

FA1203: Sustainable management of *Ambrosia artemisiifolia* in Europe (SMARTER) Short Term Scientific Mission Report

HYSPLIT Model: Simulation of emission and transport of *Ambrosia artemisiifolia* pollen

# STSM details

COST STSM Reference Number: COST-STSM-FA1203-27531 Timing of STSM: 23-05-2015 to 31-05-2015

## **Applicant details**

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### Host details

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## Summary of the STSM

During my visit at the University of Worcester I investigated the propagation of pollen of *Ambrosia artemisiifolia* in Wroclaw, south – west Poland. I studied ten years period of pollen concentration. I analysed two months (August and September) of each year, which cover the blooming season of *Ambrosia artemisiifolia*. I calculated backward trajectories of air masses with the HYSPLIT model and then I observed relationships between inflowing air masses and concentration of ragweed pollen. I could observe, that the direction of inflowing air masses affects the concentration of pollen.

#### Purpose of the STSM

The main objective was to learn to use the HYSPLIT model for the simulation of pollen of *Ambrosia artemisiifolia*. It will help to improve the understanding of pollen transport in Poland in the context of meteorological parameters. It will also be beneficial for the recent state of knowledge in this subject.

## Description of the work carried out during the STSM

I worked with the HYSPLIT model on the ragweed data from Wroclaw, the city in south west Poland. The data of pollen was taken from ten year period. I analysed two months (August and September) of each year, which cover the blooming season of *Ambrosia artemisiifolia*. I have divided the data into two groups – called later low and high. High means that the concentration of pollen grains is higher or equal to 20, while low, that the concentration is below 20. HYSPLIT (The Hybrid Single Particle Lagrangian Integrated Trajectory Model) was used with the meteorological data obtained from the Global Data Assimilation System (GDAS) with 1° spatial resolution and 3 h temporal resolution. I used 96 hours backward trajectories with 2 hours intervals. Then the trajectories were sorted in order to compare low and high concentrations of pollen and the relation between trajectories direction and Ambrosia concentration level analysed. Initial tests with a replacement of default data in HYSPLIT with data that originates from the WRF model has also been carried out.

#### Description of the main results obtained

The main observed result is a fact, that concentrations of ragweed pollen areconnected with direction of inflowing air masses. When inflowing masses are coming from areas which *Artemisia artemisiifolia* exist very common we can observe higher concentration of pollen in the territory of Wrocław. In the case of Wrocław the episodes with the highest Ambrosia concentrations were found to be related especially with the circulation from southern sector. When air flowing masses are coming from different territory, we can observe much lower concentration of pollen of ragweed.

### Future collaboration with the host institution

We have assumed further studies on modelling of pollen on HYSPLIT model in June in Wrocław. This will focus in the connection between the WRF model and HYSPLIT and is expected to add the the development of the two atmospheric models WRF and WRF-Chem that are developed in both Wroclaw and Worcester, where the later use WRF-Chem for pollen dispersion studies

## Foreseen publications/articles resulting from the STSM

We expect an article for our studies.