

Supplementary Material to "Ambiguous agricultural drought: characterising soil moisture and vegetation droughts in Europe from earth observation"

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1 Introduction

This Supplementary Material is intended to provide a more detailed background information on the separate drought events discussed in the paper and to visualise the data underlying the results.

Figures S1 to S5 provide illustrations of each drought event, with separate colours for pixels that are identified as in a soil moisture drought ($SM < -1$, purple), a vegetation drought (green, $NDVI < -1$) or both (orange).

Figure S6 is included in this document to provide an overview of spatial differences in correlation between soil moisture and NDVI anomalies.

Figures S7 and S8 show the reaction of different land use types on drought conditions. Figure S7 contains all pixels in drought areas which have at least 90% coverage in the CCI landcover dataset from 2018 in one of the following categories:

- 10 – Cropland, rainfed, tree or shrub cover
- Tree cover, broadleaved, evergreen, closed to open (>15%)
- Tree cover, broadleaved, deciduous, closed to open (>15%)
- Tree cover, broadleaved, deciduous, closed (>40%)
- Tree cover, broadleaved, deciduous, open (15-40%)
- 15 – Tree cover, needleleaved, deciduous, closed to open (>15%)
- Tree cover, needleleaved, deciduous, closed (>40%)
- Tree cover, needleleaved, deciduous, open (15-40%)
- Tree cover, needleleaved, evergreen, closed to open (>15%)

- Tree cover, needleleaved, evergreen, closed (>40%)
- 20 – Tree cover, needleleaved, evergreen, open (15-40%)
- Tree cover, mixed leaf type (broadleaved and needleleaved)
- Mosaic T and shrub (>50%) / herbaceous cover (<50%)

Figure S8 contains all pixels in drought areas which have at least 90% coverage in the CCI landcover dataset from 2018 in one of the following categories:

- 25 – Cropland, rainfed
- Cropland, rainfed, herbaceous cover
- Cropland irrigated or post-flooding
- Mosaic cropland (>50%) / natural vegetation (Tree, shrub, herbaceous cover) (<50%)
- Mosaic natural vegetation (Tree, shrub, herbaceous cover) (>50%) / cropland (<50%)
- 30 – Grassland
- Sparse vegetation (tree, shrub, herbaceous cover) (<15%)

Figures S9 to S12 show average time series of soil moisture (S9, S10) and NDVI (S11, S12), from May in the year prior to the event until the end of the event (September) in the selected pixels. All values in the selected event extent, according to the SPI6 rule as discussed in the main document, were averaged per monthly time step. Figures are provided both for the
35 anomalies (S9, S11) and the original values (S10,S12).

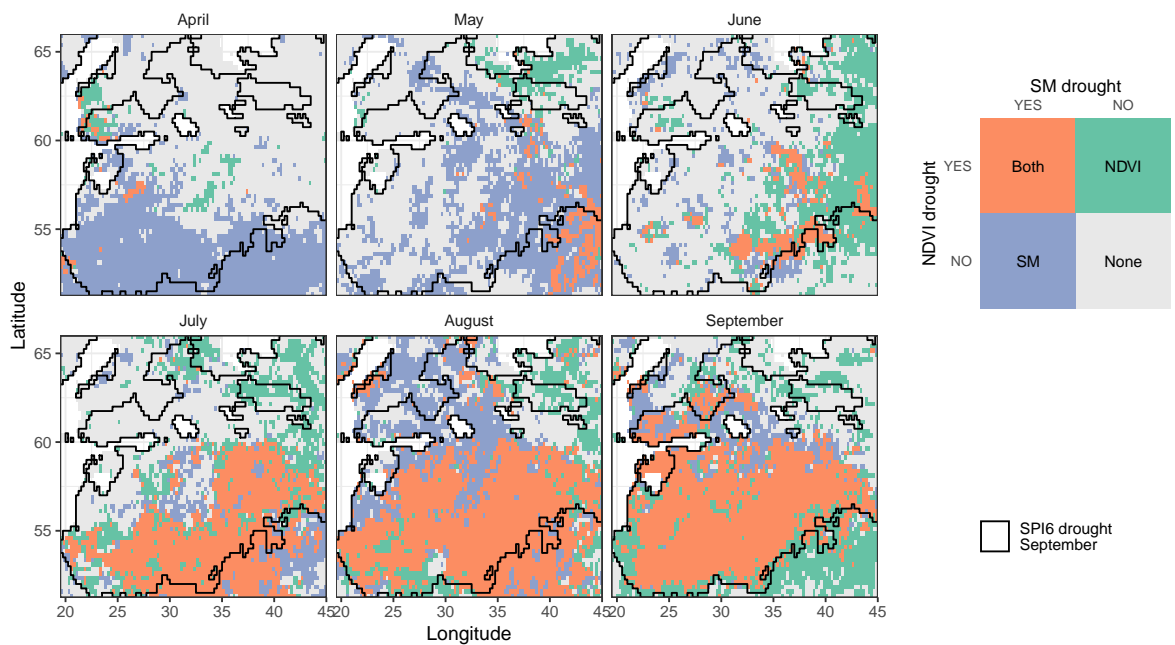


Figure S1. Soil moisture and vegetation anomalies during the 2002 growing season, produced in the same way as Figure 2 in the main document.

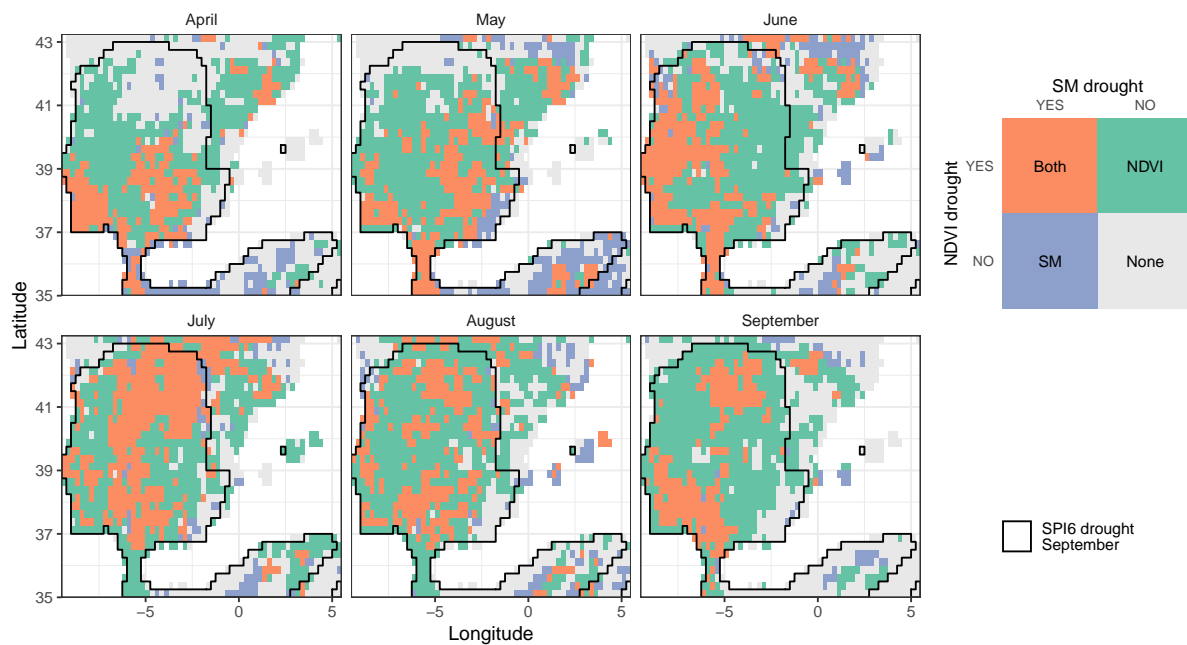


Figure S2. Soil moisture and vegetation anomalies during the 2005 growing season, produced in the same way as Figure 2 in the main document.

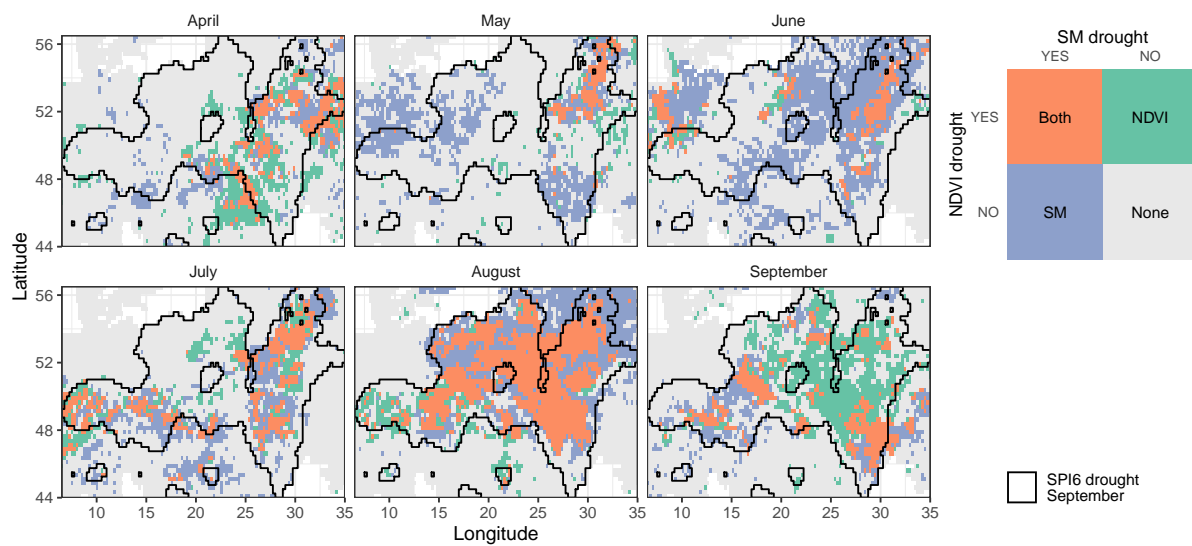


Figure S3. Soil moisture and vegetation anomalies during the 2015 growing season, produced in the same way as Figure 2 in the main document.

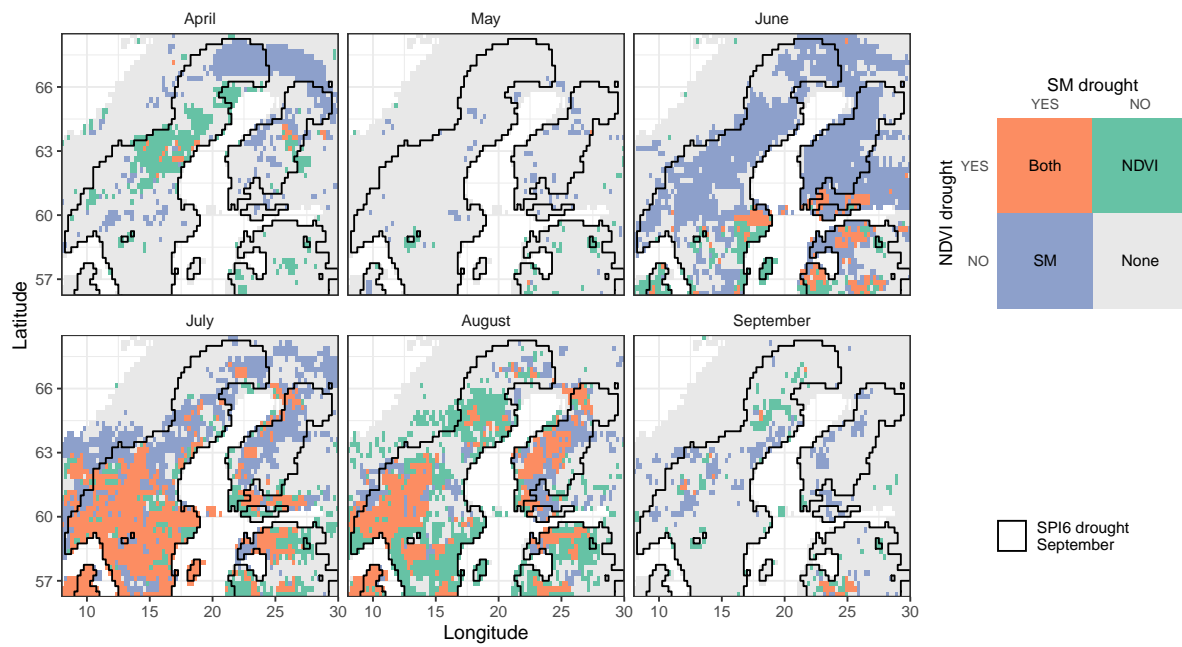


Figure S4. Soil moisture and vegetation anomalies during the 2018 growing season (northern part of drought event), produced in the same way as Figure 2 in the main document.

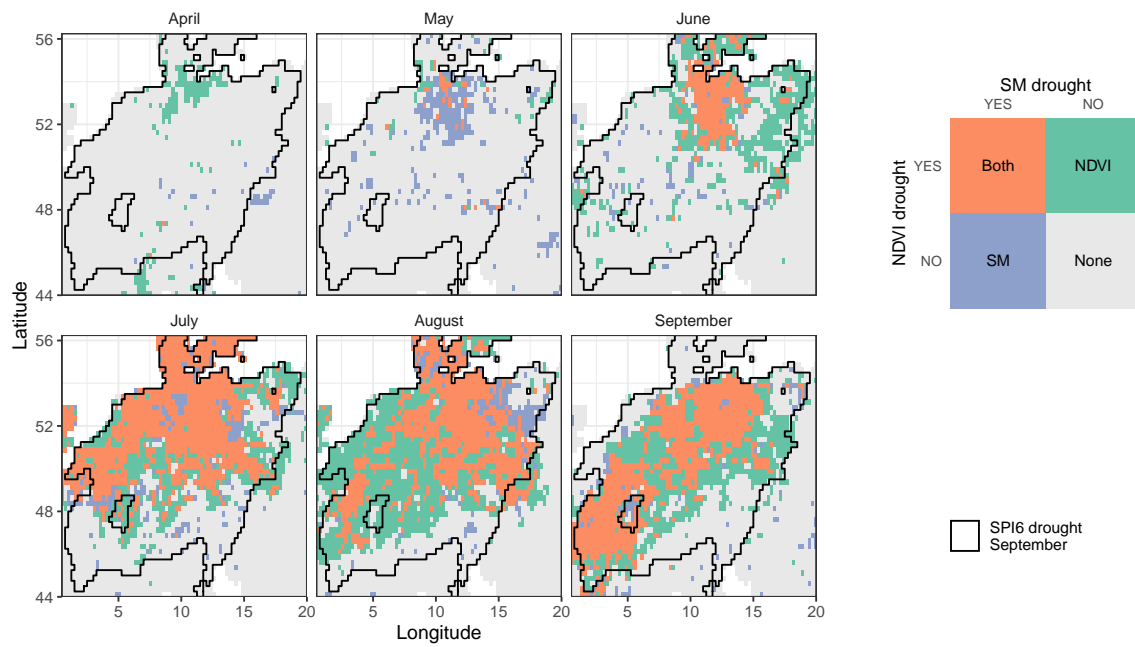


Figure S5. Soil moisture and vegetation anomalies during the 2018 growing season (southern part of drought event), produced in the same way as Figure 2 in the main document.

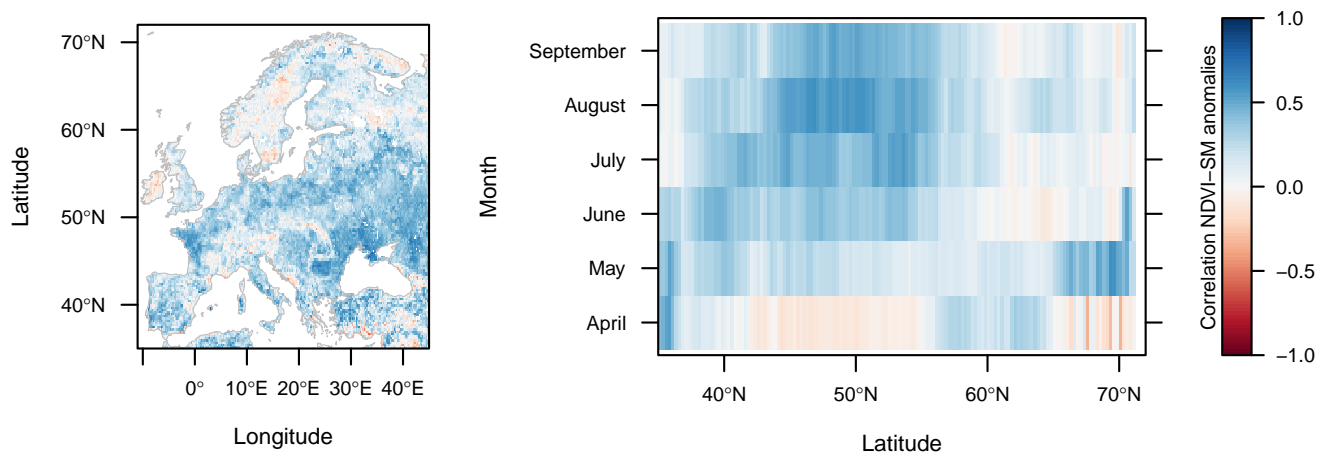


Figure S6. Correlation between soil moisture and NDVI, in space (left), and zonal averages throughout the growing season (right).

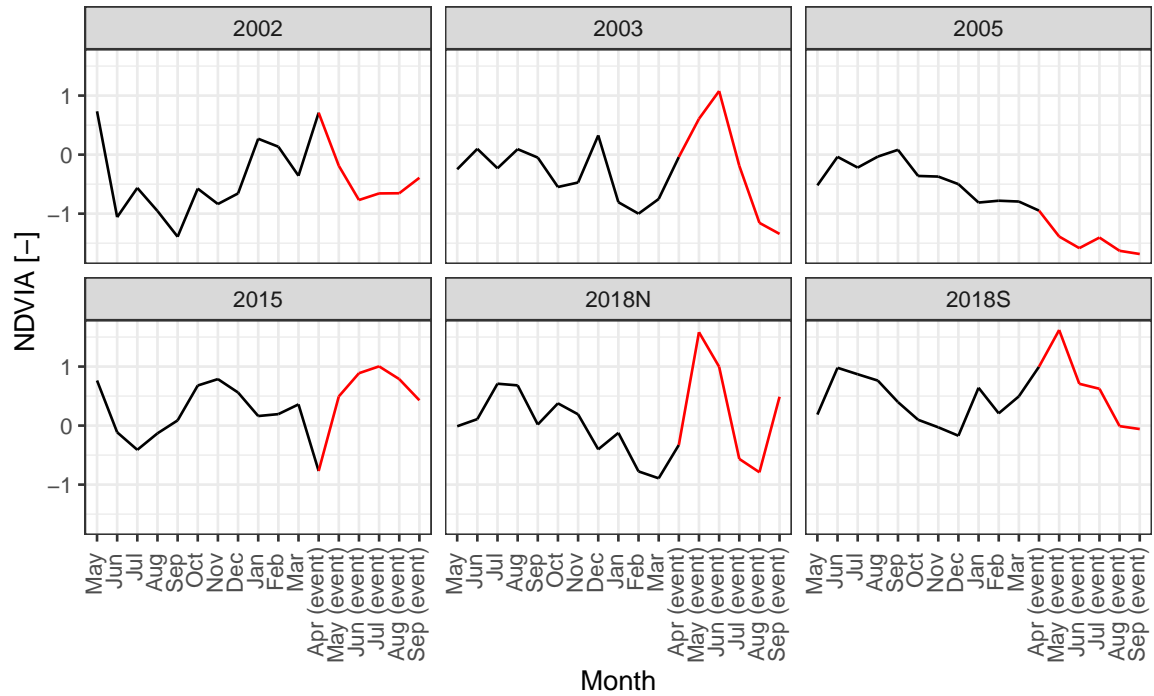


Figure S7. Average NDVI anomalies in forested pixels in event areas prior to (black) and during (red) each event.

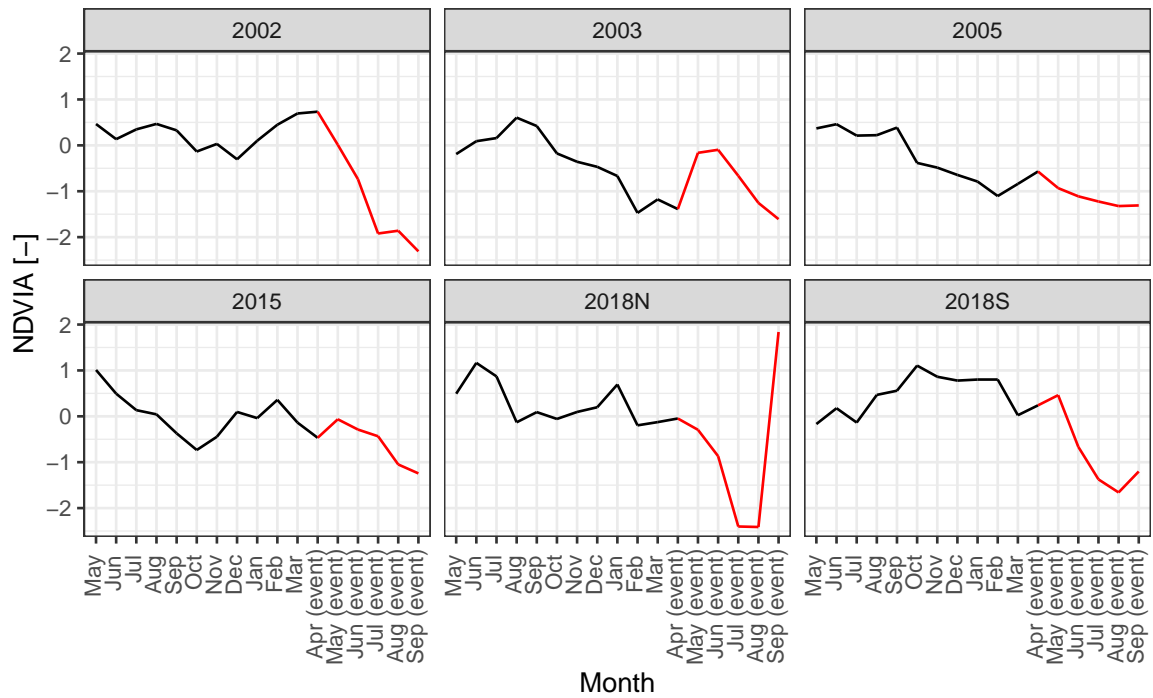


Figure S8. Average NDVI anomalies in grassland pixels in event areas prior to (black) and during (red) each event.

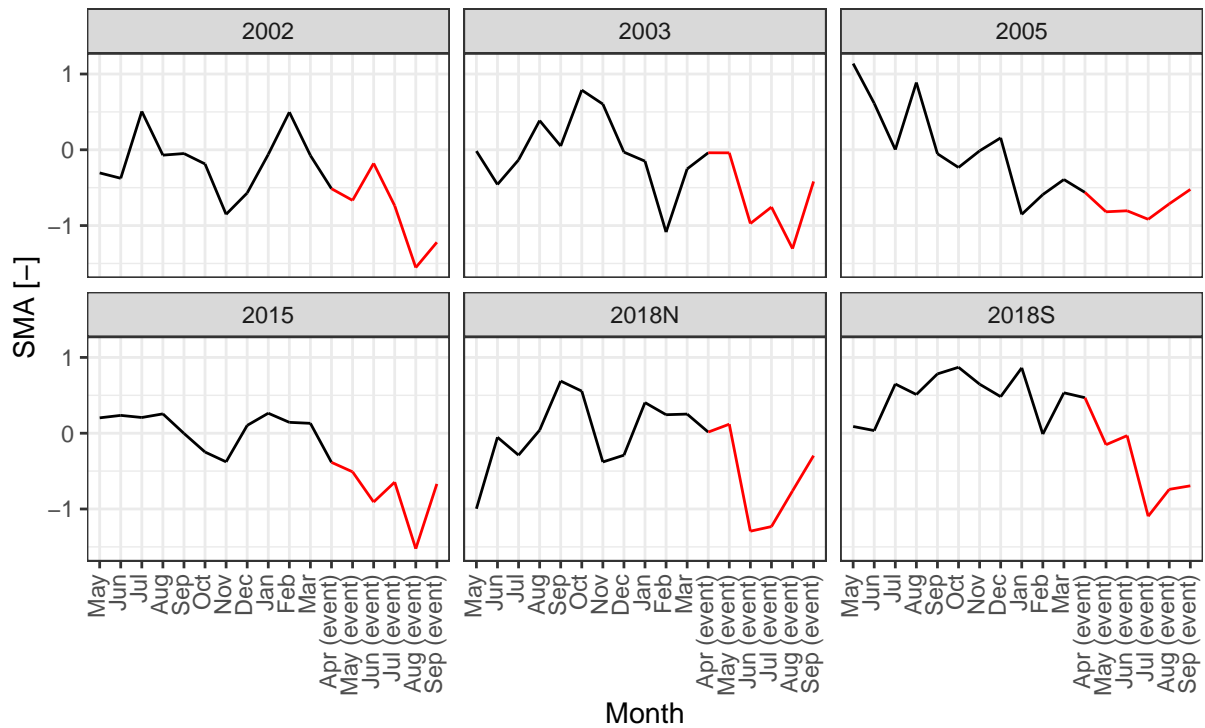


Figure S9. Average soil moisture anomalies in event areas prior to (black) and during (red) each event.

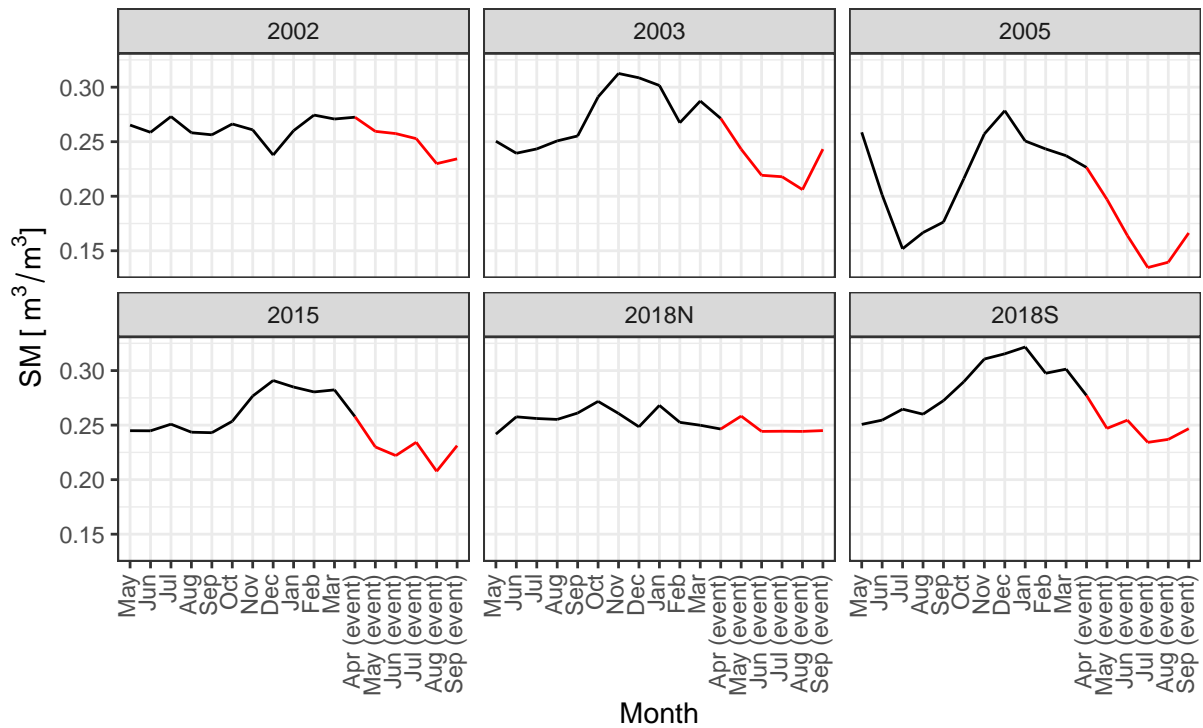


Figure S10. Average soil moisture in event areas prior to (black) and during (red) each event.

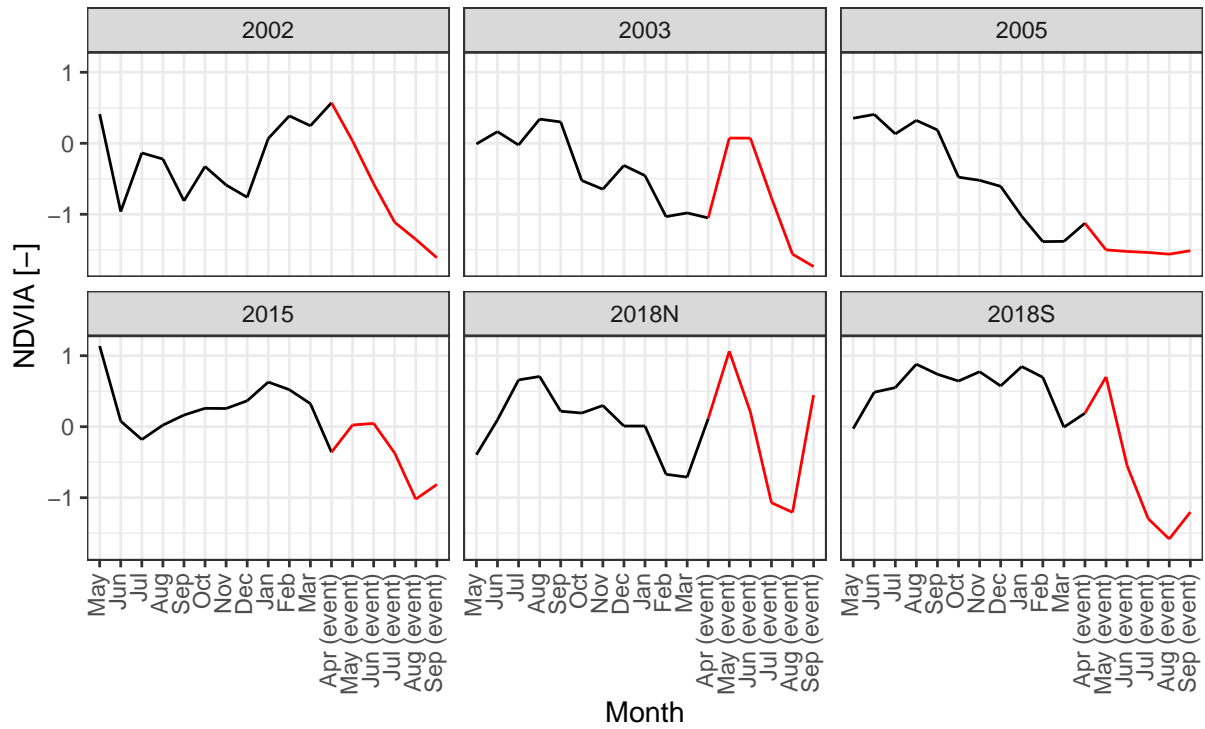


Figure S11. Average NDVI anomalies in event areas prior to (black) and during (red) each event.

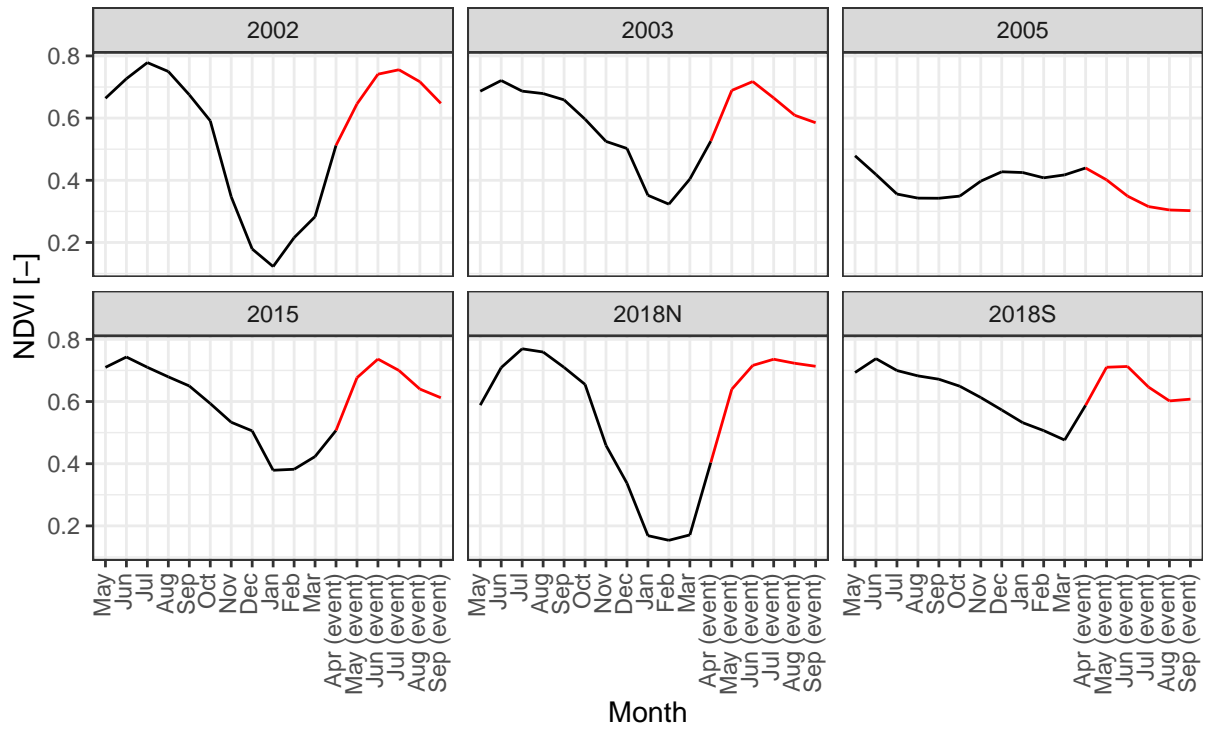


Figure S12. Average NDVI in event areas prior to (black) and during (red) each event.