Spatial modelling of *Aedes caspius* (Pallas 1771) and *Aedes vexans* (Meigen 1830) distribution in the Po Plain (Northern Italy)

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Distribution and density of two mosquito species using two different spatial analysis approaches (geostatistical and machine learning), in an open source framework, which gave congruous results.

Aedes caspius
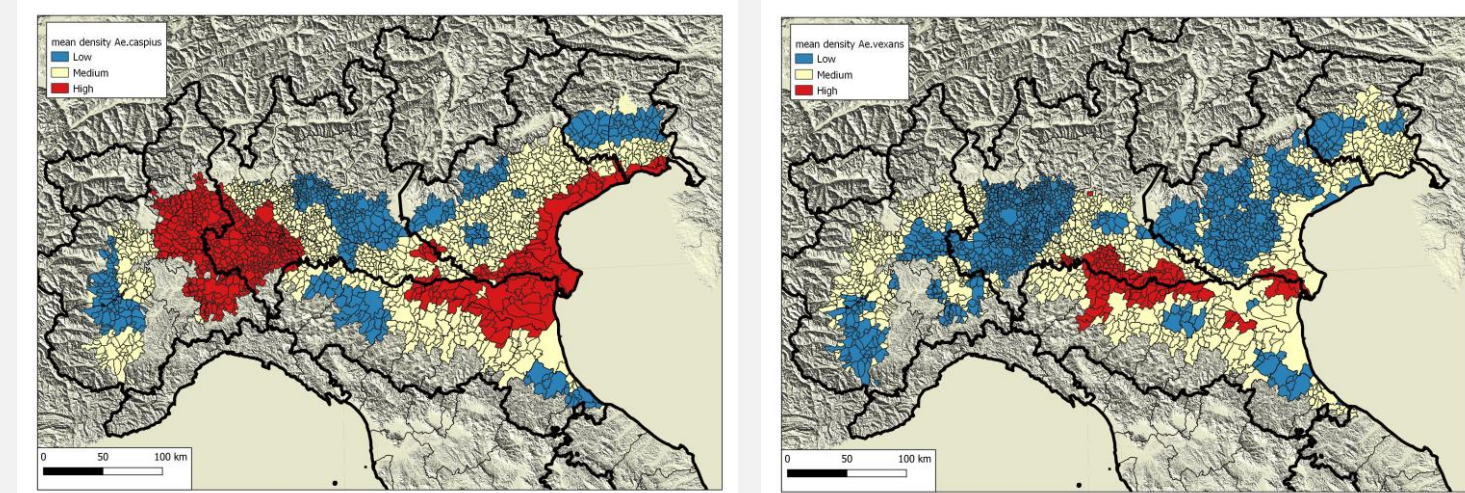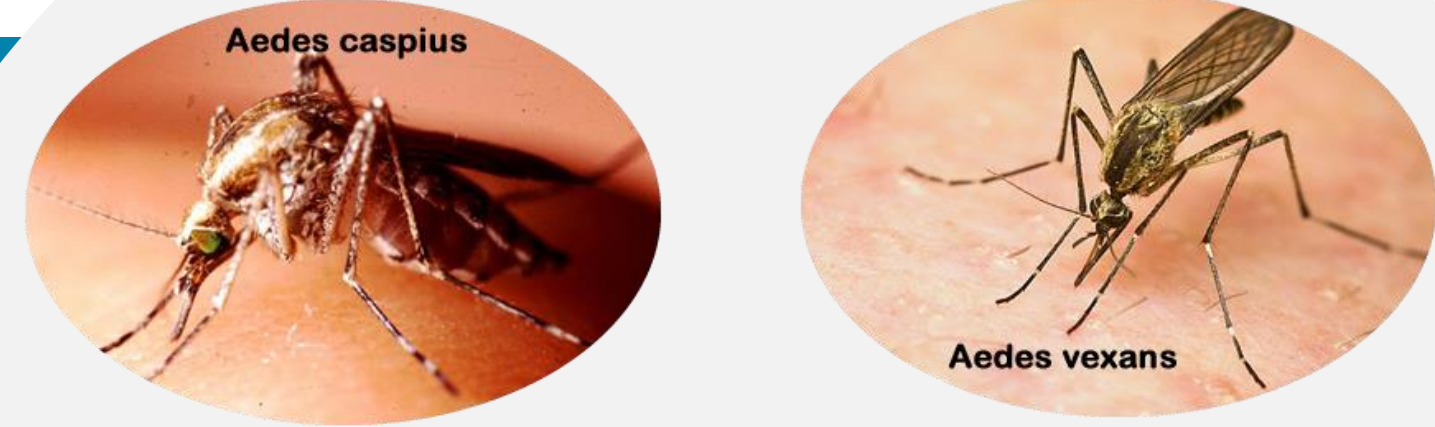
Aedes vexans

Introduction

- Study area in northern Italy of approximately **46,000 km²** (5 regions involved)
- **Two mosquito species** (*Aedes caspius* and *Aedes vexans*), competent vectors for pathogens (i.e. RVFV, WNV, TAHV, EEEV, filariasis)
- Climate is characterized from sultry summers and precipitations are not very abundant but higher in spring and autumn
- **292 CO_2-baited traps** activated from May to October 2018, 2019 and 2020 (West Nile virus national surveillance network)
- Different sampling effort from region to region
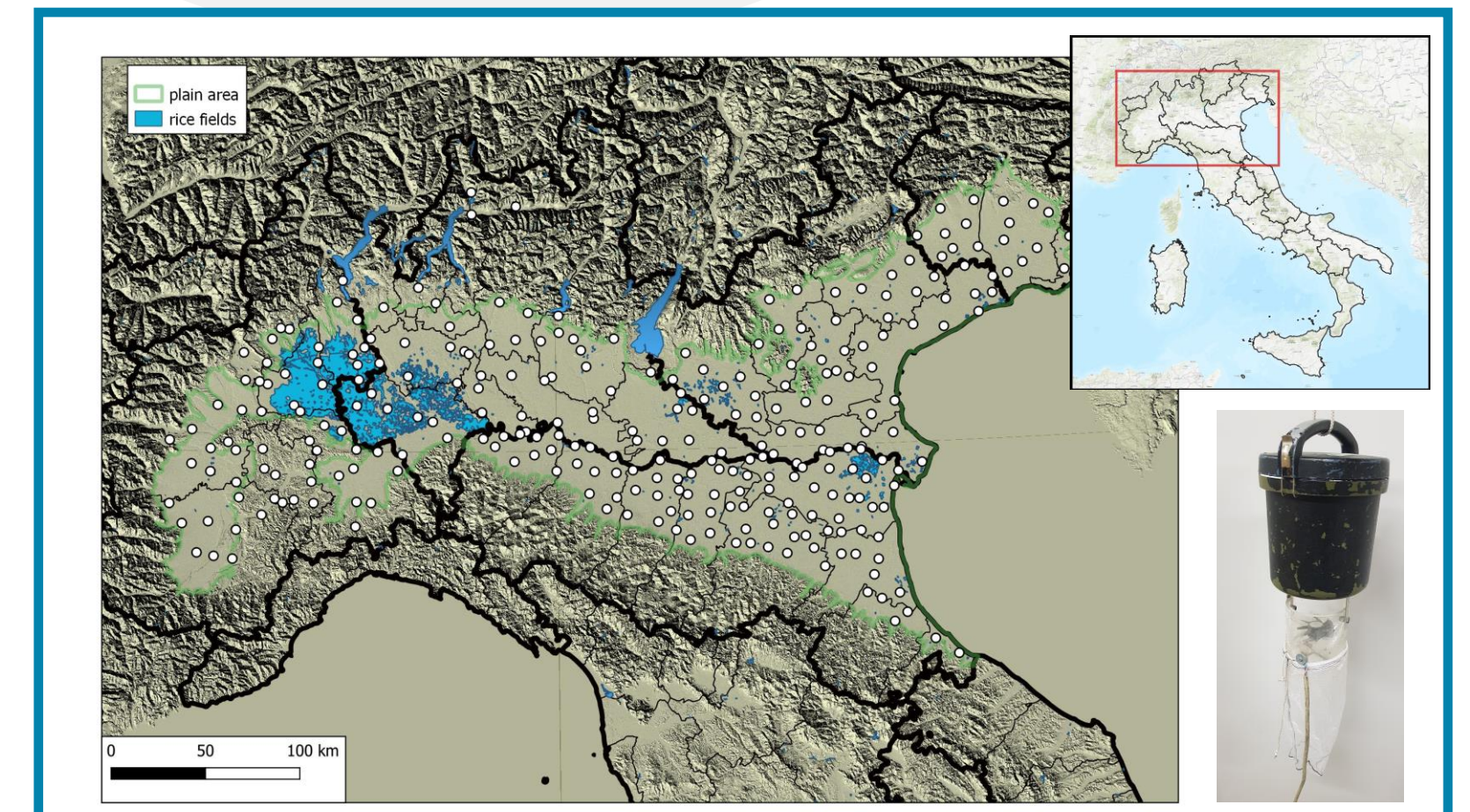
Study area (Po Plain) with CO_2 Traps (white dots)

Methods

- **ESDA** (Exploratory Spatial Data Analysis) for each species (data distribution, local and global autocorrelation analysis)
- **Two approaches**: Geostatistical analysis by QGIS and Machine Learning by MaxEnt
- Spatial models performances evaluation by **RMSE** for Geostatistical models and **AUC** for Machine Learning models
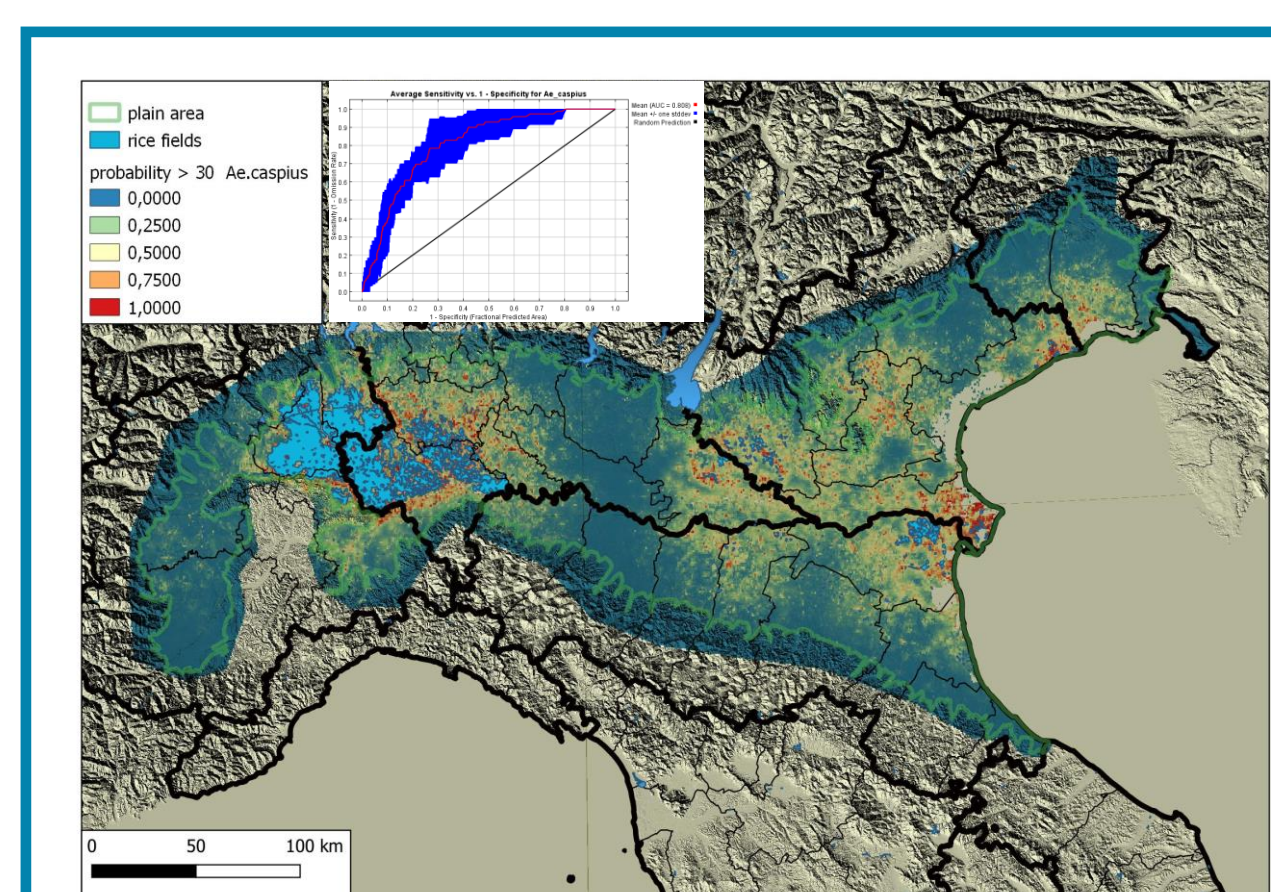- All analysis in an **open source framework**
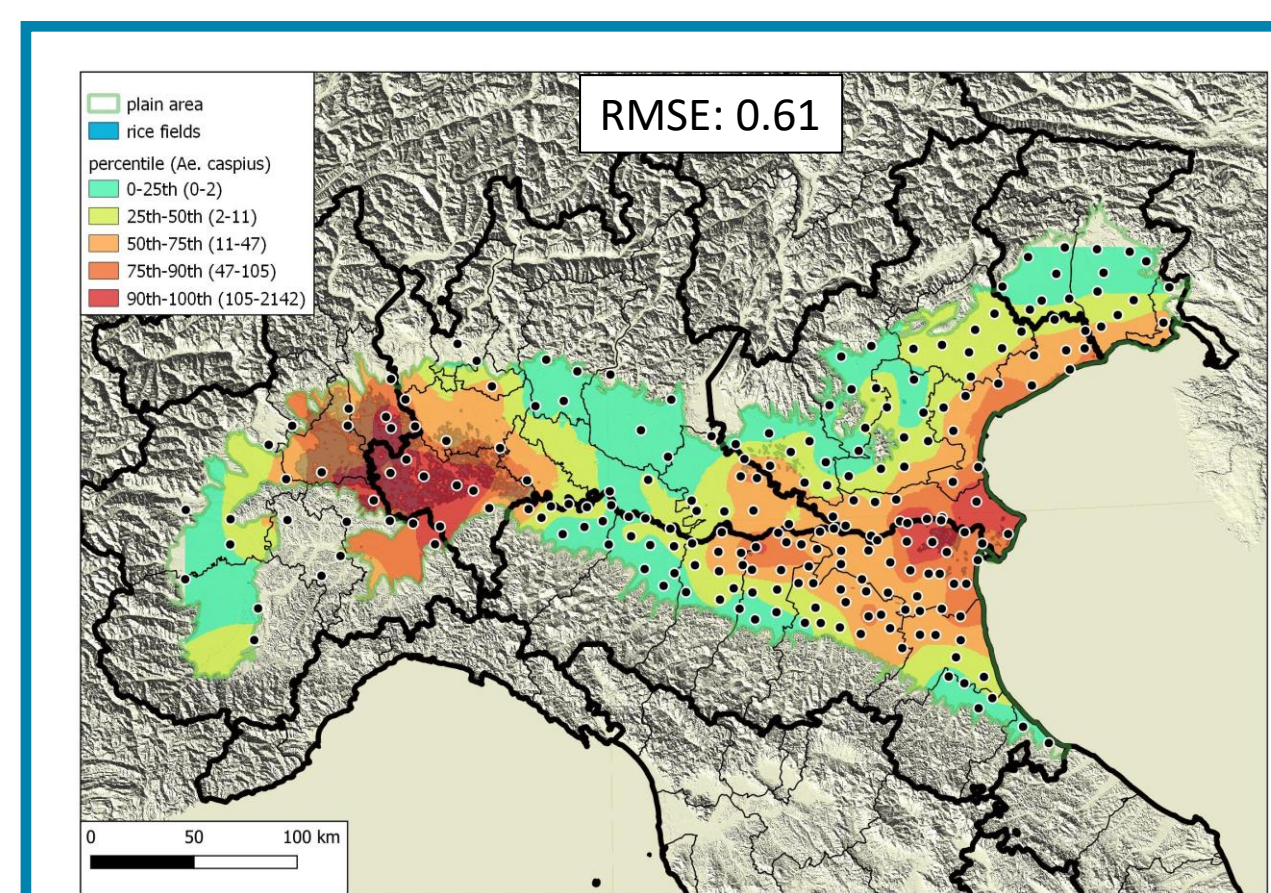
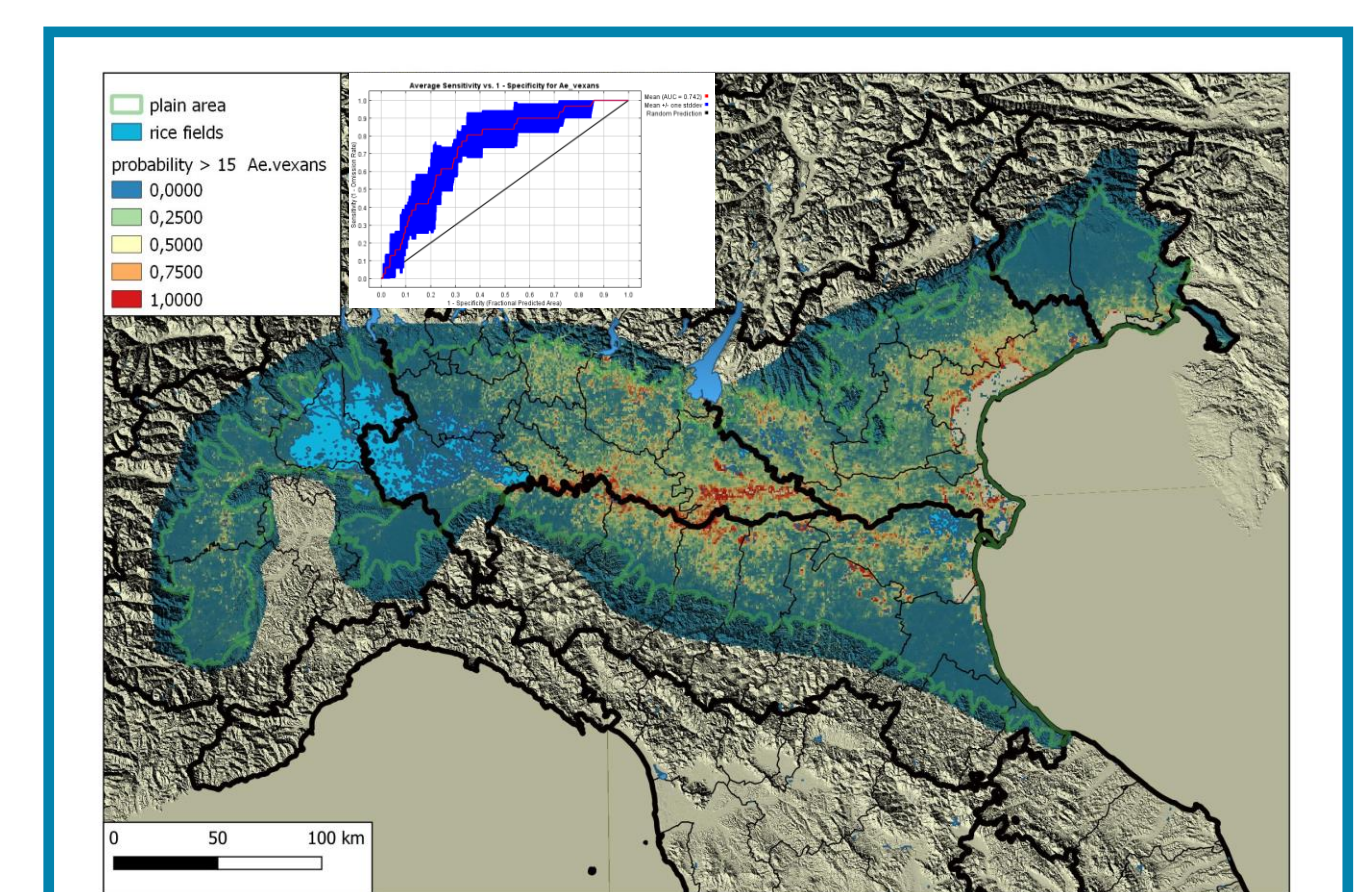Ordinary kriging interpolation of *Ae. caspius* density
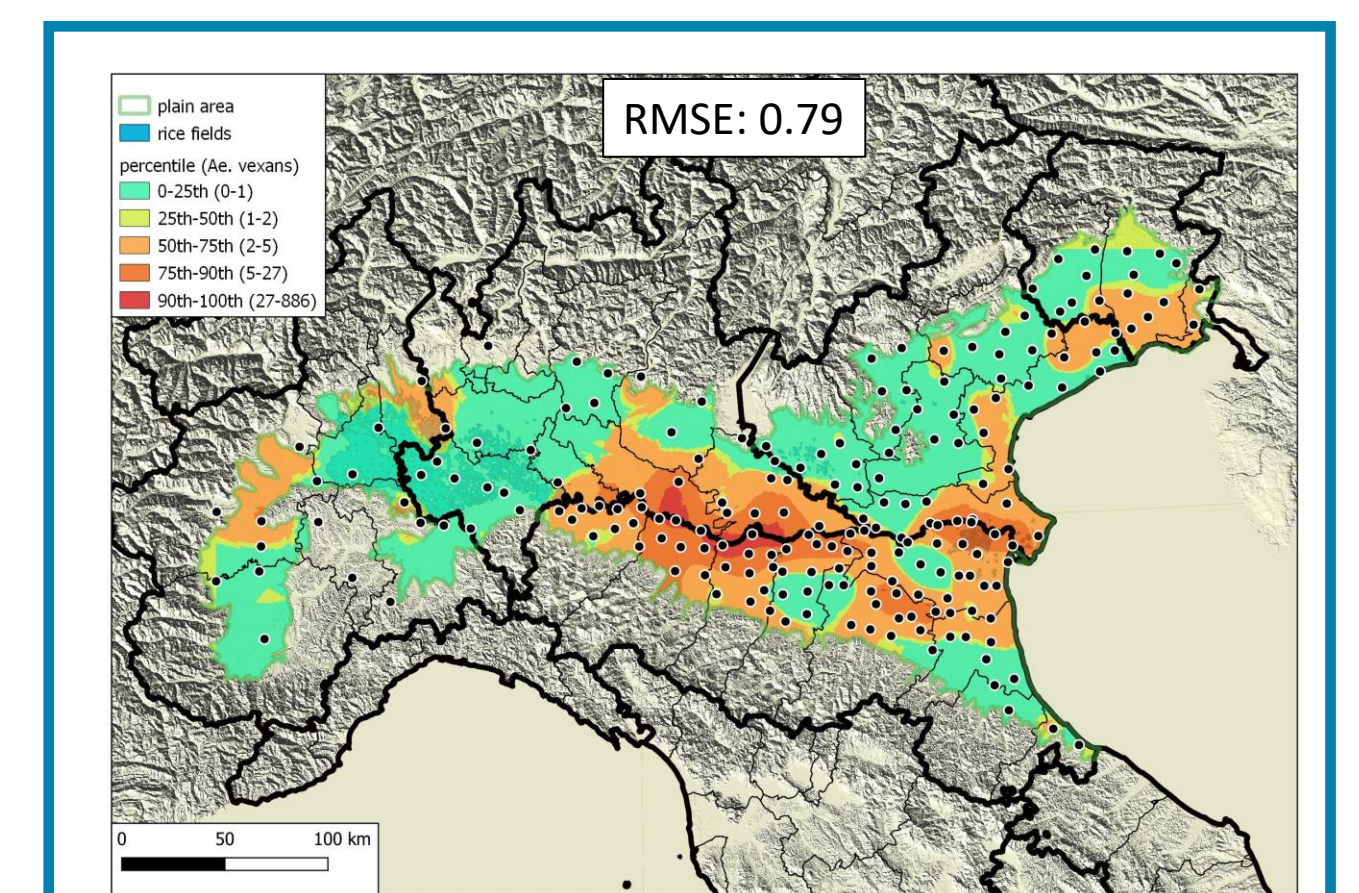
Ordinary kriging interpolation of *Ae. vexans* density

Results

- **Direct relation of *Ae. caspius*** high density with rice fields and small water bodies proximity; hot spots coincident with the big rice fields area in the west of Po valley and, in the oriental part, near the Adriatic coast
- **Direct relation of *Ae. vexans*** high density with presence of inland marshes and water courses and proximity with small water bodies; a significant hot spot was present along Po river in the middle of study area and a less significant hot spot in eastern part of the Po valley

Suitability map of **high** *Ae. caspius* density

Suitability map of **high** *Ae. vexans* density

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