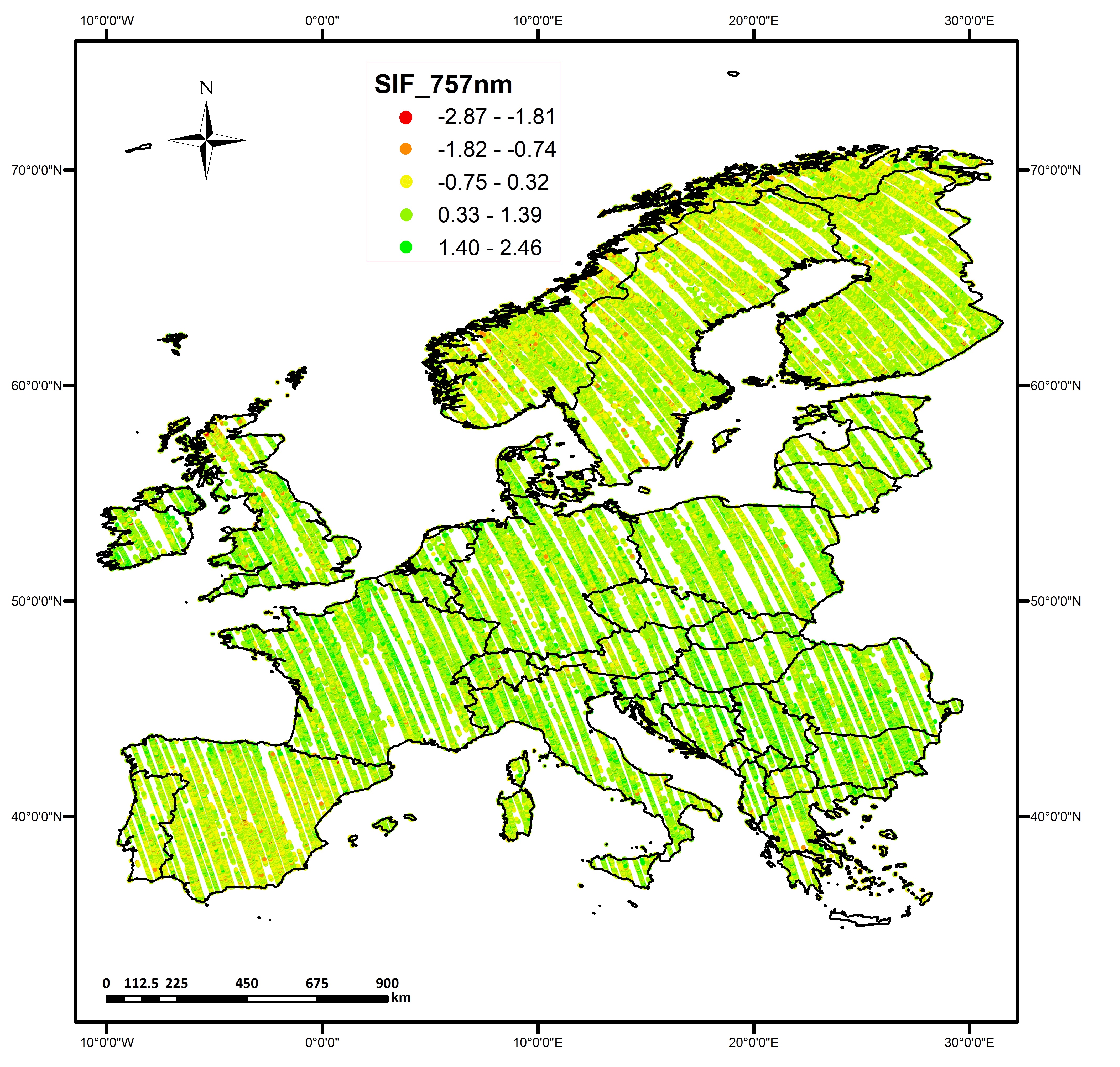
Supplementary section

Table S1: Relative vegetation class area in percentage for drought and non-drought area

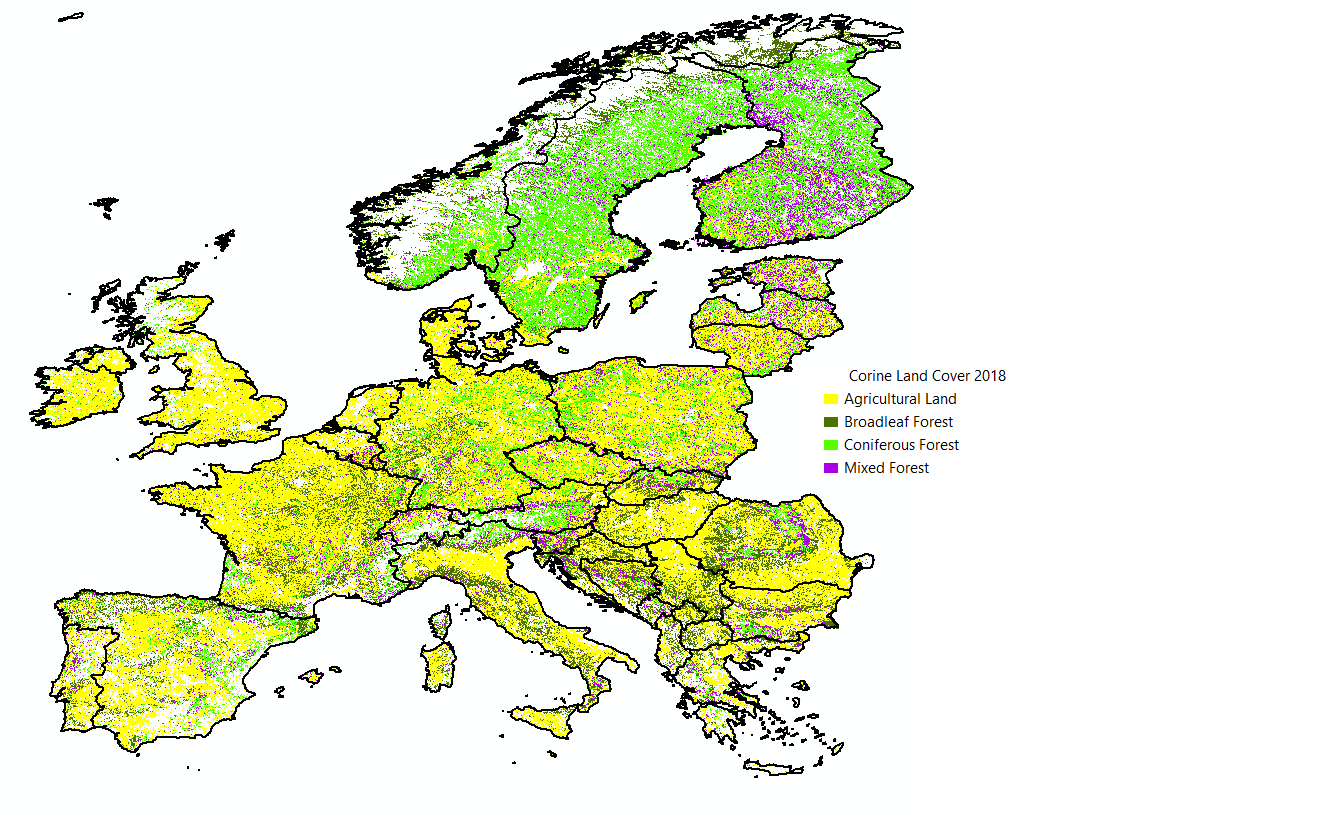
|  |  |  |
| --- | --- | --- |
| **Vegetation type (%)** | **Drought Area** | **Non-Drought Area** |
| **Agricultural area** | 53.2 | 57.4 |
| **Broadleaved Forest** | 4.2 | 21.4 |
| **Coniferous** | 37.4 | 16.4 |
| **Mixed Forest** | 5.2 | 4.8 |

Table S2: Percentage of Nadir OCO-2 measurements mode for the Mean years (2015-2017) and 2018, from total OCO-2 measurements (Nadir + Glint) mode used in the study.

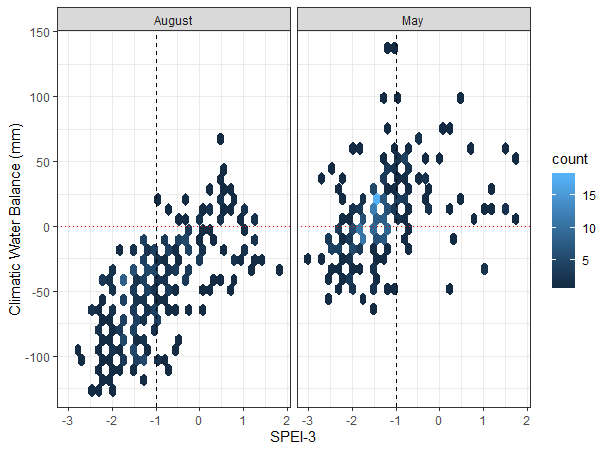
|  |  |  |
| --- | --- | --- |
|  | **% Nadir mode** | |
| **Land-cover** | **Mean (2015-2017)** | **2018** |
| **Agricultural** | 50.8 | 51.2 |
| **Broadleaf Forest** | 50.3 | 50.1 |
| **Coniferous Forest** | 51.1 | 51.5 |
| **Mixed Forest** | 52.1 | 52.7 |



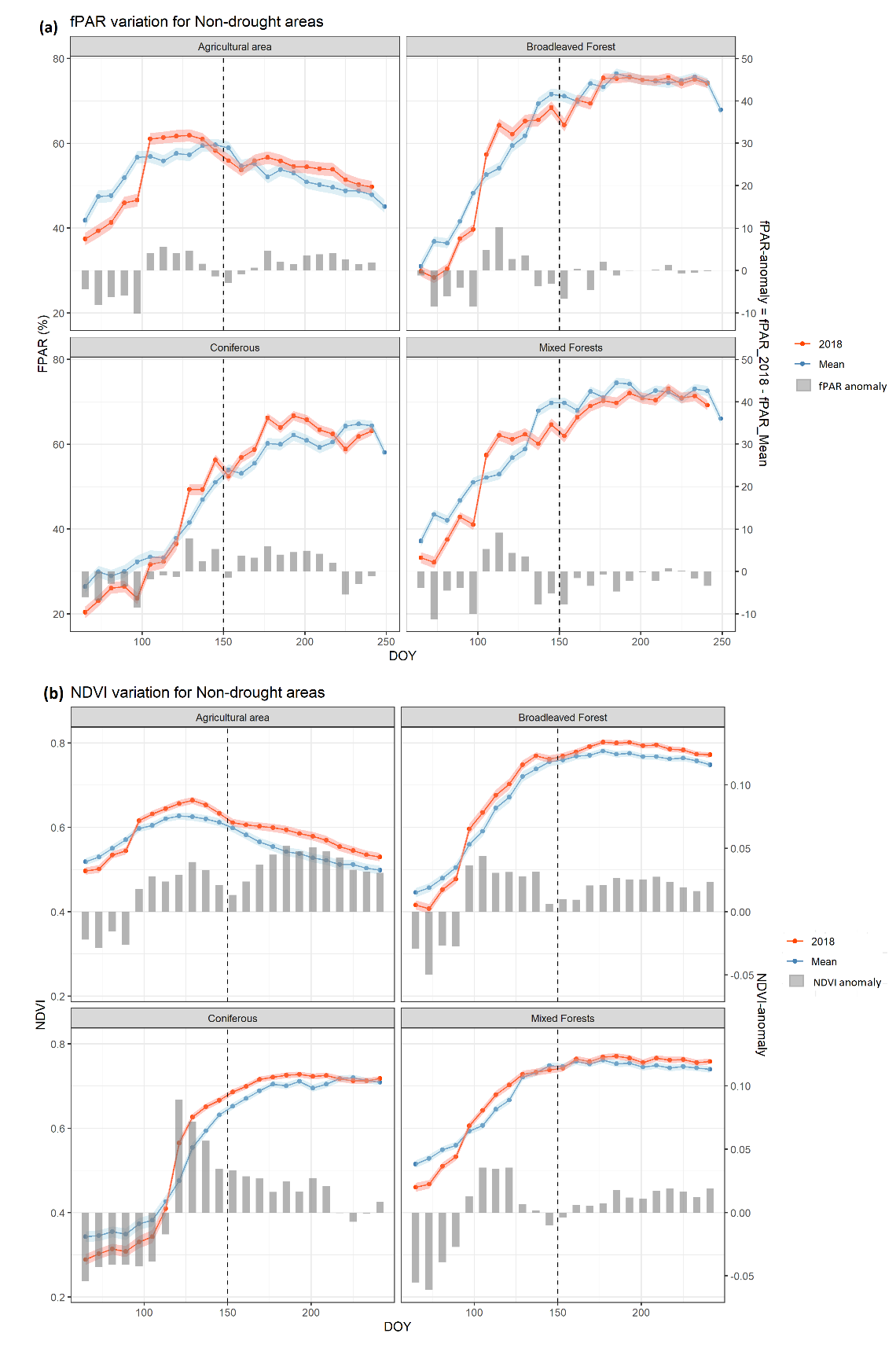
**Figure S1.** Illustration of the spatial distribution and orbit track of OCO-2 SIF soundings of spring and summer season for Europe in 2018. The temporal resolution is 16 days. The SIF values are retrieved at 757 nm (SIF757; units - W/m2/sr/µm)



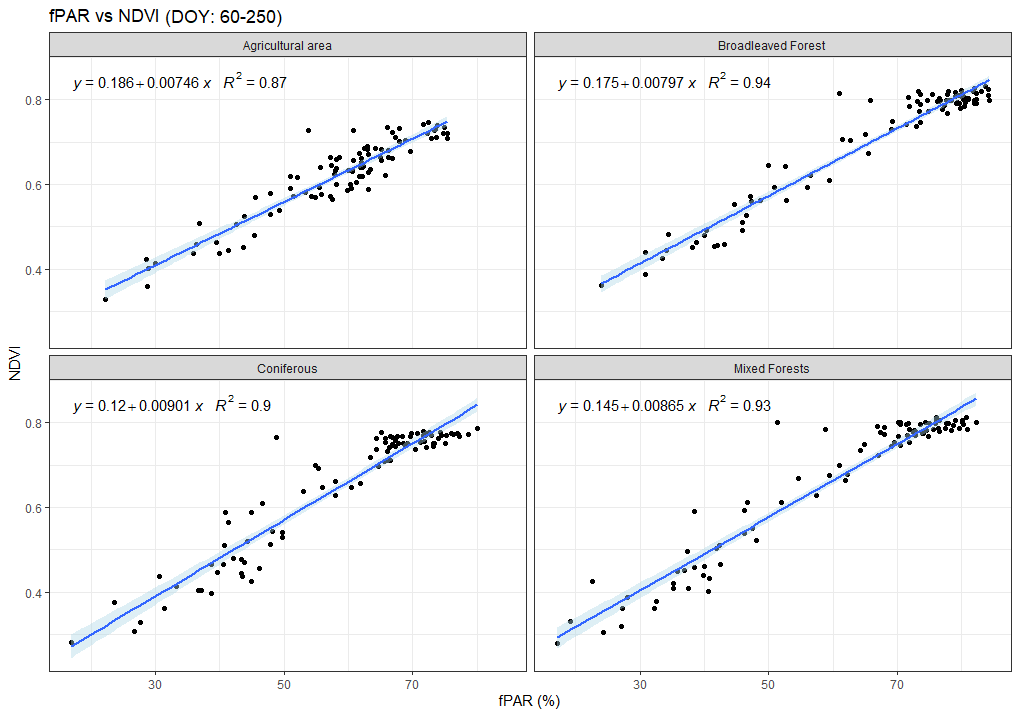
**Figure S2.** Land cover map of Europe showing agriculture, broadleaf forest, coniferous forest and mixed forest based on Corine Land Cover (CLC) 2018, version 20b2.



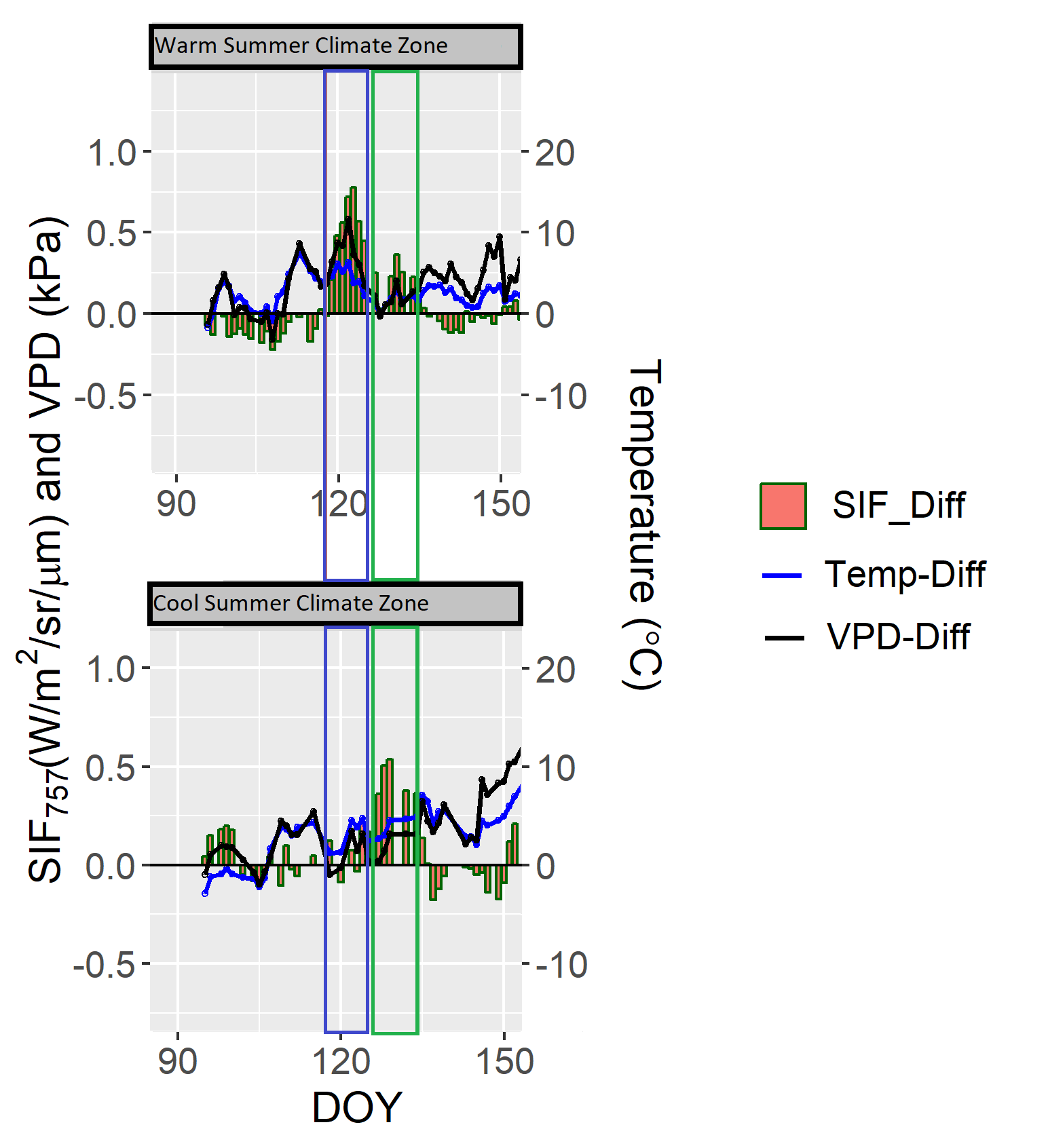
**Figure S3:** Representation of climatic water balance (CWB) by the SPEI-3 values during spring (May month) and summer (August month). The vertical line represents the SPEI-3 threshold for defining drought conditions in the study area.



**Figure S4:** Variation of (a) fPAR and (b) NDVI for non-drought area across different vegetation types as observed from MODIS fPAR product (MYD15A2H) version 6 and MODIS NDVI product (MOD/MYD13Q1) version 6. The fPAR and NDVI values are sampled from the OCO-2 SIF footprint and are spatially and temporally averaged for three previous years (2015-2017; ‘Mean’) and year 2018 (‘2018’). fPAR anomalies (fPAR\_2018 – fPAR\_Mean) and NDVI anomalies (NDVI\_2018 – NDVI\_Mean) are represented by gray bars. The left and right side of vertical solid line represents spring and summer season, respectively.



**Figure S5.** Relationship between fPAR and NDVI for different vegetation types.



**Figure S6.** Two peaks in the broadleaved forest during summer resulting from a different timing in leaf flushing in the warm summer (Central Europe, blue box) and cool summer (Northern Europe, green box) climate zones of the drought area.