Mosquito Vision:

An interactive application for the prediction of mosquito nuisance for citizens

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Ecodevelopment

ECODEVELOPMENT

ENVIROMENTAL APPLICATIONS

E-SOVE

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Ευρωπαϊκή Ένωση

ΠΕΡΙΦΕΡΕΙΑ ΚΕΝΤΡΙΚΗΣ ΜΑΚΕΔΟΝΙΑΣ

ΕΙΔΙΚΗ ΥΠΗΡΕΣΙΑ ΔΙΑΧΕΙΡΙΣΗΣ

ΕΣΠΑ 2014-2020

Με τη συγχρηματοδότηση της Ελλάδας και της Ευρωπαϊκής Ένωσης

Mosquito vision – What is it?

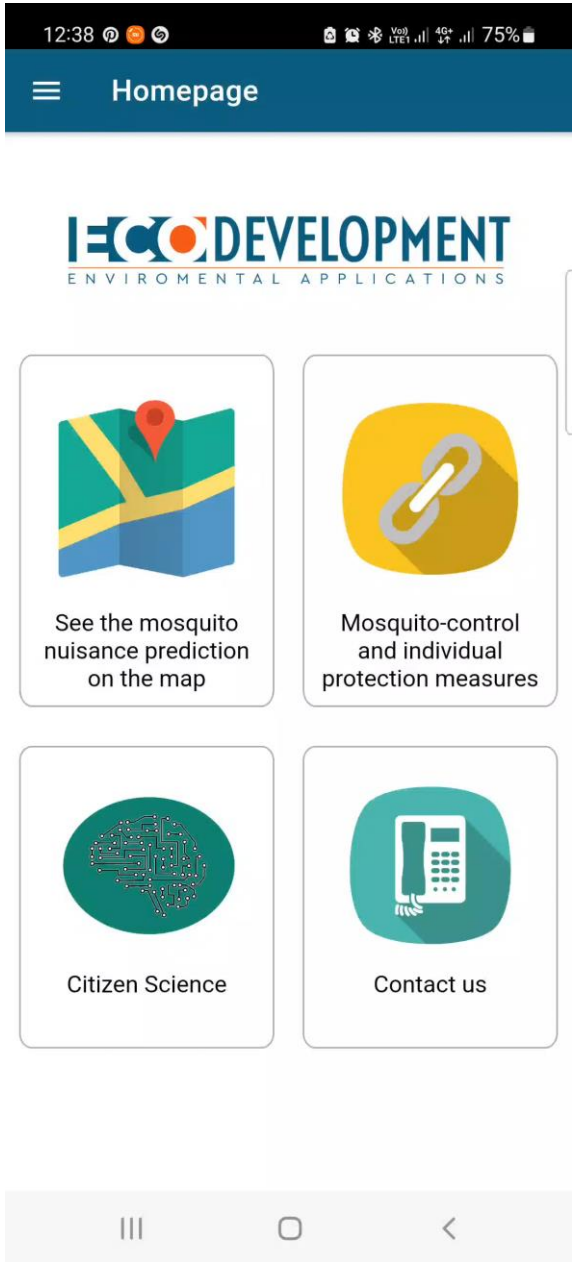
Mosquito Vision – mobile application

- Daily nuisance prediction,
- **open to the public** GET IN ON Google Play / Download on the App Store
- In 4/13 regions of Greece: Central Macedonia, Western Greece, Crete, Thessaly (2.415 settlements, 2020 – 2021)
- Based on the BAd model & 5-day **weather forecast**

- **5 nuisance categories**:

None	Minor	Moderate	Increased	Intense

- Evening (*Aedes caspius*) & night time (*Culex pipiens*)
- 288 reviews (weekly rated by 47 peers)
- Mean deviation between predicted and estimated nuisance: evening - 0.7 night level - 0.1 level
- 2 **Citizen Science** functions were added in 2021 (evaluation of nuisance, reporting of breeding sites)



https://play.google.com/store/apps/details?id=gr.ecodev.mosquitovision

Mosquitoes' abundance forecast

BoL (Big data technologies model of mosquito **Larvae**)

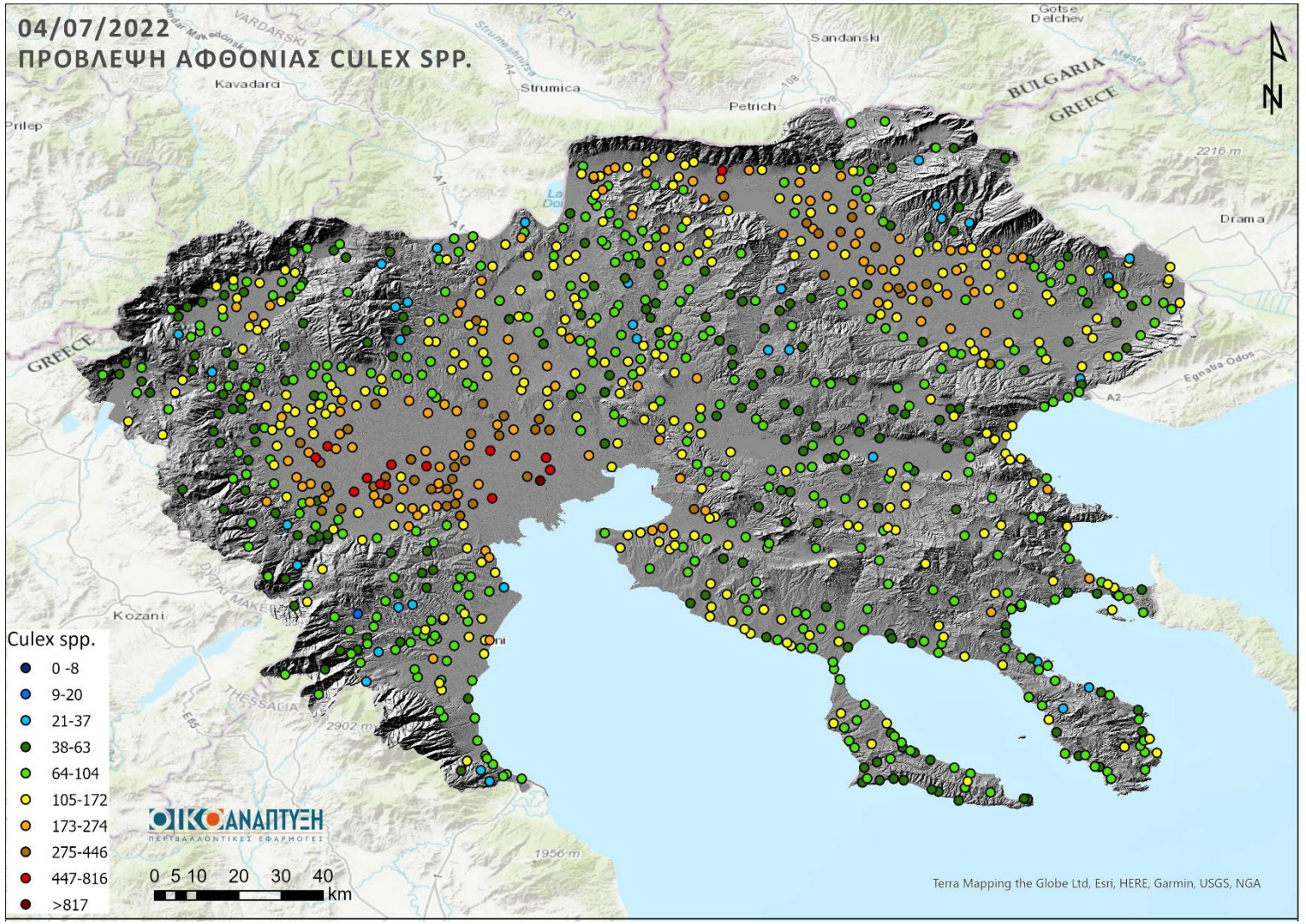
- ✓ Weekly forecast of mosquito larvae abundance for *Culex ssp., Aedes spp.* and *Anopheles spp.* at **breeding site level**
- ✓ **Continuous Training algorithm**
- ✓ Central Macedonia (2018-2021) 350,000 / 770,000 total larvae sampling data in e-bite which constitute in 33/271 input variables
- ✓ Recall = 0.83 for *Culex ssp*. F1 sore = 0.77

Embedded

BAd (Big data technologies' model for **Adult** mosquitoes)

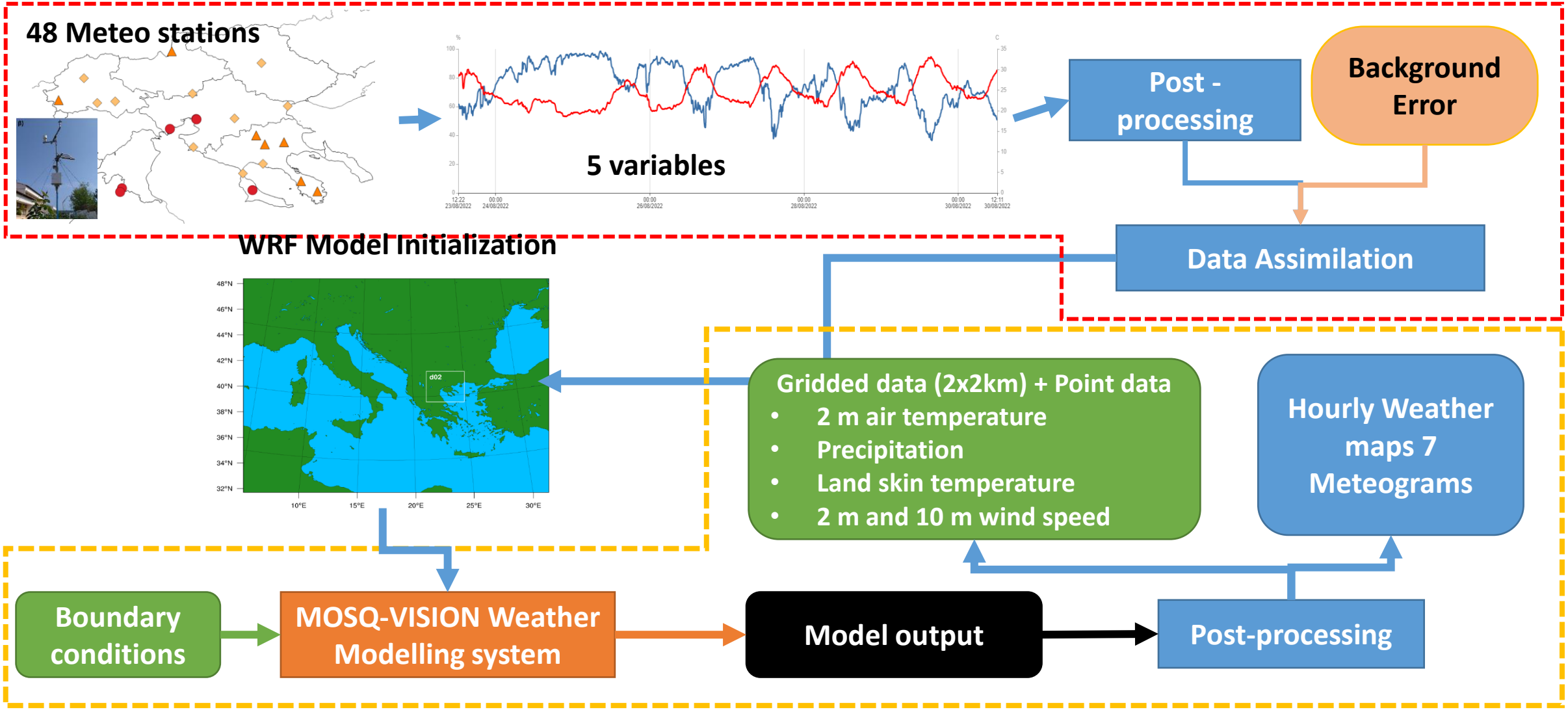
- ✓ Daily forecast of mosquito adult abundance for *Culex spp., Aedes spp. and Anopheles spp.* at **settlement** level
- ✓ CAT boost algorithm
- ✓ Central Macedonia (2011-2021) 7.152 / ~13.000 total adult samples with CO_2 traps which constitute 5/184 input features
- ✓ Mean Absolute Error = 1.31 mosquito abundance classes

BAd as a proxy for evening and night nuisance

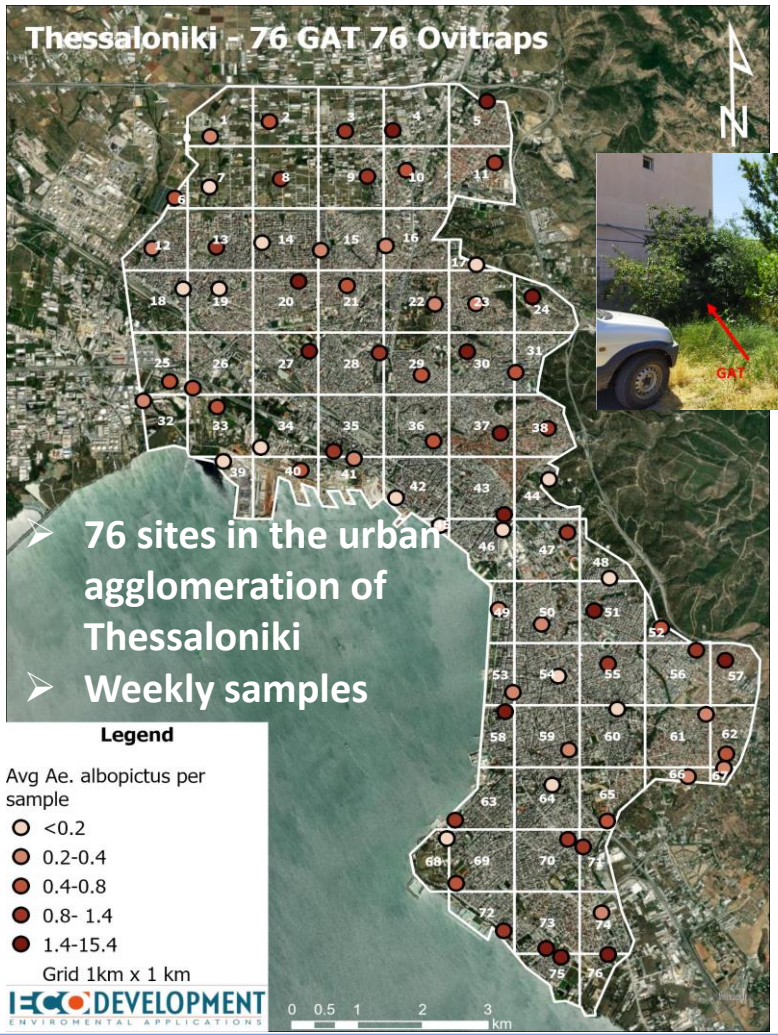


- ✓ Translation of mosquito abundance classes to nuisance levels
- ✓ Accurate short-term weather conditions for estimation of biting activity

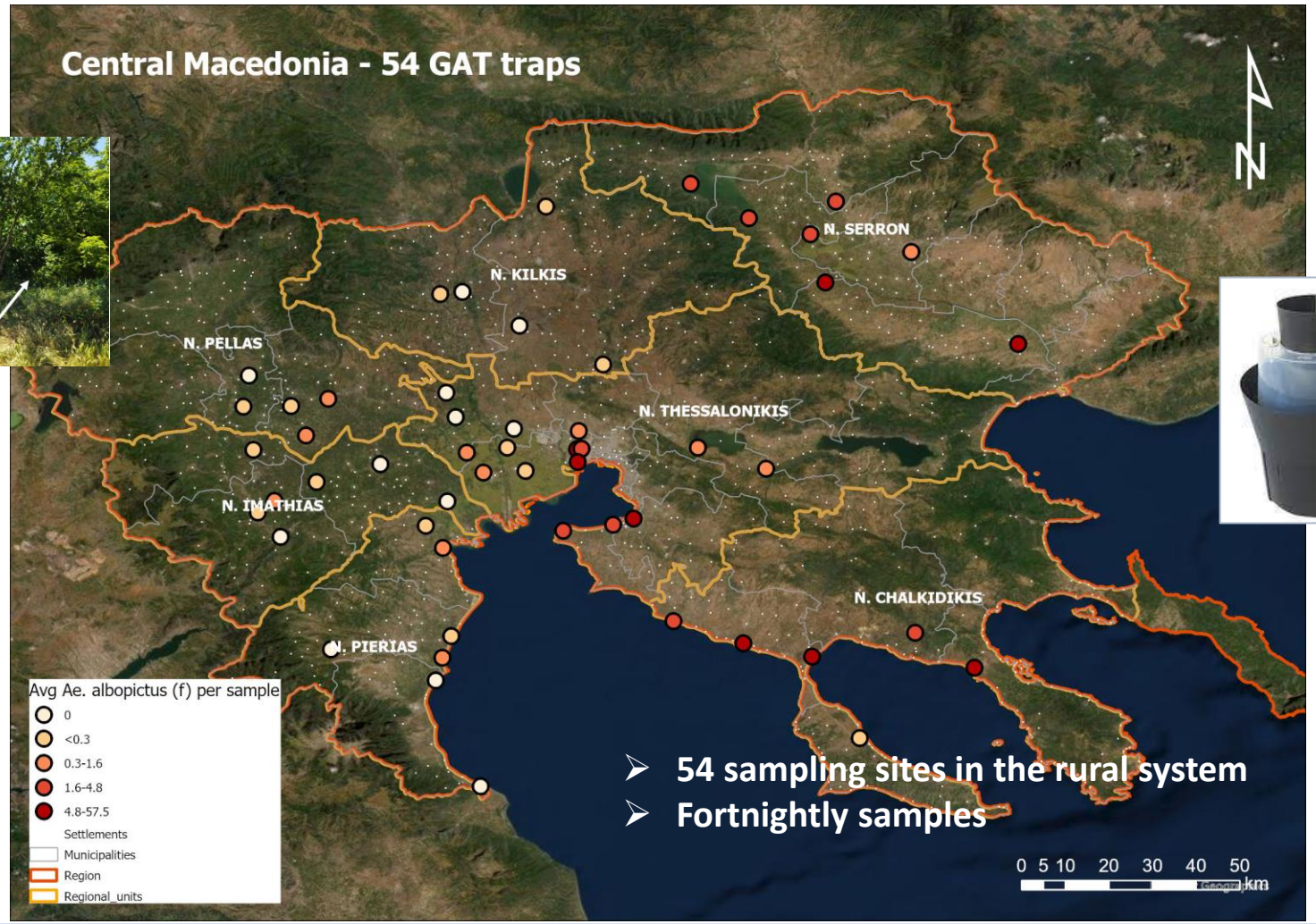
1. Optimization: Weather forecast



2. Optimization: *Aedes albopictus* – adult population monitoring



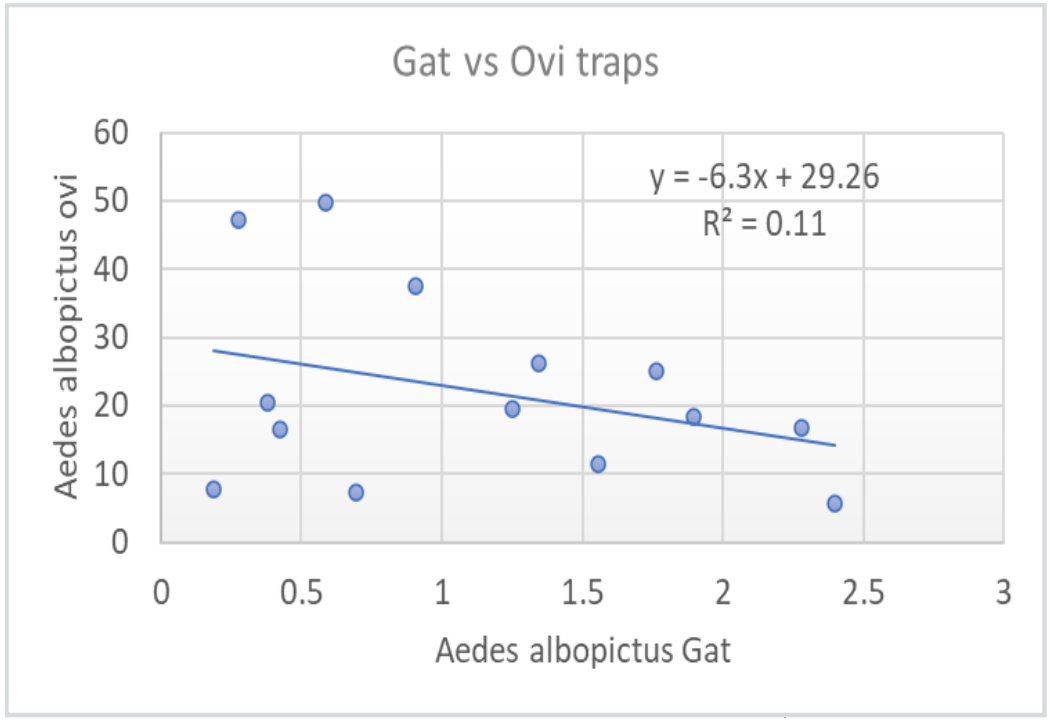
- 76 sites in the urban agglomeration of Thessaloniki
- Weekly samples



- 54 sampling sites in the rural system
- Fortnightly samples

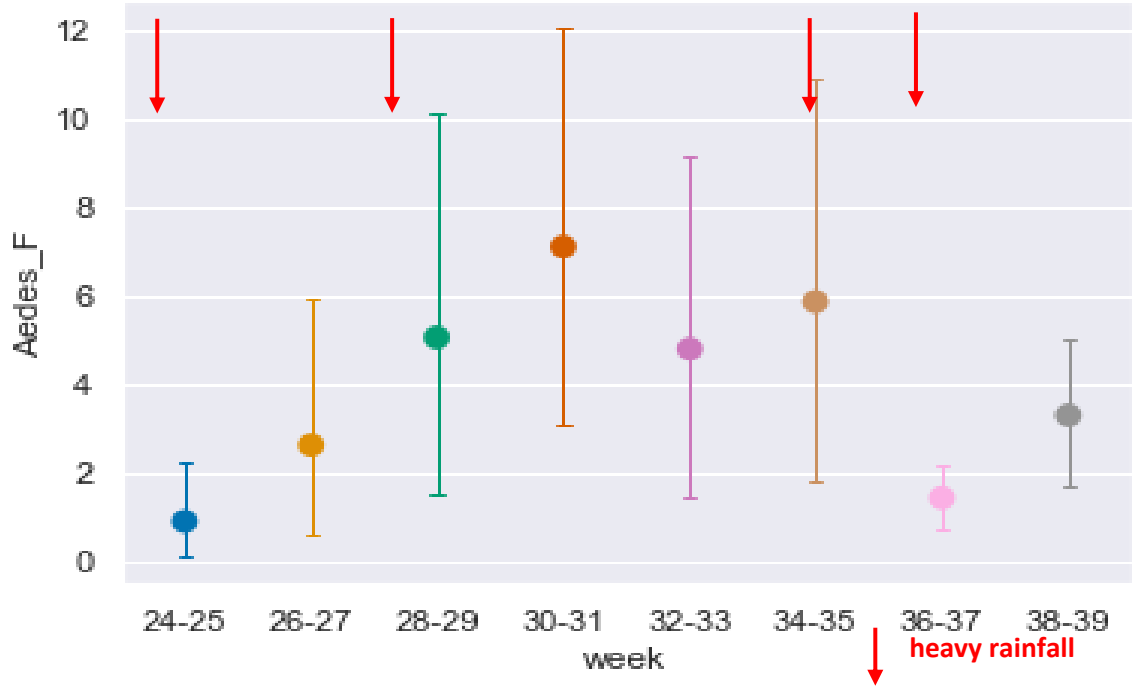
2. Optimization: *Aedes albopictus* – adult population monitoring

Thessaloniki - 76



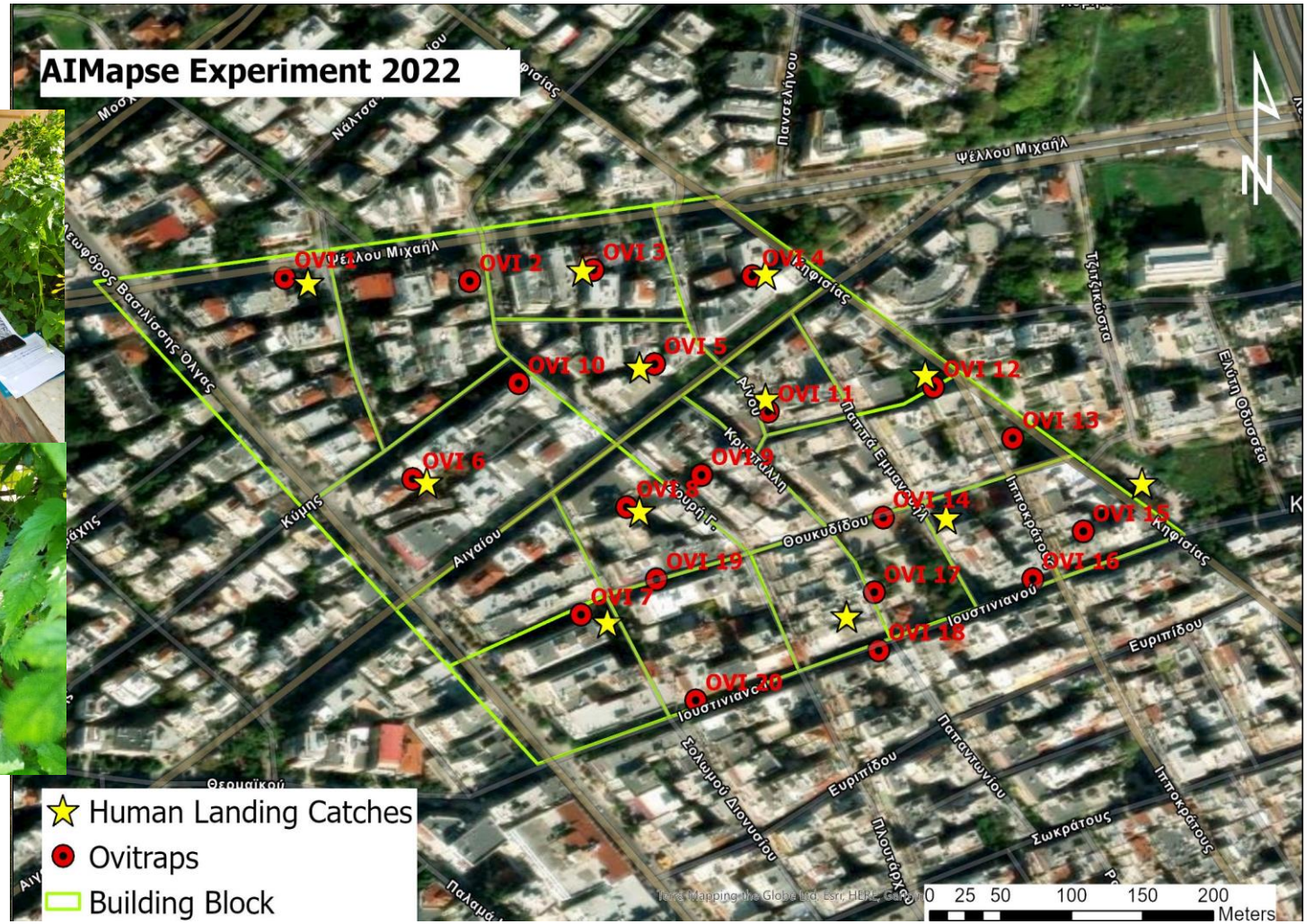
- ✓ 1.064 samples
- ✓ 1.769 specimens, 1.306 (f), 8 species
- ✓ Weekly sampling during 14 weeks (06-09/2022)
- ✓ Peaks during July and August
- ✓ Strong variability between the trapping sites

Central Macedonia – 54 GAT



- ✓ 481 samples
- ✓ 4.667 specimens, 3.592 (f), 12 species
- ✓ 16 weeks period (June-September 2022)
- ✓ forthnightly sampling
- ✓ Peaks during July and August

3. Optimization: Association of nuisance (HLC) with mosquito/egg abundances



Human Landing Catches *(all species)*

- 1997-2022
- 10 positions (per week)
- 4 months/year
- ~2,400 samplings

CO_2 traps *(Culex spp., Aedes spp., Anopheles spp.)*

- from 2010 onwards
- 60 positions (per 15-day)
- 5+ months / year
- ~7,000 samplings

HLC *(Ae. albopictus)*

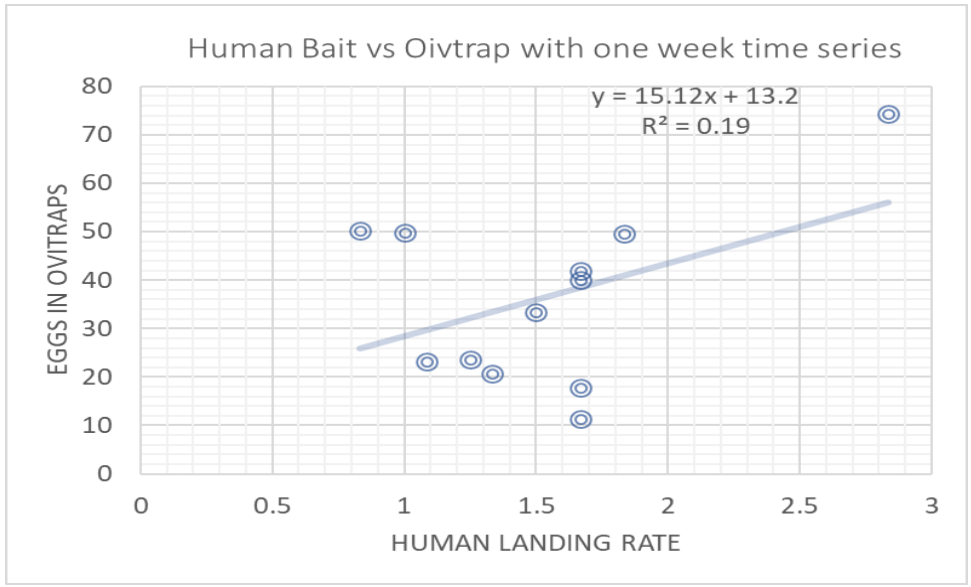
- 12 sampling sites, weekly
- 4 months
- 168 samples

Ovitraps *(Ae. albopictus)*

- 20 samplings sites, weekly
- 4 months
- 260 ovitrap samples in Thessaloniki

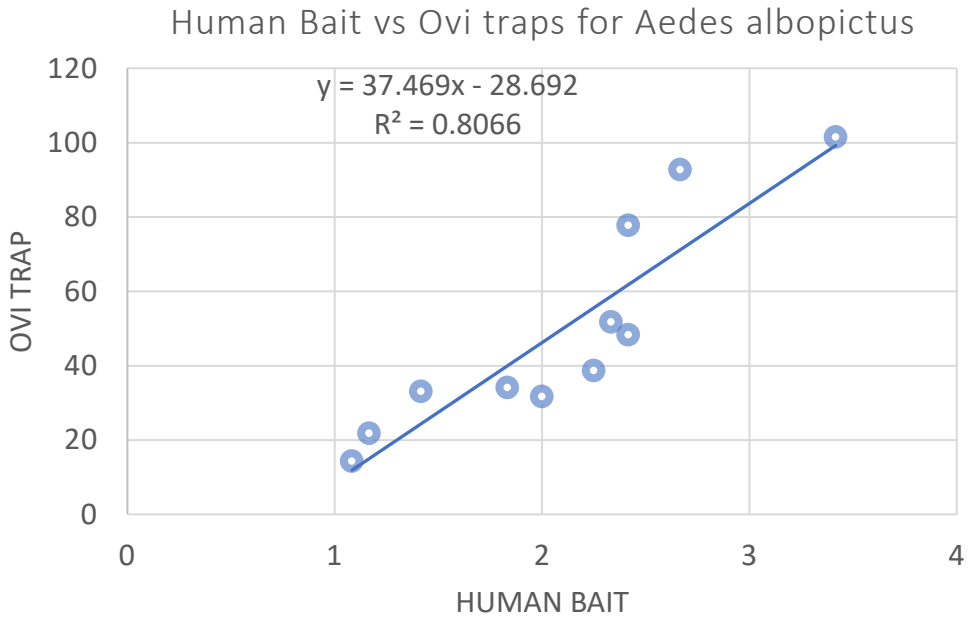
3. Optimization: Association of nuisance (HLC) with mosquito/egg abundances

AIMapse protocol - Depot



- ✓ 168 HLC samples vs 260 Ovitrap samples in very close vicinity
- ✓ 13 weeks period (July-September 2022)
- ✓ Weekly sampling

AIMapse – Depot HLC vs Thessaloniki 76 Ovitraps

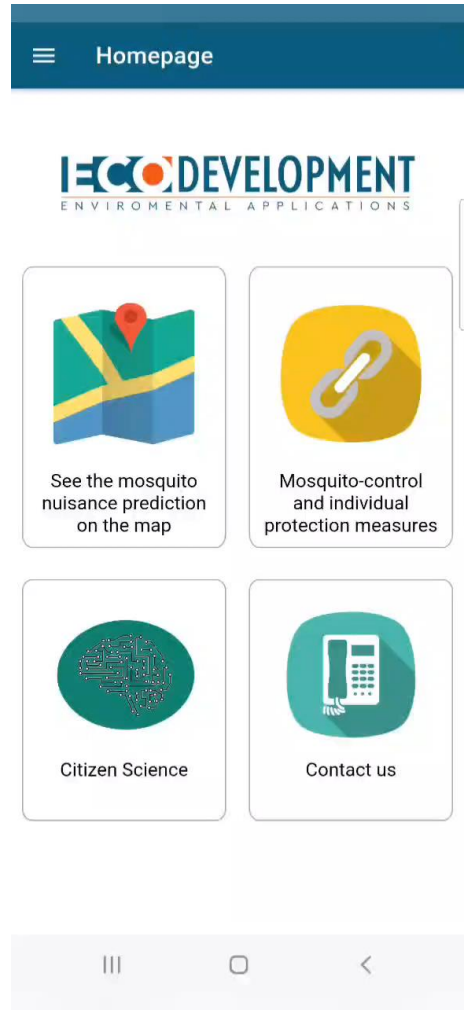


- ✓ 168 HLC samples vs 1064 Ovitrap samples all over Thessaloniki
- ✓ 13 weeks period (July-September)
- ✓ Weekly sampling

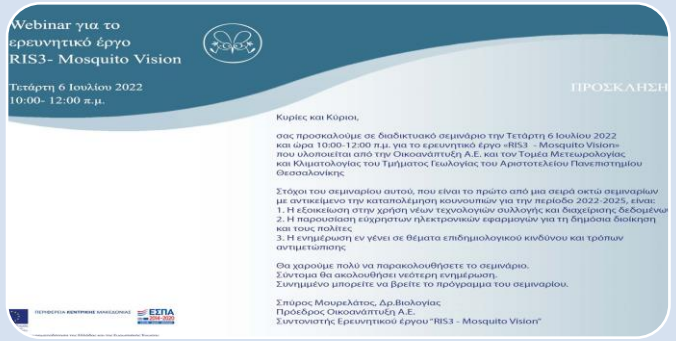
4. Optimization: Citizen Science Functions

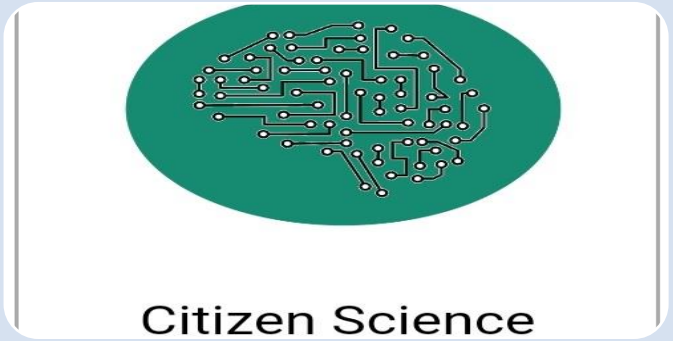
1. **Nuisance evaluation by citizens**
   - At their actual location
   - In other places/regions
   - At the same time for various periods of the day with distinct nuisance levels
   - Use for evaluation of nuisance predictions

2. **Indication of potential mosquito breeding sites**
   - E.g. flooded basements, foundations, construction sites
   - Used tires
   - Temporary breakdowns
   - A comparison is made with the geobase of Ecodevelopment breeding sites and the site submitted gets either green with the legend that we are already checking systematically this breeding site or red with the legend that it has been added to the breeding site network for mosquito control



Services for Stakeholders – Dissemination actions – First results





6/7/2022
Webinar

250 participants:
stakeholders from administration, operators and research institutions involved in Public Health and mosquito control

10-18/09/2022 **Stand at the 86th Thessaloniki International Fair**

Increase of 10% in downloads

18/8-22/9/2022
34 reports through interactive citizen science functions

25 breeding sites, 7 nuisance, 2 both

19/27 indicated breeding sites added to the monitoring network

In conclusion…

- Data time series
- Quality and flow of data
- Exchange of data and know-how
- Disclosure of new digital tools

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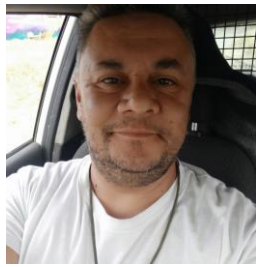

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