Data Overview:
Predicting Future Springs

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1 Overview of the phenological data

There are two main files with the phenological data. They can both be downloaded from `https://github.com/AileneKane/radcliffe`.

1.1 Experimental data

We'll walk through the experimental datafile first. Repeat what's below for the observational data ....

```
> head(expdata)
```

```
     site plot event year genus species doy variety cult
1 marchin    1   bbd 2011  Acer  rubrum  88      NA   NA
2 marchin    1   bbd 2011  Acer  rubrum  83      NA   NA
3 marchin    1   bbd 2011  Acer  rubrum  96      NA   NA
4 marchin    1   bbd 2011  Acer  rubrum  79      NA   NA
5 marchin    1   bbd 2011  Acer  rubrum  83      NA   NA
6 marchin    1   bbd 2011  Acer  rubrum  80      NA   NA
```

1.2 Observational data

Next, the observational data. Here we explain what each column means ....

```
> head(obsdata)
```

```
    site plot event year doy       date genus   species scrub varetc cult
1 fitter <NA>   ffd 1954 130 1954-05-10  Acer campestre     0     NA   NA
2 fitter <NA>   ffd 1955 131 1955-05-11  Acer campestre     0     NA   NA
3 fitter <NA>   ffd 1956 137 1956-05-16  Acer campestre     0     NA   NA
4 fitter <NA>   ffd 1957 121 1957-05-01  Acer campestre     0     NA   NA
5 fitter <NA>   ffd 1958 128 1958-05-08  Acer campestre     0     NA   NA
6 fitter <NA>   ffd 1959 129 1959-05-09  Acer campestre     0     NA   NA
```

Then we could discuss the sites, and the phenological events ...

```
> unique(obsdata$site)
```

```
 [1] fitter   harvard  hubbard  konza    niwot    mikesell concord  mohonk   marsham
[10] fargo    washdc   bolmgren gothic   uwm      rousi
15 Levels: bolmgren concord fargo fitter gothic harvard hubbard konza ... washdc
```

```
> table(obsdata$site, obsdata$event)
```

```
          L75mdoy L95mdoy    bbd    ffd    fld    lod    lud     sd
  bolmgren       0       0      0   1825      0      0      0      0
  concord        0       0      0  25668      0      0      0      0
  fargo          0       0      0   4725      0      0      0      0
  fitter         0       0      0  13721      0      0      0      0
  gothic         0       0      0 162749      0      0      0      0
  harvard        0       0    508    307      0      0      0      0
  hubbard        0       0     72      0      0     72      0      0
  konza          0       0      0   3412      0      0      0      0
  marsham        0       0      0   2131    660      0      0      0
  mikesell       0       0    445      0      0    549    554      0
  mohonk         0       0      0    673      0      0      0      0
  niwot          0       0   1280   1280      0      0      0   1280
  rousi          0       0   1021    189      0      0      0      0
  uwm          416     416    416      0      0      0      0      0
  washdc         0       0      0   7458      0      0      0      0
```

1.3 Species

```
> expdata$latbi <- paste(expdata$genus, expdata$species)
> obsdata$latbi <- paste(obsdata$genus, obsdata$species)
> length(expdata$latbi)
```

```
[1] 1123030
```

```
> length(obsdata$latbi)
```

```
[1] 231827
```

How many (and which species overlap between the two approaches?

```
> unique(expdata$latbi)[which(unique(expdata$latbi) %in% unique(obsdata$latbi))]
```

```
 [1] "Acer rubrum"              "Carya tomentosa"          "Quercus alba"
 [4] "Vaccinium pallidum"       "Vaccinium stamineum"      "Quercus rubra"
 [7] "Chimaphila maculata"      "Hieracium venosum"        "Thalictrum thalictroides"
```

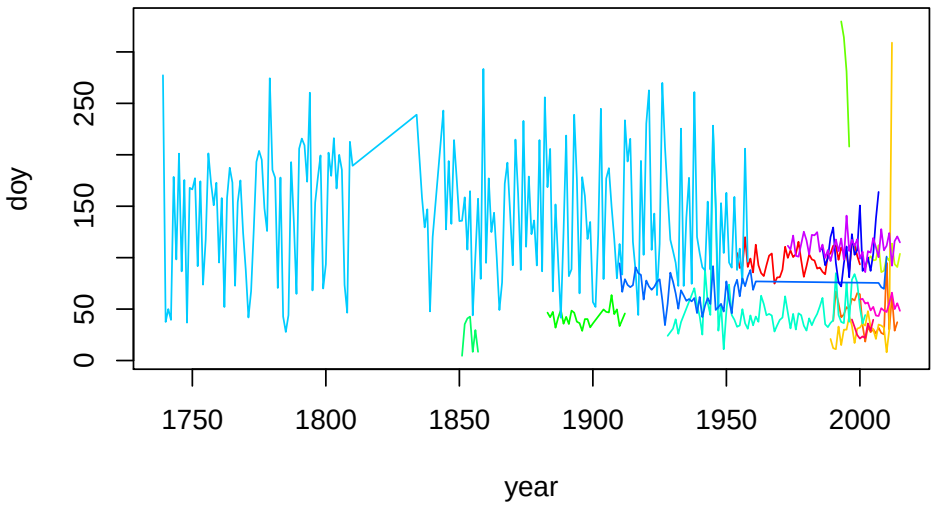

Figure S1: Mean day of year (averaged across all events and species) by year from the observational data.

```
[10] "Betula lenta"             "NA NA"                 "Fagus grandifolia"
[13] "Acer pensylvanicum"       "Castanea dentata"      "Viburnum lentago"
[16] "Vaccinium corymbosum"     "Vaccinium vacillans"   "Prunus serotina"
[19] "Viburnum acerifolium"     "Bromus hordeaceus"     "Vulpia myuros"
[22] "Geranium dissectum"       "Vicia sativa"          "Liriodendron tulipifera"
[25] "Pinus taeda"              "Fraxinus americana"    "Nyssa sylvatica"
[28] "Acer saccharum"           "Cornus florida"        "Liquidambar styraciflua"
[31] "Ulmus americana"          "Pinus strobus"         "Pinus virginiana"
[34] "Quercus phellos"          "Quercus velutina"      "Betula alleghaniensis"
[37] "Betula papyrifera"        "Carya glabra"          "Carya ovata"
[40] "Quercus falcata"          "Magnolia virginiana"   "Diospyros virginiana"
[43] "Juniperus virginiana"     "Ilex opaca"            "Quercus stellata"
[46] "Quercus coccinea"         "Cercis canadensis"     "Prunus pensylvanica"
[49] "Achillea millefolium"     "Andropogon gerardii"   "Erigeron strigosus"
[52] "Panicum virgatum"
```