**GAP-FILLING PROTOCOL**

**(*Adopted from the NitroEurope project*)**

The NitroEurope project adopted the following strategy for gap-filling 30 minute data:

Parameters which need to be gap-filled were clearly labelled in the EXCEL template worksheets (For NitroEurope these sheets were 30 min Meteorology and 30 min Flux and Concentration data).

The parameters requiring gap-filling were needed as driving data for plot-scale models, for which a continuous time series is essential.
The method of gapfilling for each variable was indicated as a flag (0-5) in the column adjacent to the gapfilled data.
The key explaining the meaning of numbers 0 to 5 for indicating the method of gapfilling by using a simple integer flag is given below.

**Key**

0 primary data

1 gapfilled with data from secondary instrument on same NEU field site

2 gapfilled with data from instrument at local nearby site

3 interpolated between primary data points

4 gapfilled by mean diurnal variation (MDV)

5 gapfilled with model output

**Explanatory notes on the Key**

0 = primary data, collected using the method and instrument that you described for that parameter in the Methodology sheet.

1 = gapfilled data, but gapfilled using a secondary instrument at the same field site. Please also describe the secondary instrument in the Methodology sheet in the appropriate row. Use Alt-Enter to type below the details of the primary system whilst remaining in the same row.

2 = gapfilled data, but gapfilled using data from an instrument at a nearby field site.

3 = interpolated using simple linear interpolation between measured data points. N.B. This should be used only between data points having a gapfilling flag of 0, 1 or 2.

4 = gapfilled by mean diurnal variation. This is to be used where there are large gaps such that interpolation is not appropriate and no other measured data is available. To use this method, calculate the average value for each hour in the day i.e. 1 to 23, for the month of interest - insert the calculated mean value for the appropriate hour. This technique may be used with a 2 week or shorter period if suitable - if so, please note this in Comments (cell B7) in the Metadata sheet.

5 = gapfilled with model output. This is using relationships between the missing parameter and measured parameters to estimate values for the missing data points. This includes relationships of soil CO2 emission with temperature, and also photosynthesis with light, temperature and humidity.