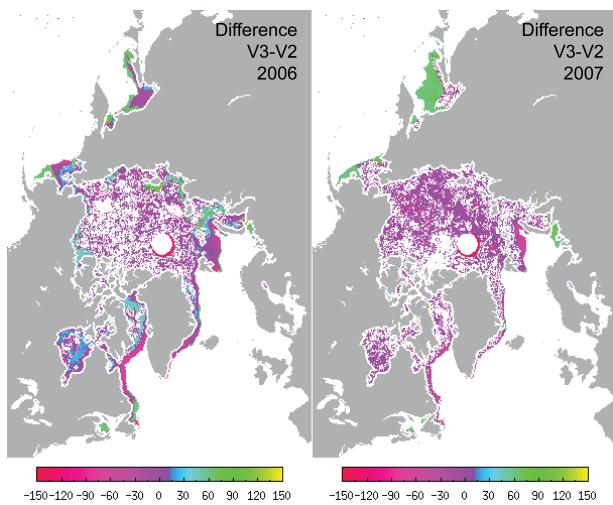


Figure S27. Difference maps for years 1979-1982, 1984-1991, 1992-2003, and 2005-2007.  
Maps show V2 MO dates subtracted from V3 MO dates. (Cont.)

Supplement Table S1. Annual Mean MO Dates

| Year | Arctic Region | Barents Sea | Kara Sea | Laptev Sea | East Siberian Sea | Chukchi Sea | Beaufort Sea | Canadian Archipelago |
|------|---------------|-------------|----------|------------|-------------------|-------------|--------------|----------------------|
| 1979 | 144.462       | 121.773     | 138.11   | 159.308    | 171.946           | 145.264     | 159.063      | 168.179              |
| 1980 | 142.199       | 106.085     | 141.047  | 158.773    | 169.379           | 148.812     | 162.075      | 161.12               |
| 1981 | 139.313       | 107.364     | 151.854  | 147.864    | 156.7             | 146.617     | 151.289      | 158.958              |
| 1982 | 146.527       | 120.458     | 152.372  | 167.066    | 171.866           | 142.973     | 155.363      | 156.727              |
| 1983 | 142.612       | 81.0937     | 146.023  | 154.737    | 174.769           | 148.066     | 158.646      | 157.558              |
| 1984 | 144.376       | 103.043     | 143.432  | 163.936    | 174.28            | 155.088     | 162.294      | 162.401              |
| 1985 | 139.757       | 91.4883     | 140.077  | 150.096    | 169.908           | 155.12      | 159.983      | 145.981              |
| 1986 | 139.192       | 93.6883     | 131.147  | 152.993    | 161.176           | 153.191     | 165.271      | 148.495              |
| 1987 | 142.891       | 101.885     | 145.811  | 157.006    | 173.166           | 160.619     | 161.042      | 159.895              |
| 1988 | 138.585       | 109.418     | 141.776  | 152.395    | 166.457           | 149.845     | 152.587      | 142.298              |
| 1989 | 133.764       | 95.3694     | 134.023  | 153.044    | 147.046           | 127.325     | 147.075      | 151.577              |
| 1990 | 125.27        | 84.7171     | 120.752  | 130.802    | 127.377           | 120.856     | 160.173      | 152.879              |
| 1991 | 133.671       | 90.636      | 126.422  | 137.169    | 144.641           | 146.194     | 149.8        | 142.658              |
| 1992 | 136.455       | 93.6829     | 127.769  | 146.904    | 145.726           | 136.711     | 145.175      | 153.603              |
| 1993 | 131.929       | 88.3622     | 129.778  | 138.572    | 143.491           | 141.545     | 149.692      | 142.489              |
| 1994 | 133.152       | 95.4414     | 138.068  | 146.543    | 152.868           | 145.594     | 142.51       | 138.303              |
| 1995 | 126.57        | 85.4072     | 108.229  | 143.396    | 155.292           | 125.716     | 132.853      | 144.497              |
| 1996 | 128.877       | 96.4108     | 136.399  | 153.521    | 144.308           | 117.103     | 138.763      | 142.034              |
| 1997 | 130.767       | 98.2811     | 120.748  | 133.785    | 148.421           | 130.077     | 151.773      | 148.298              |
| 1998 | 127.507       | 107.759     | 137.833  | 150.679    | 147.765           | 132.7       | 130.28       | 138.382              |
| 1999 | 132.627       | 93.6342     | 138.279  | 144.513    | 153.416           | 141.419     | 150.603      | 150.063              |
| 2000 | 132.661       | 86.1423     | 125.084  | 142.504    | 155.593           | 140.455     | 157.516      | 150.715              |
| 2001 | 133.851       | 101.128     | 133.389  | 149.386    | 148.183           | 141.71      | 151.793      | 143.17               |
| 2002 | 128.864       | 98.4847     | 127.265  | 141.842    | 137.413           | 117.373     | 140.738      | 149.971              |
| 2003 | 126.73        | 87.8577     | 123.168  | 126.966    | 141.942           | 126.045     | 136.503      | 148.165              |
| 2004 | 129.574       | 97.3387     | 138.869  | 155.017    | 138.578           | 124.216     | 146.157      | 152.511              |
| 2005 | 121.998       | 95.6396     | 125.487  | 139.763    | 132.226           | 112.599     | 143.484      | 142.208              |
| 2006 | 123.007       | 78.7423     | 123.889  | 142.064    | 138.793           | 133.513     | 139.677      | 135.93               |
| 2007 | 124.771       | 70.0901     | 122.887  | 123.387    | 135.807           | 131.562     | 141.67       | 148.844              |
| 2008 | 125.221       | 88.5243     | 122.326  | 142.963    | 131.257           | 120.09      | 134.652      | 138.657              |
| 2009 | 126.368       | 96.3063     | 125.867  | 141.377    | 128.603           | 117.728     | 130.085      | 150.183              |
| 2010 | 126.498       | 85.3027     | 120.541  | 138.064    | 145.003           | 139.523     | 142.858      | 144.089              |
| 2011 | 122.915       | 72.7045     | 98.4122  | 115.887    | 136.335           | 127.327     | 141.189      | 149.408              |
| 2012 | 120.979       | 69.5459     | 99.5728  | 124.971    | 133.128           | 131.828     | 140.391      | 144.302              |

Supplement Table S1. Annual Mean MO Dates (Cont.)

| Year | Central Arctic | Sea of Okhotsk | Bering Sea | Hudson Bay | Baffin Bay | Greenland Sea | Baltic Sea | St. Lawrence Gulf |
|------|----------------|----------------|------------|------------|------------|---------------|------------|-------------------|
| 1979 | 179.555        | 88.2445        | 72.8103    | 106.693    | 124.482    | 132.025       | 92.6897    | 68.8696           |
| 1980 | 171.568        | 91.0339        | 79.8431    | 108.83     | 123.238    | 107.127       | 89.4138    | 89.8696           |
| 1981 | 175.297        | 81.5808        | 73.8009    | 103.141    | 121.483    | 124.626       | 97.8276    | 68.913            |
| 1982 | 181.504        | 86.501         | 76.0703    | 111.934    | 136.98     | 127.502       | 85.0345    | 74.7826           |
| 1983 | 170.93         | 78.9122        | 78.171     | 115.402    | 137.111    | 111.355       | 70.3793    | 69.4348           |
| 1984 | 175.165        | 77.5339        | 71.8314    | 109.028    | 136.752    | 105.462       | 89.3448    | 72.1304           |
| 1985 | 168.5          | 87.1637        | 71.7002    | 112.357    | 116.471    | 118.204       | 97.0345    | 76.5217           |
| 1986 | 174.735        | 82.1038        | 78.2412    | 110.979    | 108.114    | 125.881       | 89.8276    | 74.913            |
| 1987 | 172.346        | 76.5669        | 81.4286    | 106.367    | 124.21     | 116.495       | 87.1724    | 86.087            |
| 1988 | 164.547        | 81.1527        | 88.4614    | 109.38     | 115.686    | 135.028       | 87.2414    | 72.8696           |
| 1989 | 158.191        | 71.2715        | 69.7869    | 119.337    | 126.105    | 134.858       | 67.4483    | 73.3478           |
| 1990 | 150.911        | 79.5878        | 75.2155    | 90.1347    | 132.278    | 127.971       | 71.5172    | 69.7391           |
| 1991 | 160.139        | 78.7226        | 84.3466    | 116.146    | 134.664    | 127.442       | 74.5862    | 70.087            |
| 1992 | 163.133        | 78.2455        | 90.2412    | 124.983    | 137.697    | 132.94        | 64.5172    | 66.087            |
| 1993 | 159.896        | 80.8403        | 82.0351    | 112.312    | 120.838    | 125.692       | 70.1034    | 75.4783           |
| 1994 | 160.396        | 89.3663        | 80.8197    | 109.278    | 108.638    | 125.739       | 72.8276    | 71                |
| 1995 | 156.017        | 83.6387        | 79.3747    | 96.6262    | 113.893    | 126.532       | 68.7586    | 70.3478           |
| 1996 | 159.686        | 74.8782        | 73.0937    | 110.349    | 114.118    | 98.2906       | 99.4138    | 76.4348           |
| 1997 | 161.624        | 70.9182        | 76.1101    | 108.392    | 122.57     | 127.13        | 85.5517    | 72.7391           |
| 1998 | 152.004        | 84.9132        | 75.534     | 101.596    | 102.482    | 107.218       | 86.7241    | 73.8261           |
| 1999 | 156.84         | 82.7435        | 89.8829    | 96.5245    | 127.314    | 108.27        | 72.8276    | 62.1304           |
| 2000 | 158.797        | 77.4132        | 79.9016    | 99.3606    | 124.697    | 127.567       | 71.069     | 66.9565           |
| 2001 | 161.405        | 83.6178        | 76.74      | 102.558    | 124.487    | 132.838       | 81.6552    | 79.3478           |
| 2002 | 156.191        | 81.9371        | 72.8478    | 114.947    | 119.911    | 120.02        | 75.3793    | 78.1304           |
| 2003 | 160.15         | 82.9661        | 72.7307    | 108.489    | 108.518    | 117.178       | 67         | 73.5217           |
| 2004 | 156.189        | 75.5459        | 73.1335    | 106.643    | 115.059    | 102.286       | 71.2759    | 67.3913           |
| 2005 | 153.558        | 78.2275        | 72.185     | 89.1879    | 105.502    | 109.255       | 79.8276    | 67.2609           |
| 2006 | 149.68         | 75.3463        | 95.6979    | 94.4868    | 104.948    | 96.2952       | 87.069     | 67.2174           |
| 2007 | 151.475        | 77.0828        | 81.4684    | 98.1248    | 125.892    | 122.81        | 63.0345    | 75                |
| 2008 | 152.615        | 76.3234        | 81.0843    | 105.077    | 124.688    | 127.547       | 64.931     | 75.1304           |
| 2009 | 150.208        | 77.8693        | 92.4333    | 118.85     | 121.015    | 113.034       | 72.3103    | 73.3478           |
| 2010 | 154.546        | 93.2894        | 88.911     | 94.3625    | 103.851    | 104.547       | 80.2069    | 91.5652           |
| 2011 | 150.132        | 78.3543        | 84.1241    | 113.175    | 115.569    | 116.42        | 76.931     | 65.0435           |
| 2012 | 143.804        | 84.7774        | 95.1522    | 97.9459    | 120.53     | 108.014       | 69.1379    | 72.2174           |