EMD International

New European Wind Atlas (NEWA) in windPRO:

From Turbulent Kinetic Energy (TKE) to Turbulence Intensity (TI)

This note outlines a manual step-by-step procedure with the use of Excel to convert TKE into TI when having a NEWA time series within a meteo-object. Turbulence intensities are sometimes used as input to wake calculations or site-compliance studies. Currently – October 2021 – windPRO does not support the use of TKE as a turbulence parameter. However, if the TKE is converted into the square root of the TKE, windPRO is able to convert the value into a turbulence intensity. Follow this step-by-step procedure in windPRO 3.4 or 3.5, then you have a meteo-object with turbulence intensities within 10-15 minutes.

In windPRO 3.4 or 3.5:

- 1. Download NEWA data in a meteo-object and open it
- 2. Go-to the 'Data' tab and make sure that '100.00m -' is selected in the 'Heights' list to the right
- 3. Press the 'Add signal' button and for the table and line added:
 - a. Change the 'Required signal' to 'User defined'
 - b. Change the 'Based on' to 'TKE.100 (100.0m)'
 - c. Add 'TKE' as the 'Signal name'
- 4. Press the green button '(*Re*)load all files for selected height'
- 5. Click the 'Export' button and in the 'Time Series Export Form':
 - a. Check that the 'Export all decimals' is enabled
 - b. Use 'File format': 'Local PC localization'
 - c. Check that 'TKE' is included in the export (expand the tree to check)
 - d. Click 'Copy to clipboard'

In Excel (see also the figure below):

- 1. Open a new blank spreadsheet in MS-Excel, then paste the data from the clipboard
- 2. Go-to cell V33
- 3. Name the column: *StdDevWindspeedUID_100.0m*|*Std dev wind speed*|*L0.00* (do the naming in cell V33; this will enable the meteo-importer to auto-recognize the data-field)
- 4. Calculate the square-root of all TKE-values (column 'E') within the new column 'V' (example: =SQRT(E35), do this for all cells in column 'V')
- 5. Save the file with the format: '*Text (Tab delimited) (*.txt)*'. Name it 'NEWA_N57.5046_E10.52557.txt' or similar.
- 6. Close Excel

In windPRO 3.4 or 3.5:

- 1. Make a new meteo-object on top of the 'old' one (same geographical location)
- 2. Select 'GO time series'
- 3. Press 'Add files' and select the file that you saved above (e.g. 'NEWA_N57.5046_E10.52557.txt')
- 4. Press 'Auto detect, and press 'Yes' when prompted
- 5. Select time-zone to '(UTC) Co-ordinated Universal Time'
- 6. Go-to the 'Data setup' (second vertical tab) and press 'Auto create' (green button)
- 7. Press 'Clear and load all' (green button)

Now, the turbulence-intensity data is ready to use within your new meteo-object.

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Figure: Example of NEWA data in spreadsheet.