List of input variables and measured variables for French data set – Phase 4

Variables in blue are the measrements available for calibration

|  |  |  |
| --- | --- | --- |
| Column name  Where information is repeated for several layers or doses, just one is given here | explanation | Unit |
| Number | ID |  |
| Site | Name of location |  |
| HarvestYear | Harvest year | YYYY |
| SowingDate | Sowing date | DD/MM/YYYY |
| Variety | Crop variety |  |
| Postal\_code | Zip code of location, connection to weather stations |  |
| Longitude | Longitude |  |
| Latitude | Latitude |  |
| Altitude | Altitude | m |
| Soil\_type | Soil type |  |
| Soil\_code | Soil code | code |
| Arvalis\_name\_for\_soil | Arvalis name for soil |  |
| Water\_regime | Water regime;  1: rapid drainage: coarse structure or high porosity  2: favorable drainage: no risk of excess water below 90 cm | . |
| N\_Horizons | Number of soil layers |  |
| Thickness\_H1 | Thickness of layer 1 | cm |
| Field\_capacity\_H1 | Gravimetric field capacity by layer in % | (g/100g) |
| Wilting\_point\_H1 | Gravimetric Wilting point layer 1 in % | (g/100g) (pF 4.2) |
| Apparent\_density\_H1 | Apparent density of soil layer 1 | kg/dm3 (=g/cm3) |
| Available\_water\_H1 | Available water layer 1 | See formula below (mm) |
| Clay\_H1 | Clay layer 1 | % by weight (g/100g) |
| Fine\_silt\_H1 | Fine silt layer 1 | % by weight (g/100g) |
| Coarse\_silt\_H1 | Coarse silt layer 1 | % by weight (g/100g) |
| Fine\_sand\_H1 | Fine sand layer 1 | % by weight (g/100g) |
| Coarse\_sand\_H1 | Coarse sand layer 1 | % by weight (g/100g) |
| Clay\_without\_CaCO3\_H1 | Clay without CaCO3 layer 1 0 means missing data. | % by weight (g/100g) |
| Fine\_silt\_without\_CaCO3\_H1 | Fine silt without CaCO3 layer 1  0 means missing data. | % by weight (g/100g) |
| Coarse\_silt\_without\_CaCO3\_H1 | Coarse silt without CaCO3 layer 1  0 means missing data. | % by weight (g/100g) |
| Fine\_sand\_without\_CaCO3\_H1 | Fine sand without CaCO3 layer 1  0 means missing data. | % by weight (g/100g) |
| Coarse\_sand\_without\_CaCO3\_H1 | Coarse sand without CaCO3 layer 1  0 means missing data. | % by weight (g/100g) |
| CaCO3\_total\_H1 | Total CaCO3 layer 1  0 means missing data. | % by weight (g/100g) |
| Organic\_matter\_H1 | Organic matter layer 1 | % by weight (g/100g) |
| Stones\_H1 | Stones layer 1 | % vol |
| Stone\_size\_H1 | Stone size layer 1 | cm |
| Water\_pH\_H1 | Water pH layer 1 |  |
| Initial\_available\_soil\_water | Initial available soil water | Ignore this value! |
| Available\_soil\_water,\_volumetric | Available soil water, volumetric  See formula below. | mm |
| Local\_station | Local station | code |
| Historic\_station | Historic station | code |
| Protocol | Protocol | code |
| Experiment\_code | Experiment code | code |
| Species | Species |  |
| Sowing\_density | Sowing density | Number of grains/m² |
| Number\_of\_fertilizer\_doses | Number of fertilizer applications |  |
| Total\_amount\_of\_fertilizer | Total amount of fertilizer | kg N/ha |
| Date\_fertilization\_1 | Date of first application | DD/MM/YYYY |
| Amount\_fertilization\_1 | Amount of first application | kg N/ha |
| Product\_fertilization\_1 | See details below |  |
| Number\_of\_irrigations | Number of irrigations |  |
| Total\_irrigation | Total amount of water for irrigation | mm |
| Date\_irrigation\_1 | Date of first irrigation | DD/MM/YYYY |
| Amount\_irrigation\_1 | Amount of first irrigation | mm |
| %N\_in\_grain\_at\_harvest | Nitrogen content in grain | % |
| Biomass\_straw\_at\_harvest | Biomass of straw at harvest | g/m2 |
| %\_N\_in\_straw\_at\_harvest | Nitrogen content in straw | % |
| Harvest\_Index | Biomass of grain devided by biomass of straw at harvest |  |
| HarvestDate | Date of machine harvest | DD/MM/YYYY |

|  |  |  |
| --- | --- | --- |
| Observations | Explanation | Unit |
| useCat | Category for which dataset is used (training or evaluation) |  |
| Date | Date of observation | DD/MM/YYYY |
| Date\_BBCH10 | Date of observed stage BBCH10 (beginning of stem elongation), was not observed in the experiment | DD/MM/YYYY |
| Date\_BBCH30 | Date observed stem 1 cm  This is stage BBCH30 (beginning of stem elongation) | DD/MM/YYYY |
| Date\_BBCH55 | Date of observed stage BBCH55 (50% heading) | DD/MM/YYYY |
| Date\_BBCH90 | Date of observed stage BBCH90 (maturity): Maturity data was not measured, but was set to 15 days before harvest. We ask all participants to use this date, to avoid having each team do a different estimation of maturity date and thereby add extra variability to the results. | DD/MM/YYYY |
| Biomass | Above ground Biomass measured at “Date” | g/m2 |
| EarsPerSqm | Ears per m2 | 1/m2 |
| Grain\_Number | Grains per m2 | Grains/m2 |
| ProteinContentGrain | Protein content in grain at harvest  0 means missing data. | % |
| N\_in\_biomassHarvest | Airborne nitrogen content at machine harvest | % |
| Grain\_Yield | Dry weight of grain at harvest | g/m2 |
|  |  |  |
|  |  |  |

Sowing depth : About 3 cm

Fertilizer products :

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| product | Formula | %N | %P | %K | %S |  |
| Ammonitrate | NH4NO3 | 33.5 |  |  |  |  |
| Solution azotée (urea) | CO(NH2)2 | 46 |  |  |  |  |
| 18\_46 (Di-Ammonium Phosphate DAP) | (NH4)2HPO2 | 18 | 46 |  |  |  |

Irrigation method: sprinkler (in French, water canon).

Formula for available water (mm water in each soil layer)

**RU = (Hcc tf – HpFp tf) \* Da tf \* % Vol tf \* E)+ (Hcc cx – HpFp cx) \* Da cx \* % Vol cx \* E)**

**RU** : Available water in cm3 water/cm3 soil \*100

**Hcc tf** : Field capacity of fine soil g/100g

**HpFp tf** : Wilting point of fine soil g/100g

**Hcc cx** : Field capacity of stones g/100g

**HpFp cx** : Wilting point of stones g/100g

**Da tf** : Apparent density of fine soil

**Da cx** : Apparent density of stones g/cm3

**% Vol tf** : Fraction of volume that is fine soil (value between 0 and 1)

**% Vol cx** : Fraction of volume that is stones (value between 0 and 1))

**E** : Depth of the layer in cm

**Initial values of soil water and Nitrogen**

No measurements are available. Please use following approximations:

Soil water: Start on August 1. At that date, soil layer 1 is dry (0 water) and all other layers are at permanent wilting point. That is about harvest time of previous wheat, in summer when soil is dry.

Soil Nitrogen : 35kg/ha at time of sowing

**To make the connection between site and weather file :**

Use latitude and longitude, which are given in both the site file and the weather file