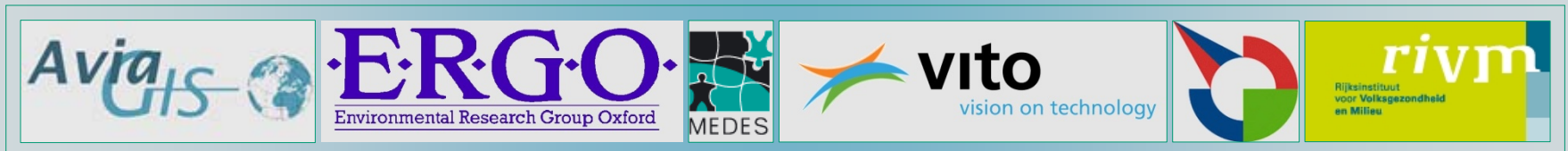


VecMap



A One-Stop-Shop for Vector Mapping





A One-Stop-Shop for Vector Mapping?

- **Vector = Arthropods capable of transmitting pathogens**

In Europe

- Outbreaks of

- West Nile Fever
- Chikungunya
- Blue tongue
- and local transmission of Dengue

- Presence and abundance of local species largely unknown
- Global introductions of new disease vectors and pathogens
 - International trade (e.g. eggs in tyres)
 - Tourism
 - Climate change

- Need for surveillance, early warning systems & control
 - Vectors survive only in particular ecosystems
 - Need for **spatiotemporal prediction maps**



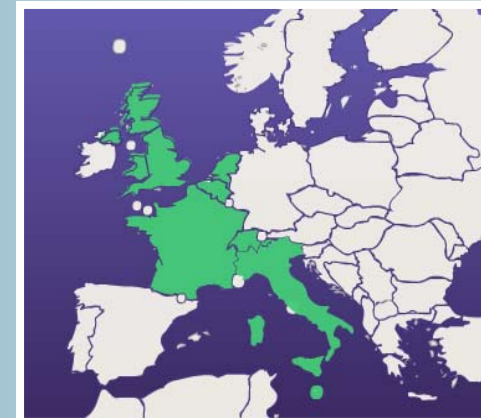
1. Academic users

- Reduce field work, more focus on analysis of data
- More standardized results



Academic Users

- PhD students
- ITM (B)
- UZH (CH)
- CEH (UK)





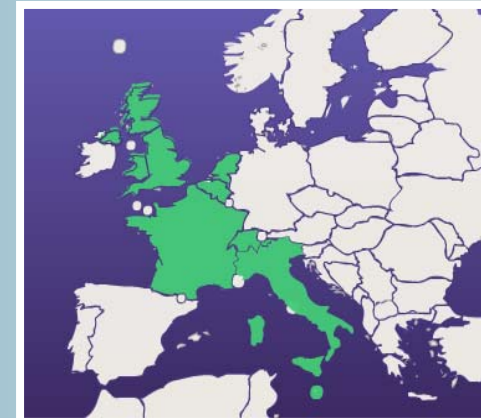
1. Academic users

2. Public Health (decision makers)

- Early warning vector presence
- Critical species
- Where are they now
- Where will they be in future
- National coverage

Public Health

- RIVM (NL)
- IPH (B)
- PH Malta
- PH French Polynesia



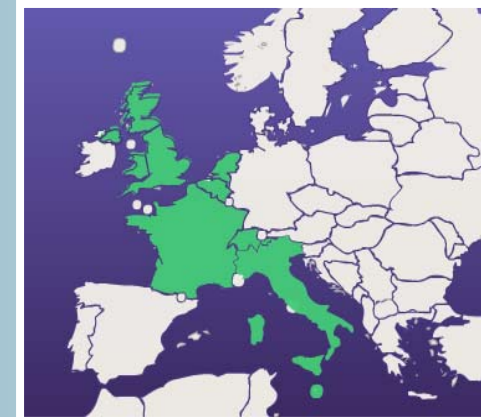
Users & their needs

1. Academic users
2. Public Health (decision makers)
3. **Control agencies**
 - Critical & nuisance species
 - Where are they (mosquitoes, larvae, eggs), high resolution
 - When will eggs hatch & population peak
 - Cover a greater area with the same budget
 - Use less pesticides



Control agencies

- EID Mediterranee (F)
- CAA (I)
- CMV (NL)

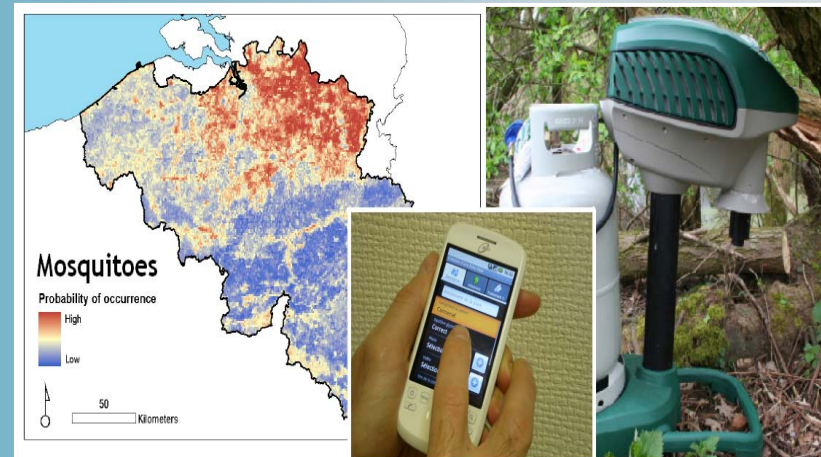


- **Cross-sectional baseline study**



Cross-sectional baseline study

- Extensive in-situ sampling (CO₂ traps)
- Randomly selected locations
- Taking into account land use distribution & seasonal effects
- Register location & conditions
- Collect field reports



The use case

- Cross-sectional baseline study
- **Laboratory analysis**



Laboratory analysis

- Species count
- Male/female
- LIMS reports

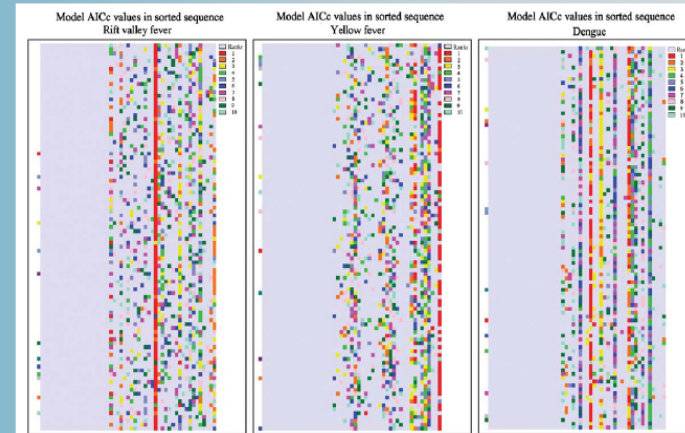


- Cross-sectional baseline study
- Laboratory analysis
- **Spatial modeling**



Spatial modeling

- Collect & resample spatial data (elevation, vegetation, temperature, demographics etc.)
- Fourier analysis (seasonal effects)
- Bootstrap in-situ datasets
- E.g. non-linear discriminant analysis
- Identify correlations with physical parameters



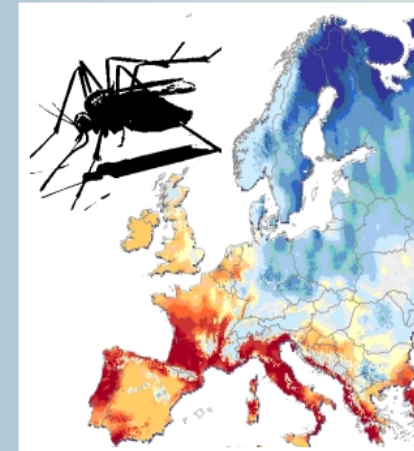
The use case



- Cross-sectional baseline study
- Laboratory analysis
- Spatial modeling
- **Risk maps**

Risk maps

- Suitability of environment
- For each stage of vector life cycle
- Available at 1 km and 30 m resolution
- Raster functions for trend and impact analysis





- Cross-sectional baseline study
- Laboratory analysis
- Spatial modeling
- Risk maps
- **Longitudinal study**

Longitudinal study

- Continued sampling in high-probability locations
- Register local conditions
- Collect field reports

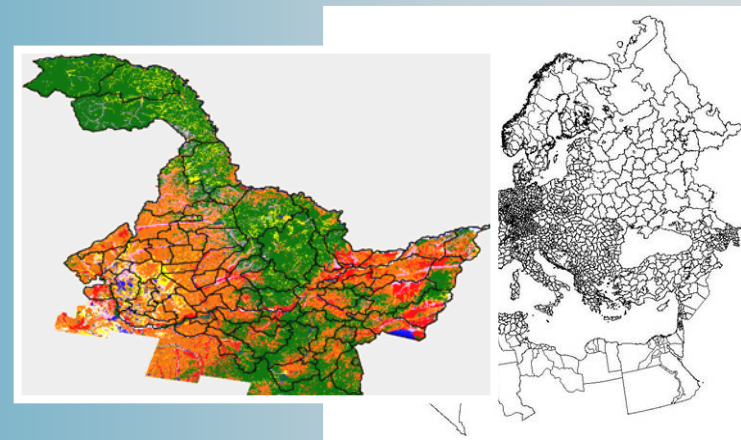


Data of Interest for Vector Mapping

- **Static data**

Static data

- Digital Terrain Maps (GTOPO30)
- Land use maps (GLC2000, Corine)
- Administrative regions (NUTS 1,2,3)



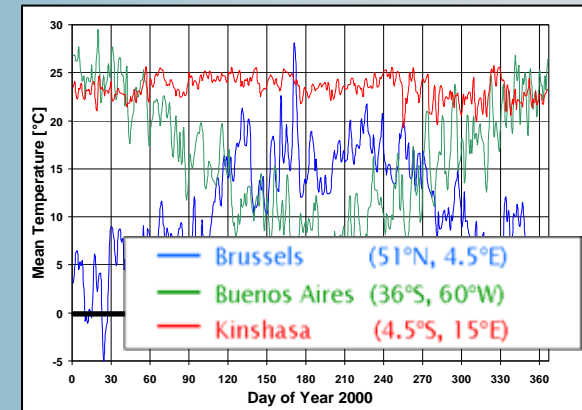
Data of Interest for Vector Mapping

- Static data
- **Meteo data from ground stations**



Meteo data from ground stations

- Daily AGROMET–data (Tmin, Tmax, Rad, Pluvio)
- Atmospheric data, water vapour etc.





Data of Interest for Vector Mapping



- Static data
- Meteo data from ground stations
- **Satellite band combi's**

Satellite band combi's

- Proxy's from spectral band ratio's
- Normalised Difference Vegetation Index
- SAVI, NDWI
- Visual and Infrared
- Envisat, Terra/Aqua, Spot



Data of Interest for Vector Mapping

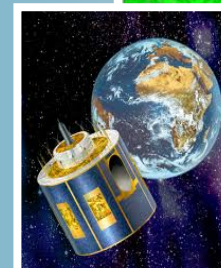
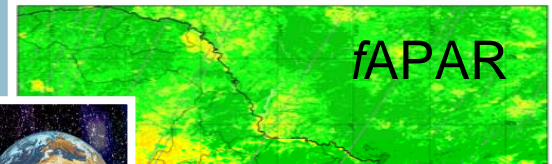


- Static data
- Meteo data from ground stations
- Satellite band combi's
- **Satellite model-based data**

Satellite model-based data

- fAPAR Fraction of Absorbed Photosynthetically Active Radiation
- Dry Matter Productivity (DMP)
- Leaf Area Index (LAI)
- Evapotranspiration, Precipitation: VIR/TIR, MSG
- Land Surface Temperature (LST): TIR
Terra/Aqua, NOAA/METOP

Region: Heilongjiang Province (China)
Period: June, 2003, Dekad 2/3
Theme: Fraction of Absorbed Photosynthetically Active Radiation (fAPAR)
Maximum value in period
Source: SPOT-VEGETATION



Data of Interest for Vector Mapping

- Static data
- Meteo data from ground stations
- Satellite band combi's
- Satellite model-based data
- **Satellite navigation data**

Satellite navigation data

- Currently: GPS, 15 m
- Since 2008, EGNOS Augmentation: 5 m + integrity
- From 2013: Galileo: integrity + guarantee
- Galileo + GPS: increased availability (urban)

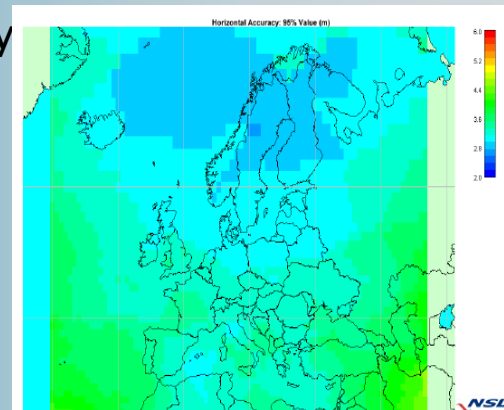
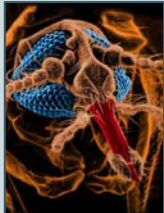


Figure 19 EGNOS performance



VECMAP infrastructure



Smart-Web



OR



Stand-alone System User



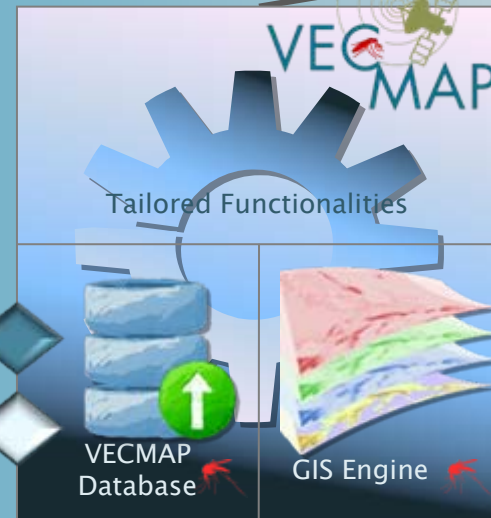
Server based Service Provider

Integration of Earth observation and Navigation



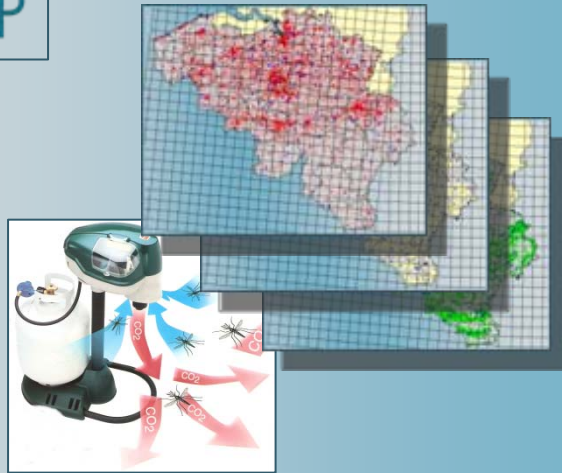
External Database(s)


Tailored agent(s)






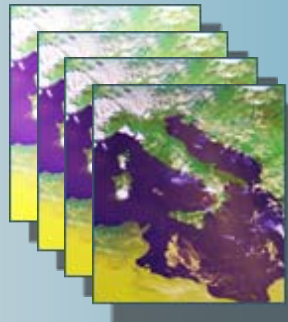
VEGMAP functionalities



Sampling strategy 



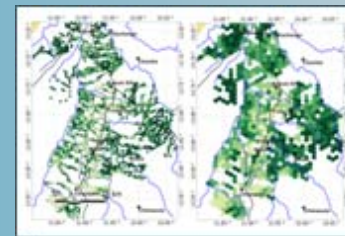
Field data analysis 



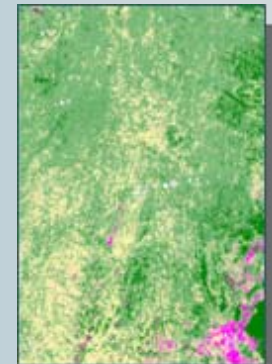
L-MR EO Time series 



Distribution Models 



Landscape Models SERVICE 



HI-VHR EO Products 



Summary

- Typical IAP activities in **Health/Epidemiology**
 - Field data collection
 - Vector and disease risk mapping
 - Early warning & emergency response
 - Integration/centralized data & analysis

- The **VECMAP** service maps vector habitat suitability
 - Proof of Concept starts 24 November
 - End of Feasibility April 2011
 - **New users welcome!**
 - **Demonstration project** starts mid 2011
 - Service operational in 2013





Consortium



- **Avia-GIS (B)**

- Team leader & service provider

- **ERGO (UK)**

- Geospatial modelling based on in-situ and Earth Observation data

- **MEDES (F)**

- In-situ measurements and field reporting

- **EARS (NL) and VITO (B)**

- Analysis of Earth Observation data

- **RIVM (NL)**

- User representative



Thank you



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