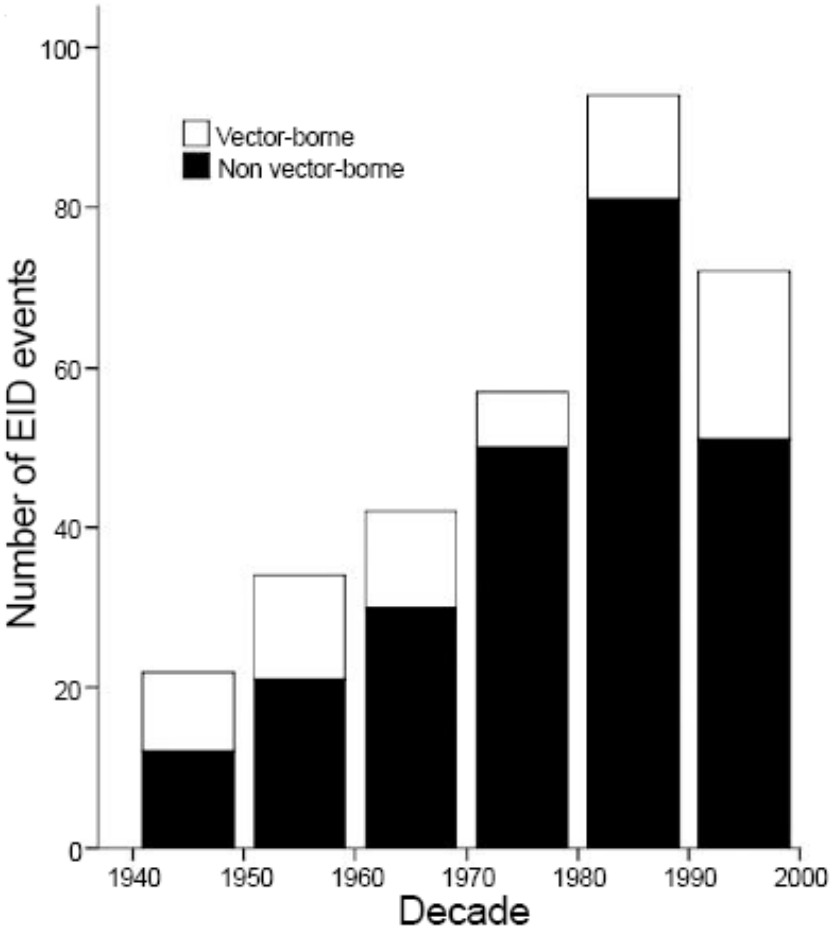
Invasive Aedes species on the Belgian horizon: risk mapping and rapid screening using Pandora+

Alien Alert - 12 March 2014 – Veerle Versteirt

Mosquitoes on the rise

- Increased number of species records in different countries (VBORNET)
- Increased number of vector-borne diseases



Mosquitoes on the rise

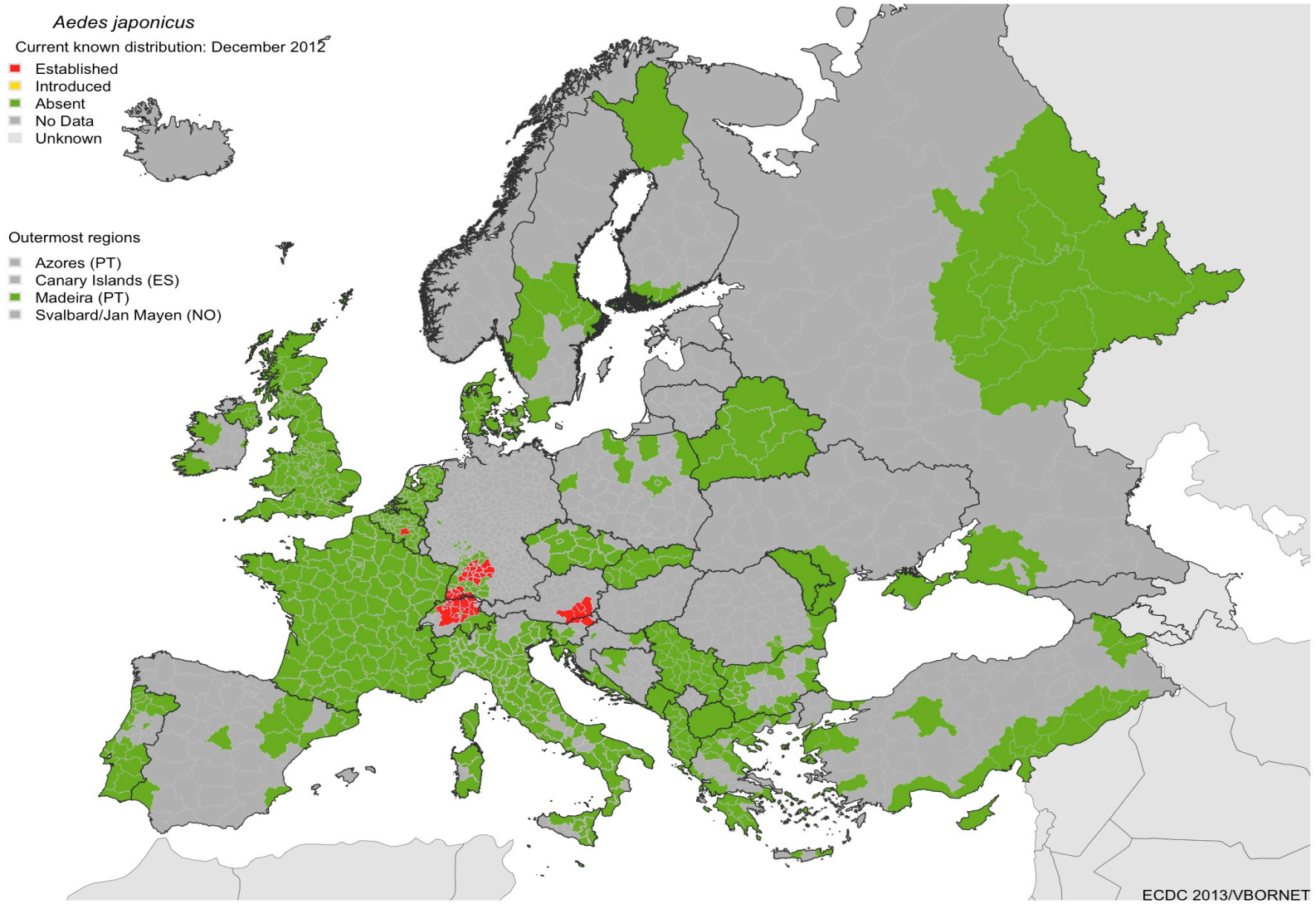
- Europe:
  - *Aedes aegypti*
  - *Aedes albopictus*
  - *Aedes atropalpus*
  - *Aedes japonicus*
  - *Aedes koreicus*

- Invasive *Aedes* mosquitoes
  - Eggs: resistant to desiccation
  - Container-breeding species
  - No restrictive host preferences
  - Dissemination by human activities
  - Adapted to temperate climate (+ winter diapause)

Aedes japonicus

- ‘Asian bush mosquito’; ‘Asian rock pool mosquito’
- Breeds in rock pools and containers
  - Tolerance of cold temperatures (no limit spread)
- Biting nuisance
- Putative vector of pathogens of medical and/or veterinary
- significance: possible WNV vector, avian malaria, JEV, Chikungunya, Dengue, but status unclear
- Potential threat to biodiversity
  - outcompeting native mosquitoes, USA

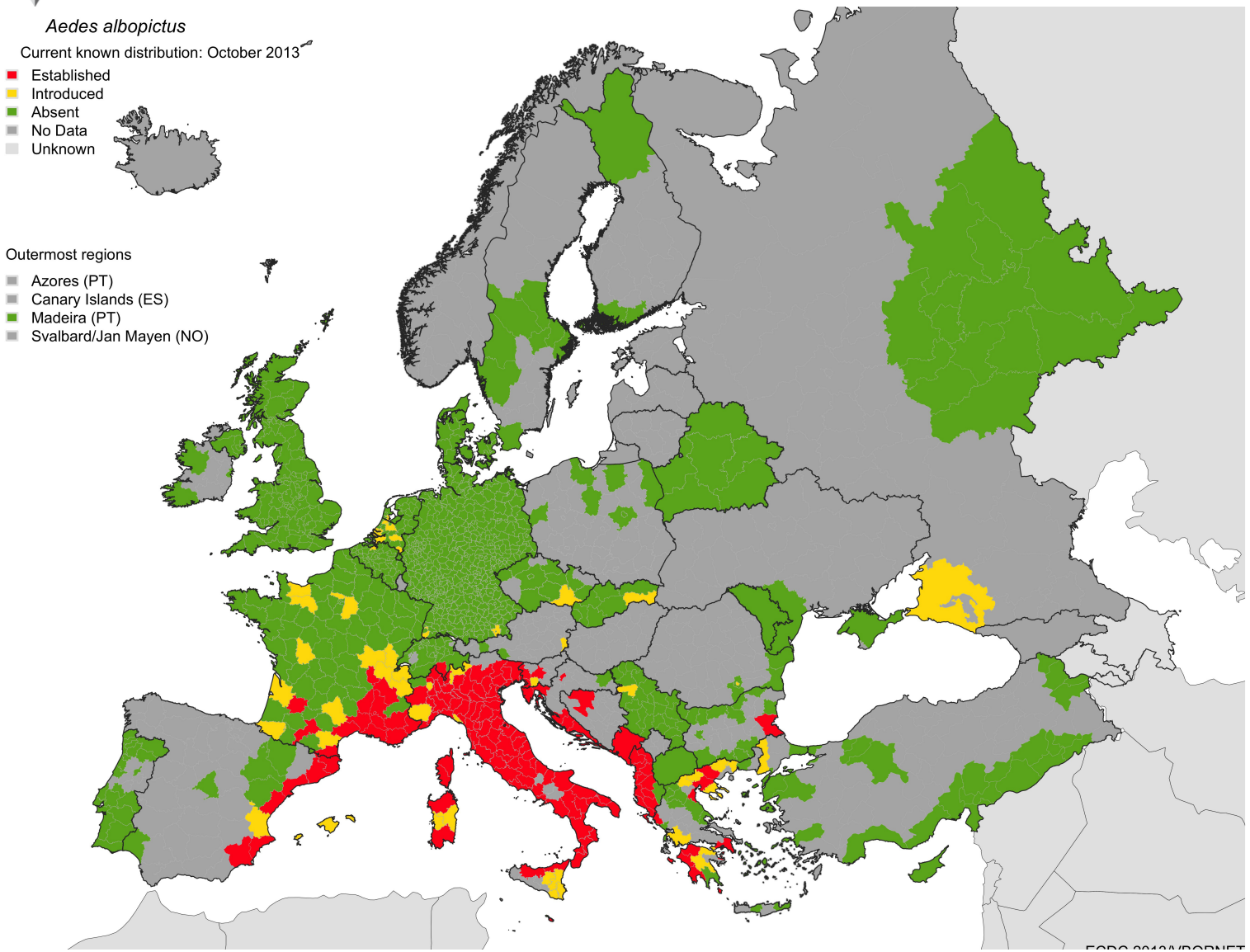
Aedes japonicus: distribution



Aedes albopictus

- Asian Tiger Mosquito
- One of the 100 worst invaders worldwide
- Introduced in USA in
  - late 1800's (Hawaii, ship)
  - 1985 (Continental USA; tires from Japan)
- Introduced in Europe in
  - 1979 Albania
  - 1999 Italy (tires, harbour)
- Container breeder, treeholes, bamboo & leaf axils
- Urban, semi-urban and forested areas
- Vector for several arboviruses: Chikungunya, Dengue, Yellow fever, la Crosse virus, Equine Encephalitis and West Nile
- Spreading gradually in Europe (Southern, moving norhtwards)

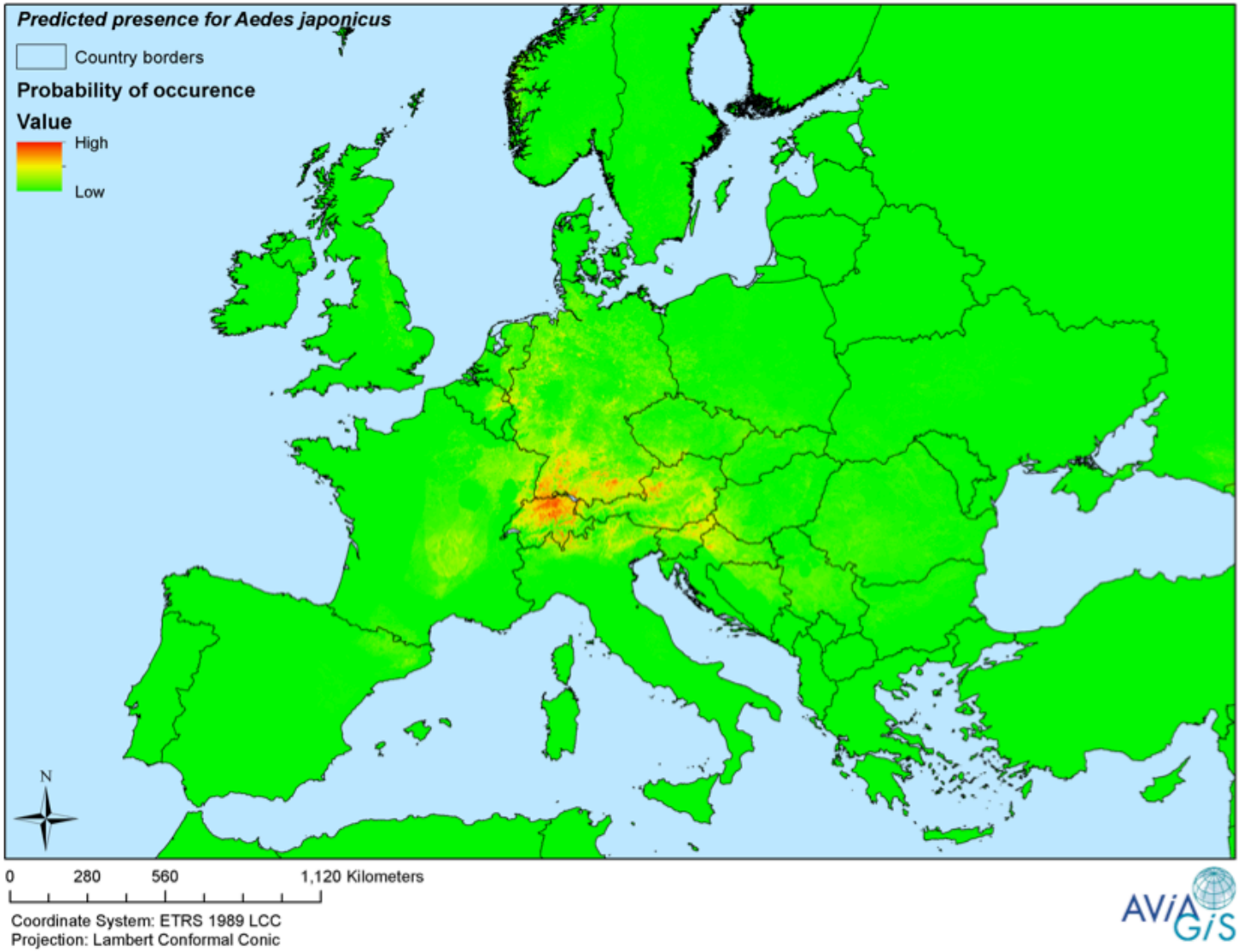
Aedes albopictus: distribution



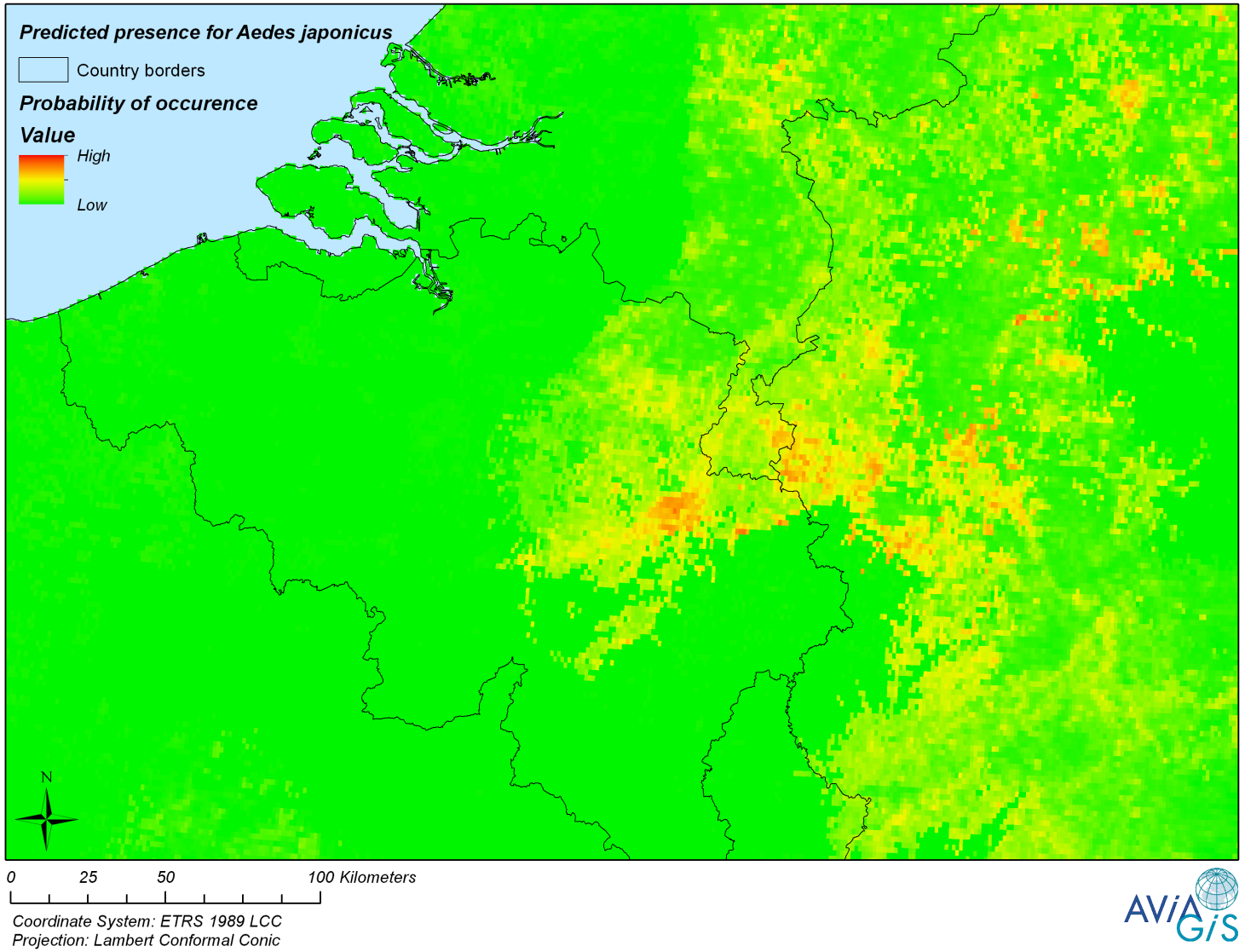
Species Distribution Models

- Prediction spatial distribution areas & areas @ risk
- Modelling techniques
  - Ecological niche
  - Georeference presence points & environmental parameters (satellite)
  - WorldClim and MODIS data
  - MaxEnt
- Modelling “Donor areas”
  - Mahalanobis distance

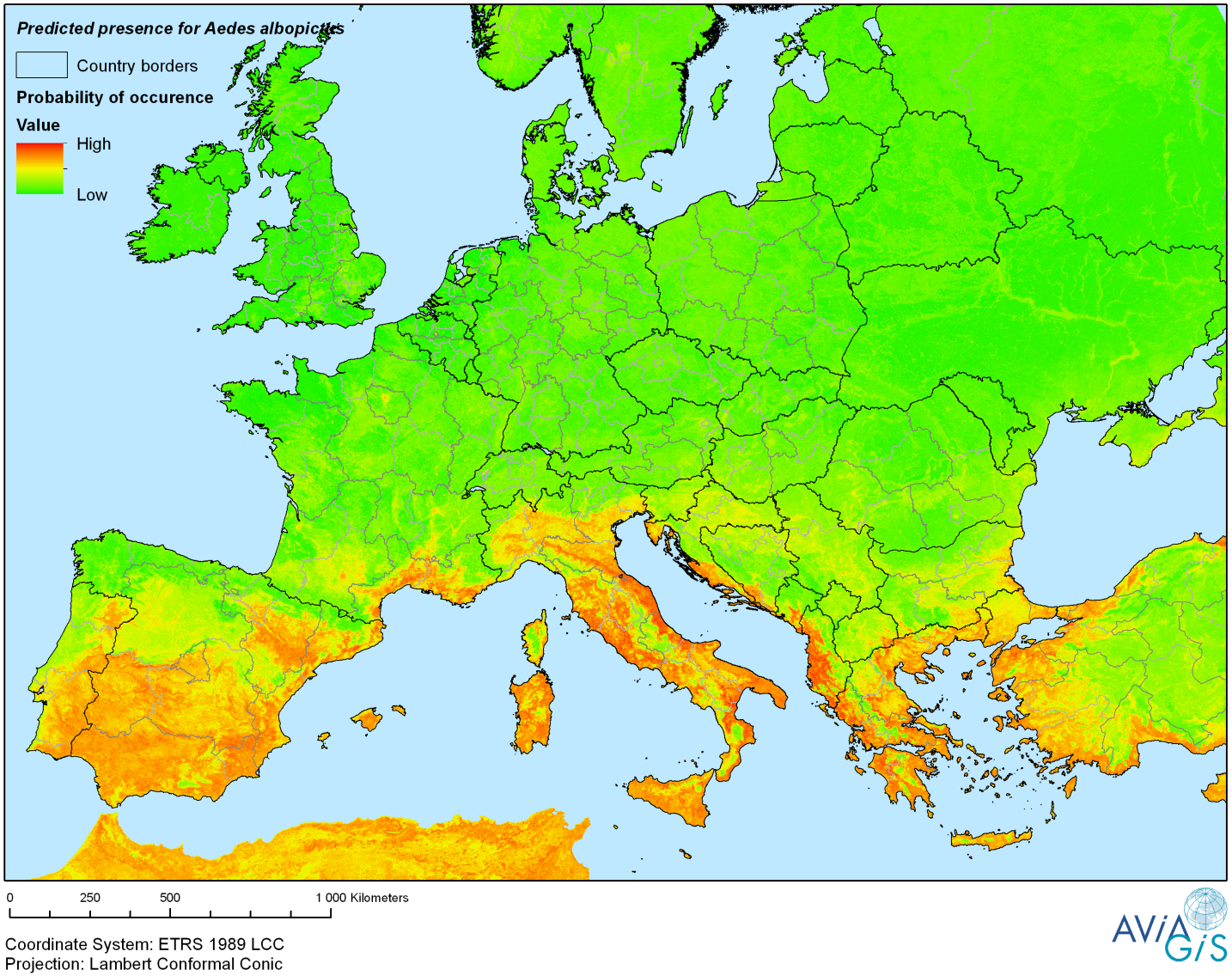
Aedes japonicus: predicted presence Europe



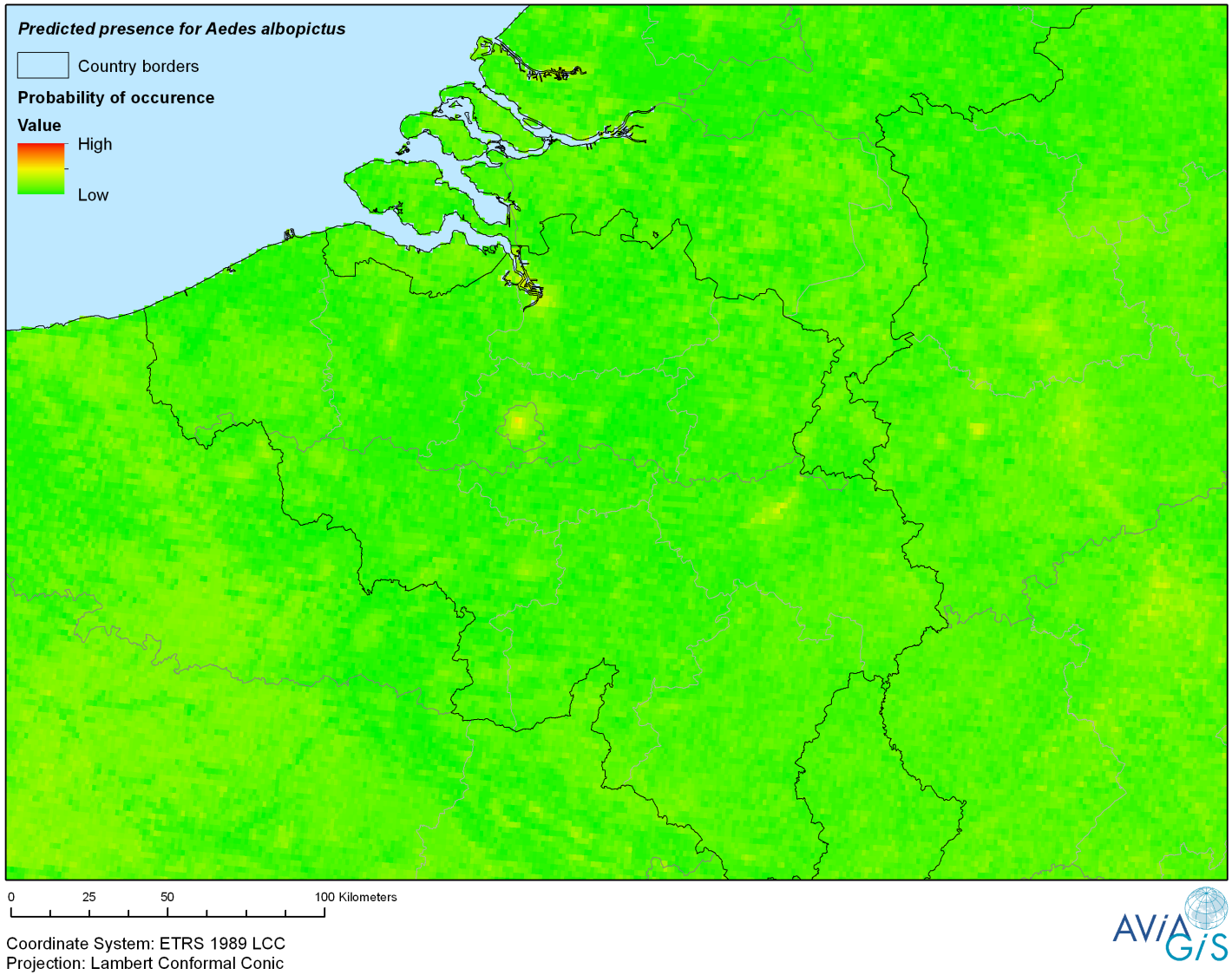
Aedes japonicus: predicted presence



Aedes albopictus: predicted presence Europe



Aedes albopictus: predicted presence Belgium



Pandora+

- First-line screening tools for potentially invasive organisms and its pathogens
- Questions around invasion, risk and confidence
- Assess impact of a pathogen on e.g. human health, trade and tourism
- Three international experts scored independently
- Weights given to each question

Alien Alert

Pandora **+ :**

first-line screening tools for potentially invasive organisms and its pathogens

β2α version

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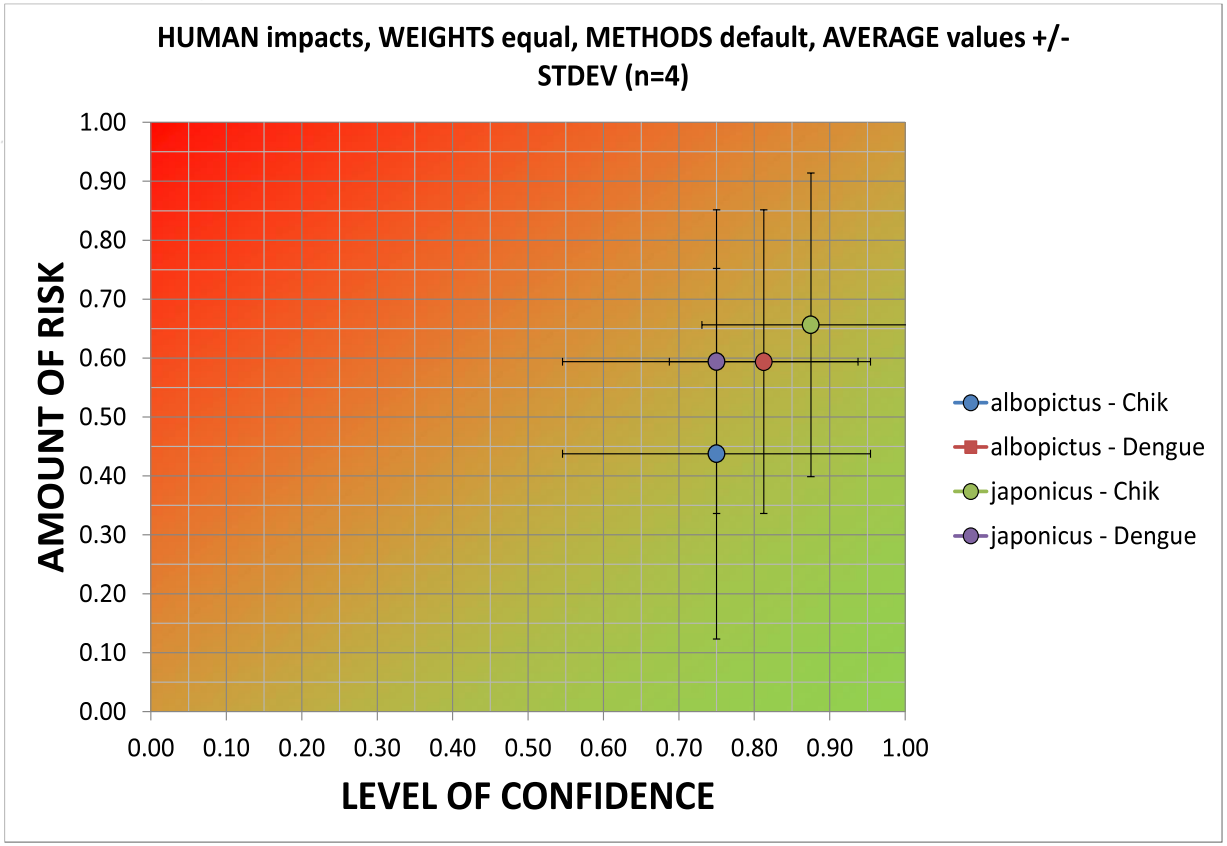
Pandora+



- All experts scored similar
- High overall risk to human health
- High confidence levels

Surveillance?

- Surveillance in Belgium
  - MODIRISK (2007-2010): ‘inhibitor’
  - ExoSurv
  - FAVV funded surveillance of import sites
  - Control *Aedes japonicus* in Natoye
- No consistency
  - Different groups, experts
  - Screening tire companies
  - Cost-efficient?

Conclusion

- Increased suitability of certain regions in Belgium for the establishment of:
  - *Aedes japonicus*
    - Liège region & area around Meuse
  - *Aedes albopictus*
    - Major cities, especially Antwerp and Brussels
- Four experts (1 national & 3 international ones) using Pandora^{+} scoring risk
  - All over high
- Need for continued, standardised surveillance, especially in boarder areas
- Prevention before introduction

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