**Actual ET of Hupsel – step 1  
Answer sheet**

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| Student (name) |  |

## 1. Characterize weather conditions

Characterize the weather conditions during the period in which the data were gathered. Do this in very broad terms (do not study individual days, but rather in terms of e.g. 'in the first 5 days the weather was sunny'. Think of it as a report to your family or friends when you return from field work. Select the variables that you think will characterize the weather best (e.g. sunshine duration, precipitation, ....), plot a time series of that variable and summarize that in words.

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| **Variable** | **Graph** | **Description** |
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Based on your analysis above, try to identify a number of periods of similar weather and concisely describe them. Try to formulate a one-sentence description of characteristic periods (e.g. 10-12 May: 'windy weather, mostly overcast with maximum temperatures around 18 C and most days a few mm of rain per day')

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| **Start date** | **End date** | **Characterize in words** |
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## 2. Complete the functions

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)

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| **Function** | **Progress** | | |
|  | **OK at once** | **OK some tries** | **Challenges** |
| f\_Lv(T) |  |  |  |
| f \_esat(T) |  |  |  |
| f\_s(T) |  |  |  |
| f\_gamma(T,p,q) |  |  |  |
| f\_makkink(Kin,T,p,q) |  |  |  |

## 3. Reference evapotranspiration

Compute the reference evapotranspiration in mm/day based on the current data set (check what is the unit of the flux you computed with your f\_makkink function). Subsequently, make a time series graph that you can include below.

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## 4. Actual evapotranspiration

Include your values below and/or include a graph that shows the time series of actual ET.

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## 5. Comparing actual ET and reference ET

How do actual and reference evapotranspiration compare? Are they identical, is there a fixed offset, or is the difference variable over time. If so, can you related those differences to specific conditions? Discuss values, possibly show a graph.

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## 6. Crop factors and reference evapotranspiration

Compute the crop factor for the current data. What is the overall magnitude the crop factor? Is the crop factor constant over time, and if not, can you explain the variations using the characterization of the conditions you made in question 1 (e.g. the crop factor is around … when the weather conditions are …)?

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|  | **Comment** |
| **Typical value of the crop factor (mean, median, …)** |  |
| **Variability of crop factor from day to day (how much, how, when)** |  |
| **What determines the day-to-day variation?** |  |

Summarize your findings regarding the crop factor for grass in such a way that you could use it as simple model to derive grass evapotranspiration from the reference ET, based on a limited number of variables (e.g. rainfall history, air humidity, temperature, wind speed, ...). There is no need to come with a model in the form of an equation. What we need, in the end, is some sort of look-up table that provides you with a value for the crop factor, given certain conditions.

In the table below, indicate a few conditions: give the typical value for the ‘crop factor’ for grass, 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).

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