Allergic diseases represent a major health problem of most modern societies. The most frequent aeroallergens derive from pollen. During the last years, allergies due to airborne pollen indicate an increasing trend, while the severity of allergic symptoms is also increasing in most industrialised countries, and synergism with other common atmospheric pollutants has also been identified affecting overall quality of citizens' life. The triggering of allergic reactions is highly correlated with airborne pollen concentration levels, although there is no clear threshold value. The thresholds strongly depend on the taxon, whereas different individuals may experience symptoms of varying severity for the same concentration levels. These highlight the need to produce high spatial and temporal resolution information on biological aerosol (bioaerosol) concentration in order to better manage the severity of their allergic reactions.

The main source of information on air pollen concentrations are measurements, which provide information in limited number of points. Modelling is a method which allows to obtain spatially and temporally continuous information and allows for identification of episodes with high pollen concentrations. Within this project the tool for modelling of bioaerosol emission and transport will be provided, which will take into account feedbacks between bioaerosol, air pollution and meteorology. The model will be prepared for tree pollen and tested for Europe with a particular focus on Poland. Bioaerosols during their transport interact with weather, which again affects its concentrations in the air. These feedback mechanisms are not well identified and not accounted for in atmospheric models.

The meteorological model with chemistry (WRF-Chem) currently used in air pollution modelling will be developed for studying transport of bioaerosols (tree pollen) and their feedback on the weather. The model results will be evaluated through comparison with available observations – air pollution and tree pollen concentrations.

The results of the proposed project are significant for both researchers and public. The following achievements are expected:

- High spatial and temporal resolution information on variability of tree pollen in the air will be especially important both for researches working on the dependency between pollen in the air and the allergic reaction of the body as well as people suffering from allergy.
- The advanced atmospheric transport model WRF-Chem will be developed towards bioaerosols modelling with the focus on tree pollen species. This will be a step forward to bioaerosols modelling, complementing statistical approach used so far.