Part III. The Climate of Brno

Main aim: What are typical features of spatial and temporal climate variability in Brno?

1. Local geography character
   a. Land use distribution
   b. Complex relief
2. History of meteorological measurements
   a. No typical urban station
   b. Compiled series of air temperature and precipitation. Air temperature is rising continuously (since 1960s) while precipitation demonstrate high inter-annual variability without any long term trend.

   Q1: Is it useful to have a long term measurements?

   Q2: What do we need for analysis of urban climate?
3. Meteorological data (dependent, target variables)
   a. Standard measurements at professional stations (Met-service)
   b. Special-purpose measurements
   c. Mobile measurements
   d. Measurements from remote sensing systems (satellite imagery)
4. Geographical database (independent, explanatory variables) in the form of 300 x 300 m grid cells
   a. Altitude
   b. Density of buildings
   c. Density of vegetation
   d. Density of roads
   e. Sky view factor

   Q3: Do they reflect all main factors that control urban climate?
5. Two examples of air temperature variability analysis
   a. Land surface temperatures (LSTs) derived from thermal satellite images
      i. We quantified to what extent different land use categories increase/decrease LSTs
      ii. "Hot-spots" occur in typical parts of the city
      iii. Amount of vegetation (in the form of NDVI) explains more than 2/3 of LST variability

      Q4: What parts of the city are most susceptible to higher temperatures?
   b. Nocturnal air temperature field analyzed from mobile measurements
      i. The same explanatory variables, but used for air temperature analysis
      ii. Design of traverses through the city
      iii. Amount of air temperature variability explained – the best result for density of vegetation and density of buildings. Weak influence of altitude.
      iv. Typical air-temperature spatial distribution – **Urban heat island (UHI)**

      Q5: Why it is important to study temperatures at night?

      Q6: Compare positive/negative features of the two methods?