Vienna is the capital and largest city of Austria, with a population of about 1.8 million. It covers an area of approximately 415 km² and extends about 26 km from the east to the west and 23 km from the north to the south. The climatic conditions that prevail in large metropolitan areas differ from the climate of their rural surroundings. The following tasks are designed to study the effects of Vienna’s urban climate on the honey bee.

To this end, three eHives were placed along a transect which ranges from the city centre (Gymnasium Sacre-Coeur: AUT-GSC-1) through an outer district (Wiener Imkerschule: AUT-WIS-1) to the outskirts of the city (Austrian Agency for Health and Food Safety AGES: AUT-BIE-1). A transect is a usually straight line through an area, along which observations are made or measurements are taken. Researchers usually suspect that there will be variation in certain parameters, such as temperature, alongside the transect. In other words, they expect to find a gradient there. This is the topic of the following task.

## Tasks

### The basics of urban ecology

1. Use your own words to explain what an “urban climate” is. Find suitable information and write a short text of around 120-150 words.

### The three study sites

1. Find the three study sites on a map (e.g. www.openstreetmap.org). Select a suitable section of the map to display all three of them. Mark the transect on your map.

### Comparison of the three locations

Compare the following three parameters, which are collected by the eHives, for the three study sites: temperature within the eHive (sensors 3 or 4), hive weight, outside temperature, rainfall, wind speed.

1. For each parameter above, plot the eHive data in separate charts.
2. Start with selecting one season (e.g. from February to October) to get an overview.
3. Now try to find significant differences by zooming in on those sections which seem interesting to you. Reduce the length of the periods you study.
4. Have a closer look at the data by e.g. plotting in another chart the data of different sensors, which seem to interrelate.
5. Chose those parameters which seem to demonstrate best the differences between the three different locations. Plot them in charts which visualise your conclusions as clearly as possible.
6. Use your data analyses to draw conclusions concerning the differences between the bee colonies at the three different locations. Exploit the information you gathered on urban climates to find a possible explanation.
7. In a short presentation, explain your conclusions to your classmates. Choose three diagrams to support your claims.

For the quicker pupils

1. Compare the data of the three Viennese locations with data from other cities, e.g. Deutschhaus-Gymnasium in Würzburg, Germany (DEU-DHG-1). Comment shortly on similarities and differences.