**Practical 3 Answer sheet**

|  |  |
| --- | --- |
| Student (name) |  |

**At the end of this practical, upload this document to the Brightspace assignment**

**Practical 3a - actual ET of the Hupsel catchment** First collect some of your insights from Step 1 and Step 2 here.

# Preparation

## Step 1: crop factors for grass – 2014 Hupsel data.

What is the overall magnitude the crop factor? Is the crop factor constant over time, and if not, can you explain the variations (or at least bring forward a hypothesis)?

|  |  |
| --- | --- |
|  | **Comment** |
| **Typical values** |  |
| **Variability** |  |
| **What determines the variabililty** |  |

In the table below, indicate a few conditions: give the typical value for the ‘crop factor’ for grass evapotranspiration, and the variables that characterize that condition (e.g. when no rain and high temperatures -> crop factor = ...). It is up to you to see how many conditions you distinguish (i.e. how many rows you fill) and how many variables you need to describe a given condition (how many columns you need).

|  |  |  |  |
| --- | --- | --- | --- |
| **Crop factor** | **Variable: ...** | **Variable: ...** | **Variable: ...** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

## Step 2: crop factors for bare soil – 2009 Transregio data.

What is the overall magnitude the crop factor? Is the crop factor constant over time, and if not, can you explain the variations (or at least bring forward a hypothesis)?

|  |  |
| --- | --- |
|  | **Comment** |
| **Typical values** |  |
| **Variability** |  |
| **What determines the variabililty** |  |

In the table below, indicate a few conditions: give the typical value for the ‘crop factor’ for bare soil evaporation, and the variables that characterize that condition (e.g. when no rain and high temperatures -> crop factor = ...). It is up to you to see how many conditions you distinguish (i.e. how many rows you fill) and how many variables you need to describe a given condition (how many columns you need).

|  |  |  |  |
| --- | --- | --- | --- |
| **Crop factor** | **Variable: ...** | **Variable: ...** | **Variable: ...** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

# Characterize conditions in the May 2021 dataset

In the table below describe the weather conditions in the 3-week period in broad terms. Insert graphs of some of the variables, and describe in words the variation that you observe (keep it concise).

|  |  |  |
| --- | --- | --- |
| **Variable** | **Graph** | **Description** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

Based on your analysis above, try to identify a number of periods of similar weather and concisely describe them. Indicate them with the start and end day (day in May 2014). The number of rows in the table is arbitrary

|  |  |  |
| --- | --- | --- |
| **Start** | **End** | **Characterize in words** |
| 01 |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

# Reference evapotranspiration

Include your values below and/or include a graph that shows the time series of reference ET for May 2021 (are the values reasonable. how do they compare to the values you computed for 2014?).

|  |
| --- |
|  |

# Day-to-day crop factor for grass

In the table below explain how you constructed your time series for the crop factor for grass (if you clearly explained it un the preparation section above, just refer there) and give the values and/or include a graph.

|  |  |
| --- | --- |
| **Method** |  |
| **Values / graph** |  |

# Day-to-day crop factor for bare soil

In the table below explain how you constructed your time series for the crop factor for grass (if you clearly explained it un the preparation section above, just refer there) and give the values and/or include a graph.

|  |  |
| --- | --- |
| **Method** |  |
| **Values / graph** |  |

# Actual ET for grass and bare soil

In the table below explain how you constructed your time series for the actual ET of grass and bare soil and give the values and/or include a graph.

|  |  |
| --- | --- |
| **Method** |  |
| **Values / graph** |  |

# Actual ET for the Hupsel catchment

In the table below explain how you constructed your time series for the actual ET of the catchment as a whole give the values and/or include a graph.

|  |  |
| --- | --- |
| **Method** |  |
| **Values / graph** |  |

**Practical 3b – other reference ET methods**

# Complete the functions: Priestley Taylor, aerodynamic resistance and Penman-Monteith

The main work needs to be done in the notebook. In the table below you can briefly document your progress (did it work at once, or after some iterations, what were the hurdles)

|  |  |  |  |
| --- | --- | --- | --- |
| **Function** | **Progress** | | |
|  | **OK at once** | **OK some tries** | **Challenges** |
| f\_PM(....) |  |  |  |
| f\_ra(...) |  |  |  |
| f\_PM(...) |  |  |  |

# Compute ETref with different methods (2014 data)

Include your values below and/or include a graph that shows the time series of reference ET with the three methods (include them in one plot, and please give the series a name so that it is clear which line represents which method).

|  |
| --- |
|  |

# Explore the different methods (2014 data)

|  |  |
| --- | --- |
| How do each of the methods vary, and can you link those variations to the meteorological conditions |  |
| How do the three methods differ (in which direction, at which moments) and which properties of the different methods could explain those difference? |  |

# Compare the different methods to actual ET of grass (2014 data)

|  |  |
| --- | --- |
| Are the results of Priestley-Taylor or Penman-Monteith closer to the actual ET? |  |
| On which moments? |  |
| What could be the explanation? |  |