



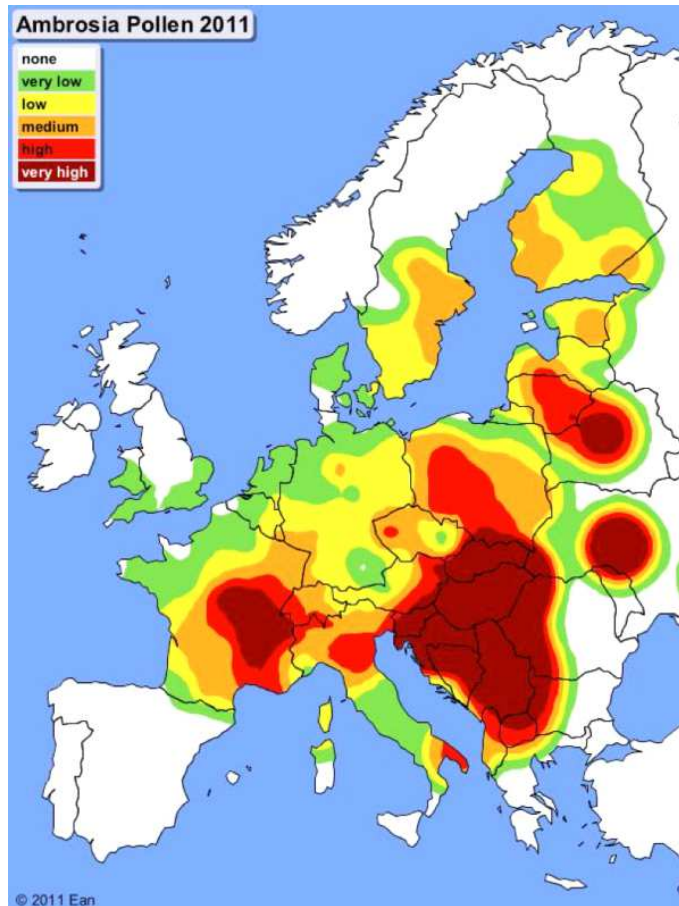
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CONSTRUCTING RAGWEED POLLEN SOURCE INVENTORIES

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RAGWEED IN EUROPE

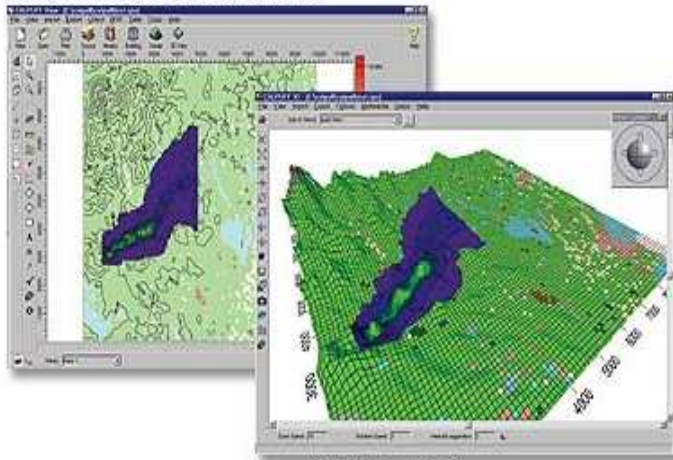


- **Three major centers of distribution** (Rybníček and Jager, 2001):
 - **Pannonian Plain** (relatively homogenous with respect to terrain and ragweed abundance)
 - **Rhone Valley** (France)
 - **Northern Italy**

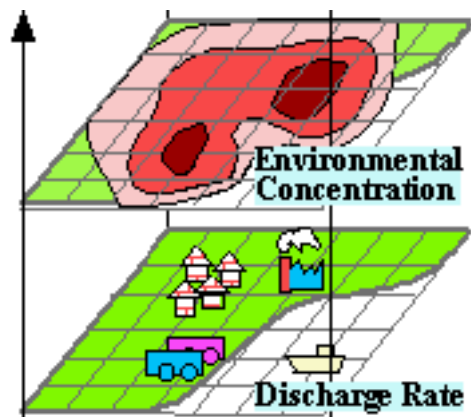
AIM: proposing methodology for producing ragweed pollen source inventory

SOURCE INVENTORY

Complete Graphical Environment



Powerful 3D Visualization



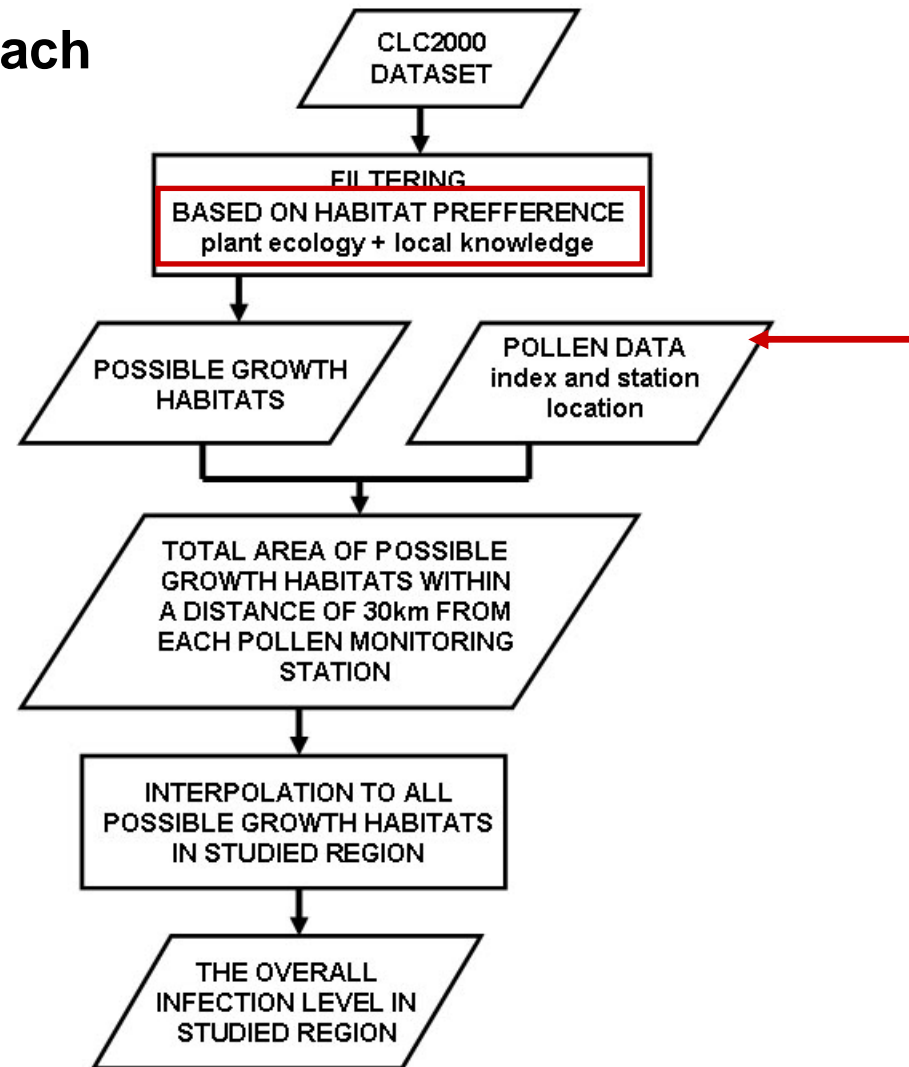
- An aggregation of all available material with respect to abundance and distribution (gridded) of subject on some sort of geographical area
- As a component of emission characterization, required input for source orientated dispersion models (e.g. DEHM, COSMO-ART, SILAM, CHIMERE)

Pollen source inventories

- **Mapping source distribution and abundance**
 - Perennials – relatively stable populations
 - Annuals – unstable populations
 - **Bottom-up** - use statistical data of pollen producing species with the respect to location and amount within a given geographical area
- VS.
- **Top-down** – use quantity of emitted pollen as a starting point and then backward calculation to estimate the distribution of source plant species using land use data

RAGWEED POLLEN SOURCE INVENTORY - methodology

Top-down approach



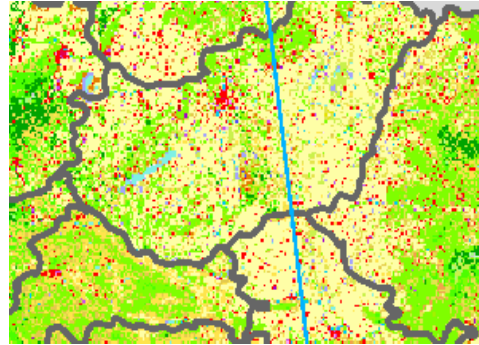
Volumetric pollen and spore trap
(Hirst, 1952)



Stage1: Identification of characteristic habitats

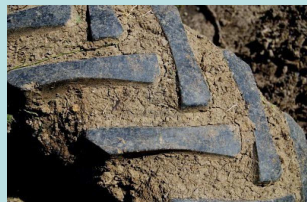
CORINE 2000
habitat
distribution/ coverage

Pannonian plain



FILTERING MECHANISM

**SOIL
MOVEMENT & DISTURBANCE**

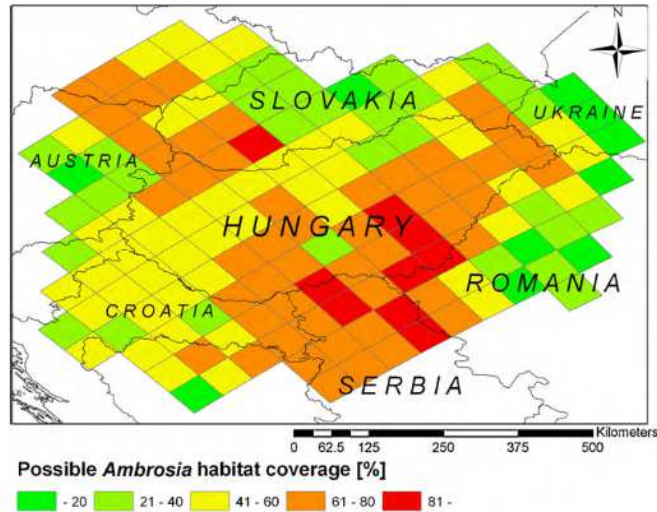


HABITAT PREFERENCE

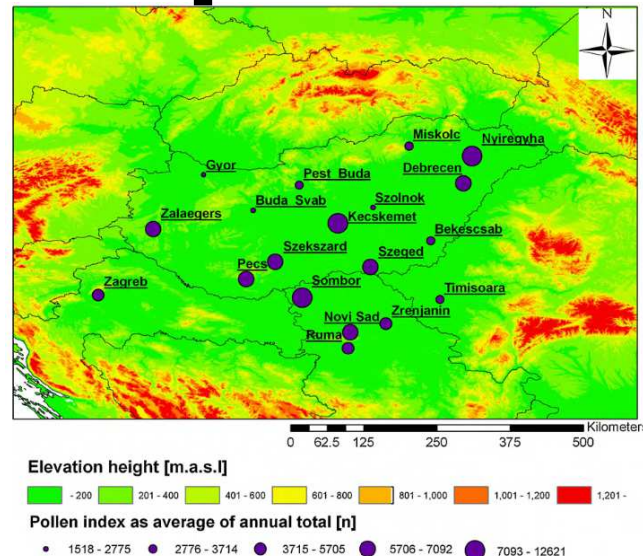
Stage2: Plant distribution on possible growth habitats

Possible growth habitats:

- 1.1.2 Discontinuous urban fabric
- 1.2.1 Industrial or commercial units
- 1.2.2 Road and rail networks and associated land
- 1.2.4 Airports
- 1.3.3 Construction sites
- 1.4.1 Green urban areas
- 2.1.1 Non-irrigated arable land
- 2.1.2 Permanently irrigated land
- 2.2.1 Vineyards
- 2.2.2 Fruit trees and berry plantations
- 2.4.1 Annual crops associated with permanent crops
- 2.4.2 Complex cultivation patterns
- 2.4.3 Land principally occupied by agriculture, with significant areas of natural vegetation



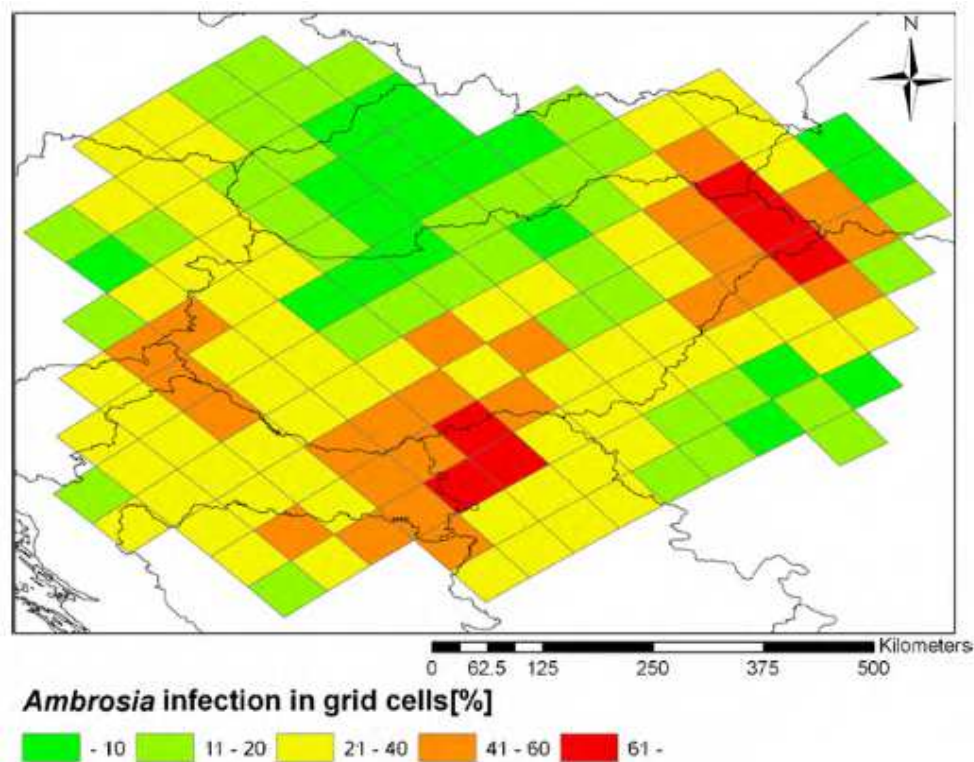
Average annual pollen indexes: (indicator of abundance)



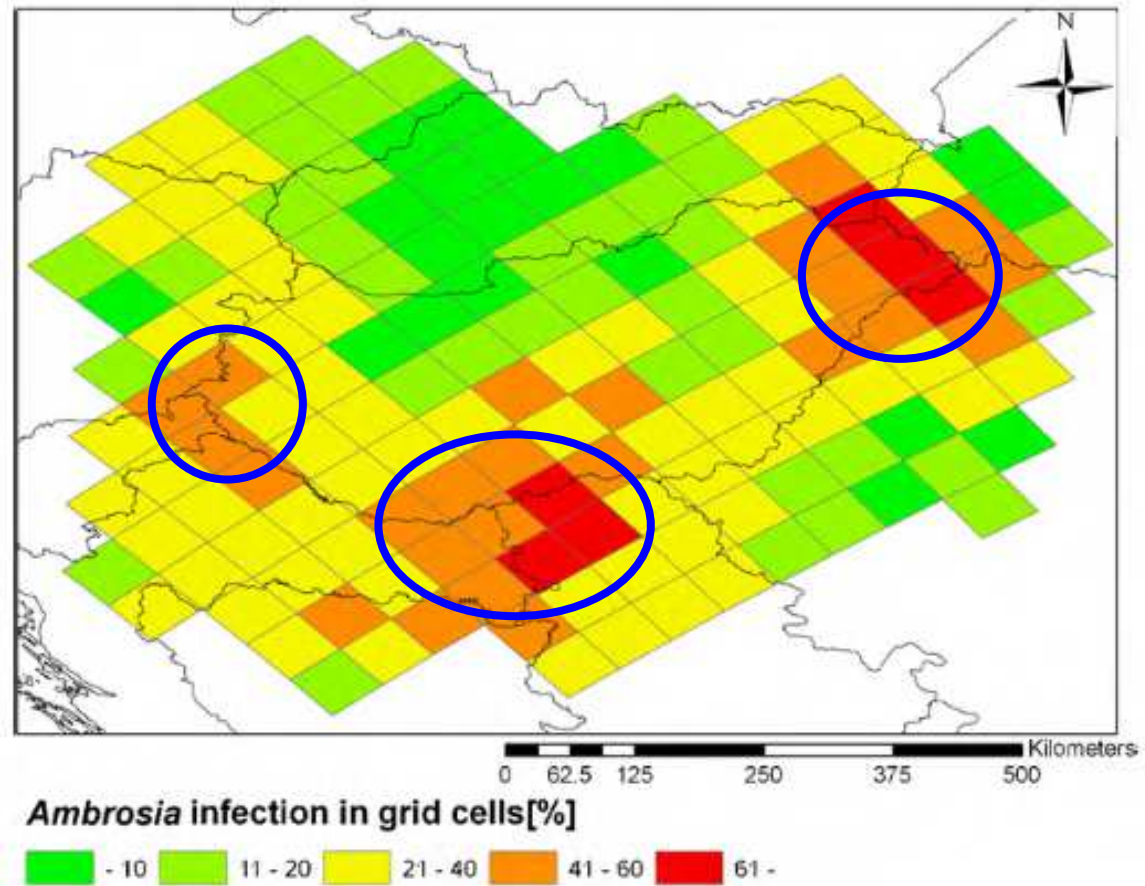
Stage3: Interpolation to entire studied region

Both habitat coverage and infection gridded to the European Monitoring and Evaluation Programme 50 grid

R A G W E E D P O L L E N S O U R C E I N V E N T O R Y (Skjoth et al., 2010)



THE INVENTORY RESULT

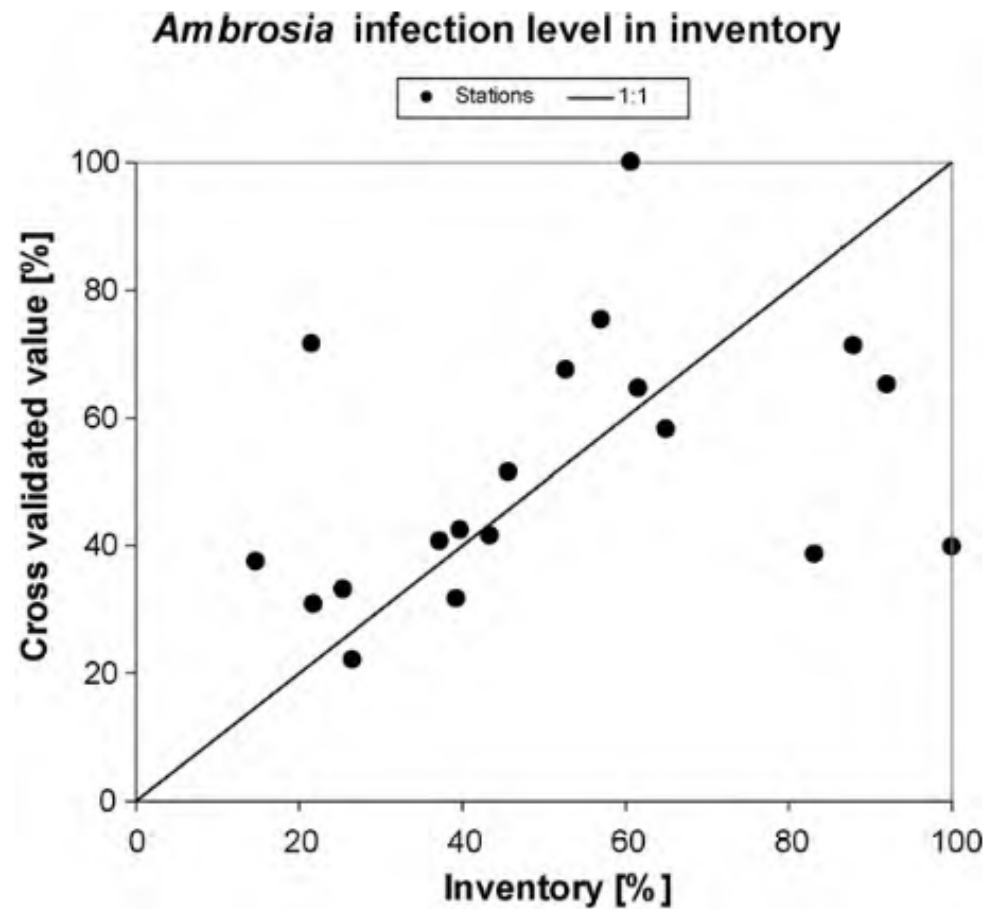


Three distinctive “hot-spots”

The infection level:

100% (Kecskemét) - 14.7% (Buda Svábhegy)

CROSS VALIDATION

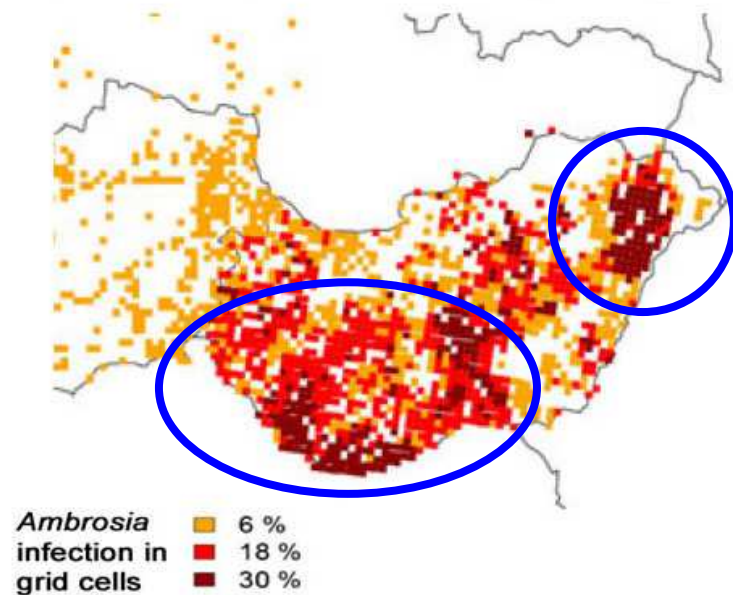


Only few stations with a sensitivity larger than 20%: Szolnok, Zagreb and Kecskemét

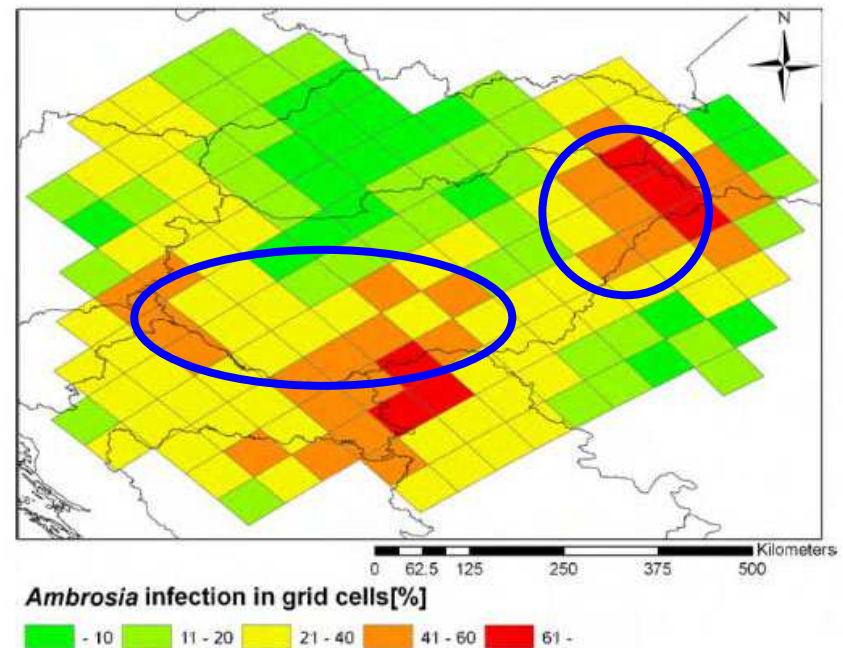
COMPARISON TO AVAILABLE RAGWEED DISTRIBUTION MAP

Zink, K., Vogel, H., Vogel, B., Magyar, D., Kottmeier, C. 2011
Modeling the dispersion of *Ambrosia artemisiifolia* L. pollen
with the model system COSMO-ART.
Int J Biometeorol, DOI 10.1007/s00484-011-0468-8

For Hungary, a map is available showing the percentage of land covered by ragweed plants, thus giving classified information about the number of plants shedding pollen (Páldy et al. 2006; Novák et al. 2009). A map with stands



Skjøth et al. 2010,
A method for producing airborne pollen source inventories:
An example of *Ambrosia* (ragweed) on the Pannonian Plain.
Agricultural and Forest Meteorology, 150, 1203-1210.



Conclusion (1/2)

The obtained ragweed inventory and its components are expected to be used

- (1) by law makers - as a basis for eradication strategies aiming to reduction both in growth area and infection;
- (2) by ecologists - for assessing changes in the plant distribution;
- (3) by atmospheric transport modellers – as an input for source orientated models taht forecasts daily pollen concentrations;

Conclusion (2/2)

The proposed methodology allows expanding the inventory to other areas but also to other pollen sources (e.g. *Iva xanthifolia*, *Xanthium strumarium*).



There is still room for improvement, and future inventories could include also other sources of data, such as soil atlases and/or remote sensing images



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- **Thank You!!**