Integrated system for forest damage and disturbance monitoring: The perspective of large scale bark beetle outbreak in Central Europe

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Assessing Forest Damage and Disturbance
Scientific-Technical Symposium jointly organized by the United Nations

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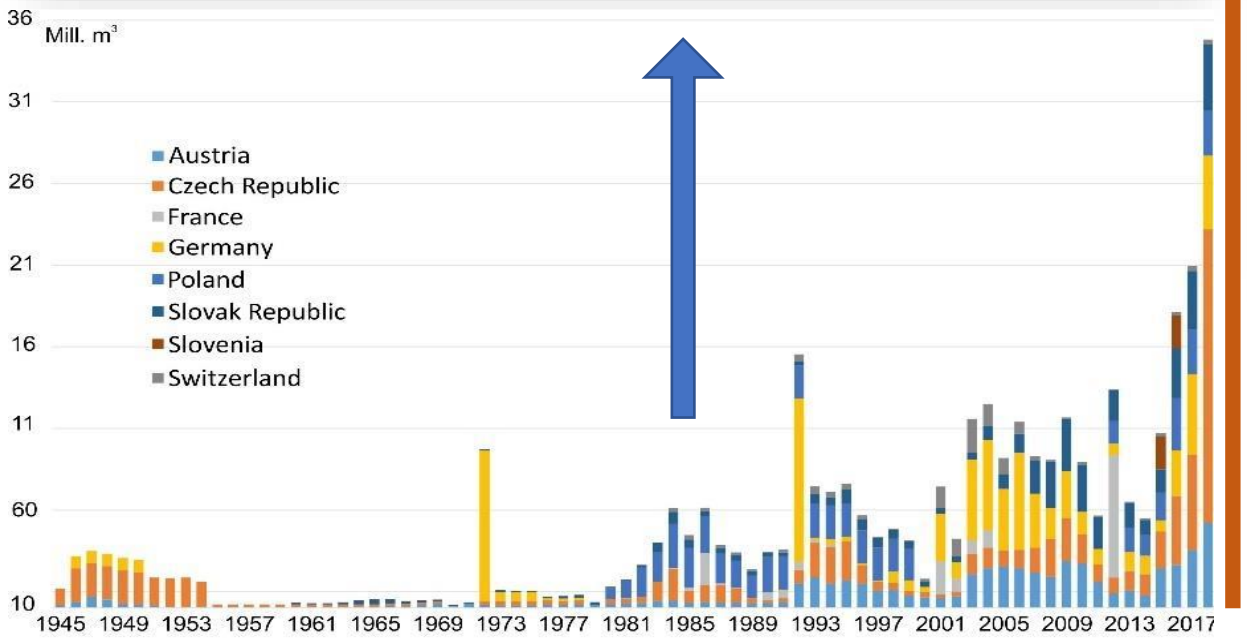

36
Mill. m³
31
26
21
16
11
60
10
Austria
Czech Republic
France
Germany
Poland
Slovak Republic
Slovenia
Switzerland
1945 1949 1953 1957 1961 1965 1969 1973 1977 1981 1985 1989 1993 1997 2001 2005 2009 2013 2017

Disturbance / forest health monitoring

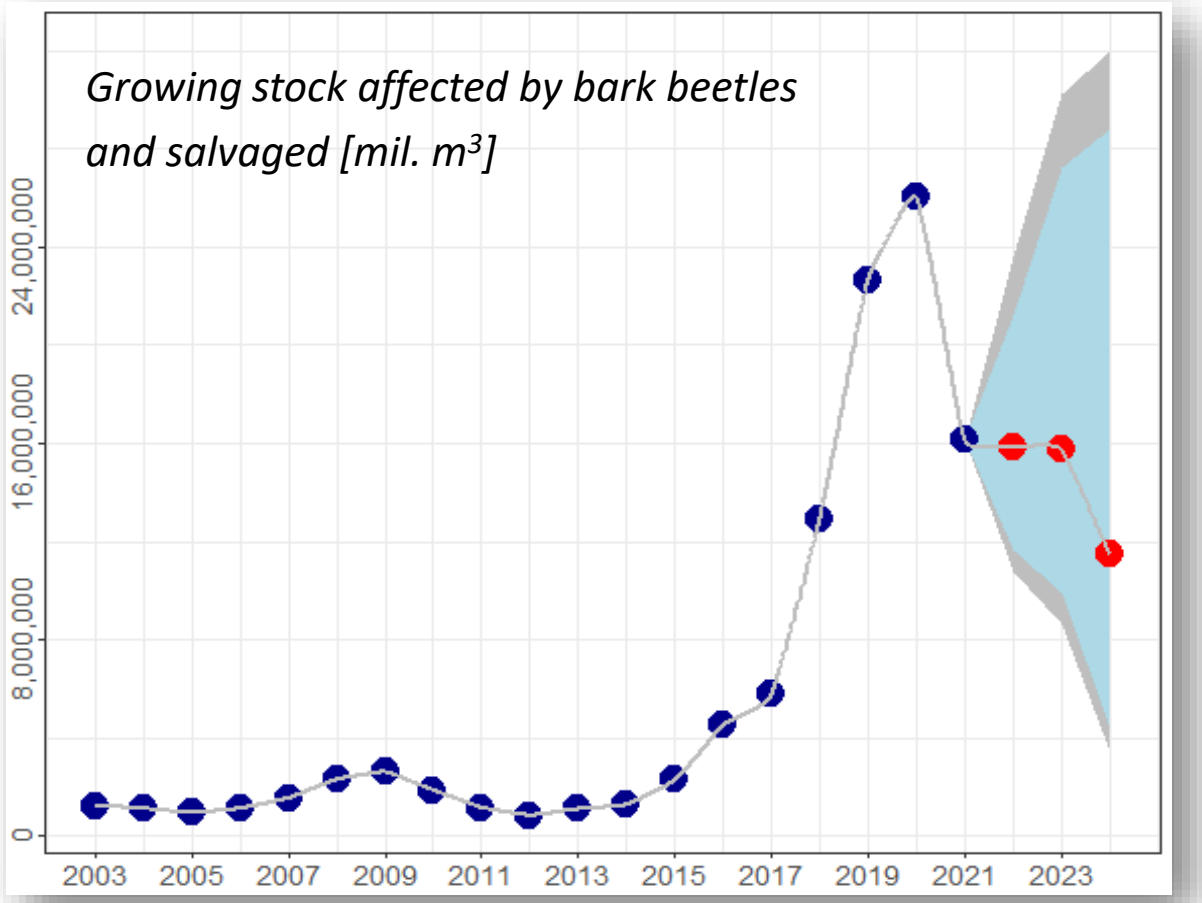
- Plot-wise: ICP Forests, NFI, targeted surveys, pheromone traps, etc.
- Areal: satellite, air-borne, and close-range remote sensing
- Other: forest owners reports, citizen science, etc.

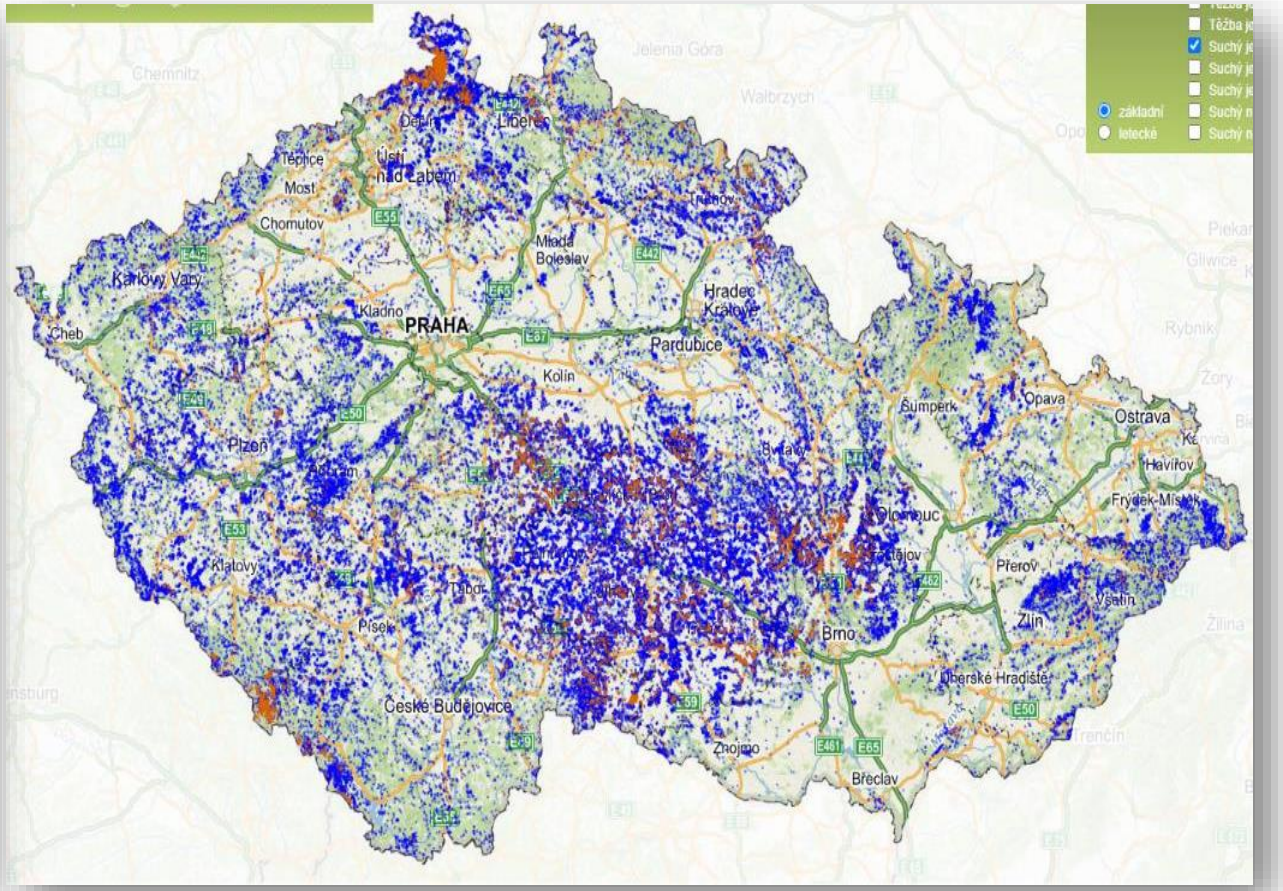
?

- How current monitoring systems perform under catastrophic events erasing hundreds of monitoring plots and tenths thousand hectares of forest per season?

- Do they just make scientists happy or can provide a real support to operational and strategic planning?

Czech Republic – an exemplar we can learn from





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What do we need to know to support management responses?

- What happened and where – in terms of hectares and cubic meters of wood
- Quickly identify infestation spots and support sanitary operations
- Secure public safety
- Inform compensation and subsidy payments, plan regeneration actions
- Inform state oversight of actions taken and their compliance with the law
- Support short-term forecasts at the level of management units

Fast detection of a green-stage attack phase

Assessment of regeneration conditions

Spatially explicit changes in standing volume on annual scale

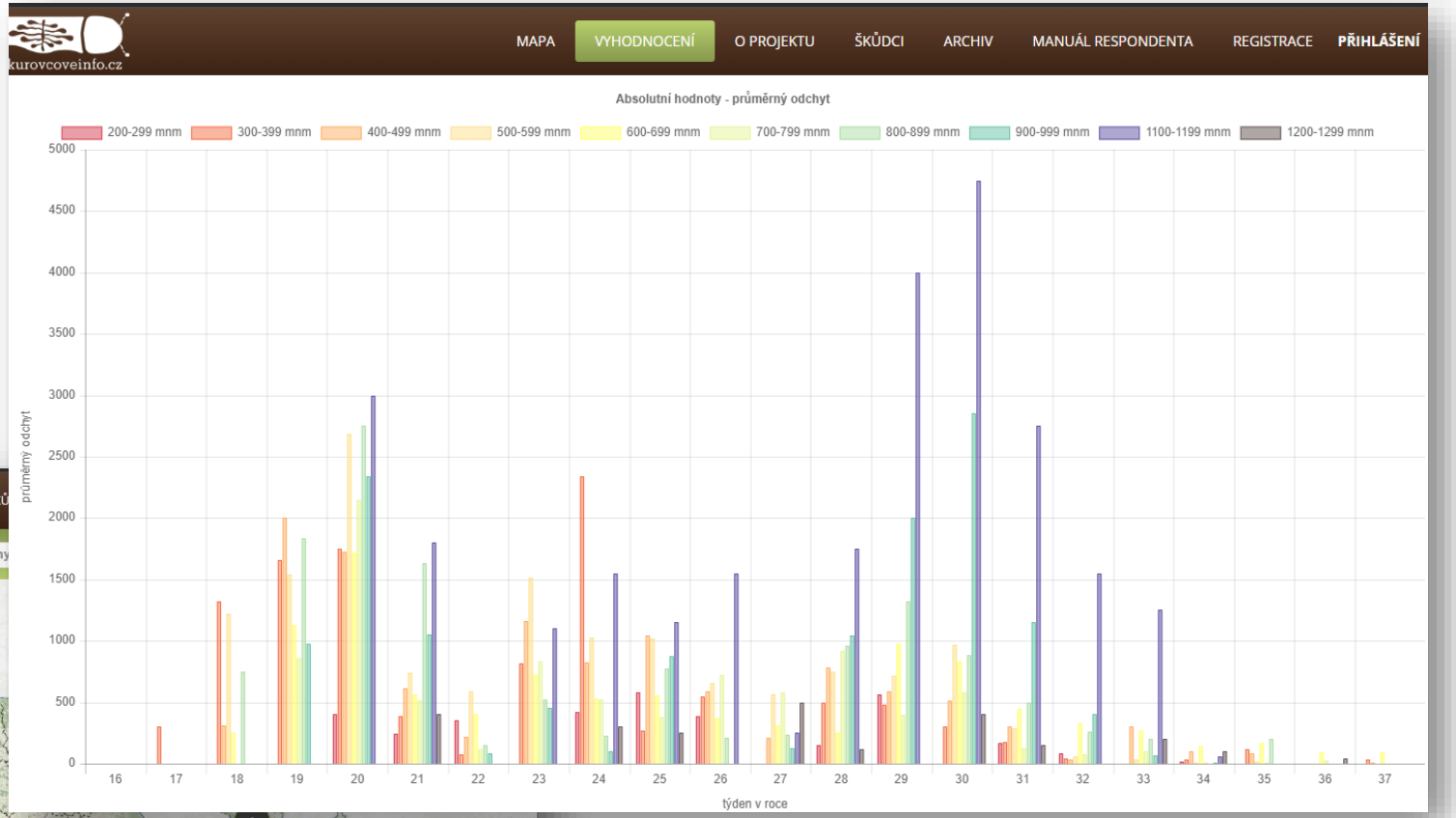
A gap between what monitoring systems produce and disturbance management needs

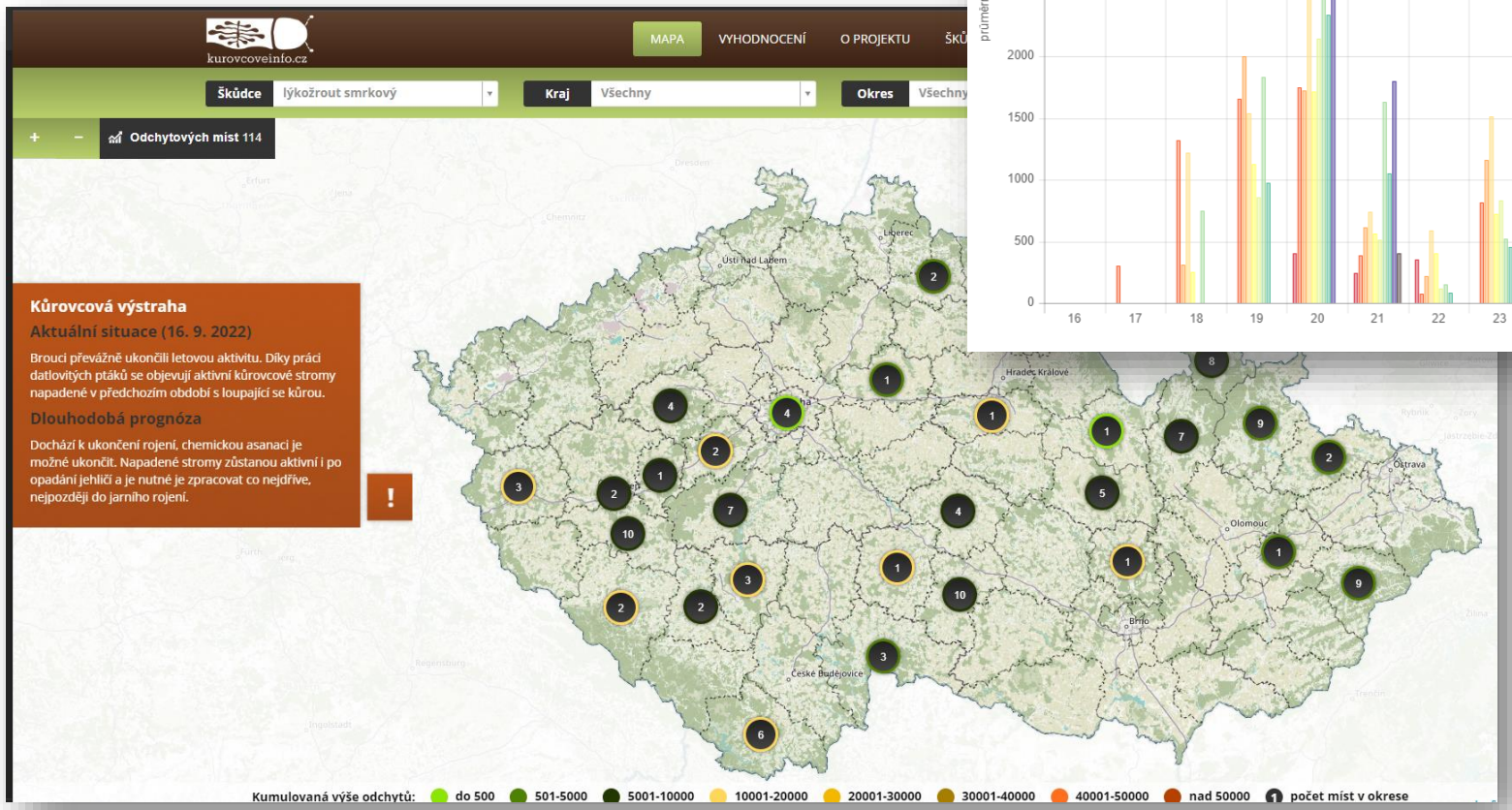
- Data too coarse (plot-based monitoring), to sparse in time (remote sensing), or both
- Different data availability depending on ownership
- Poor integration of partial systems and datasets
- Emerging technologies used only marginally (close range, AI)

Reconnaissance flights

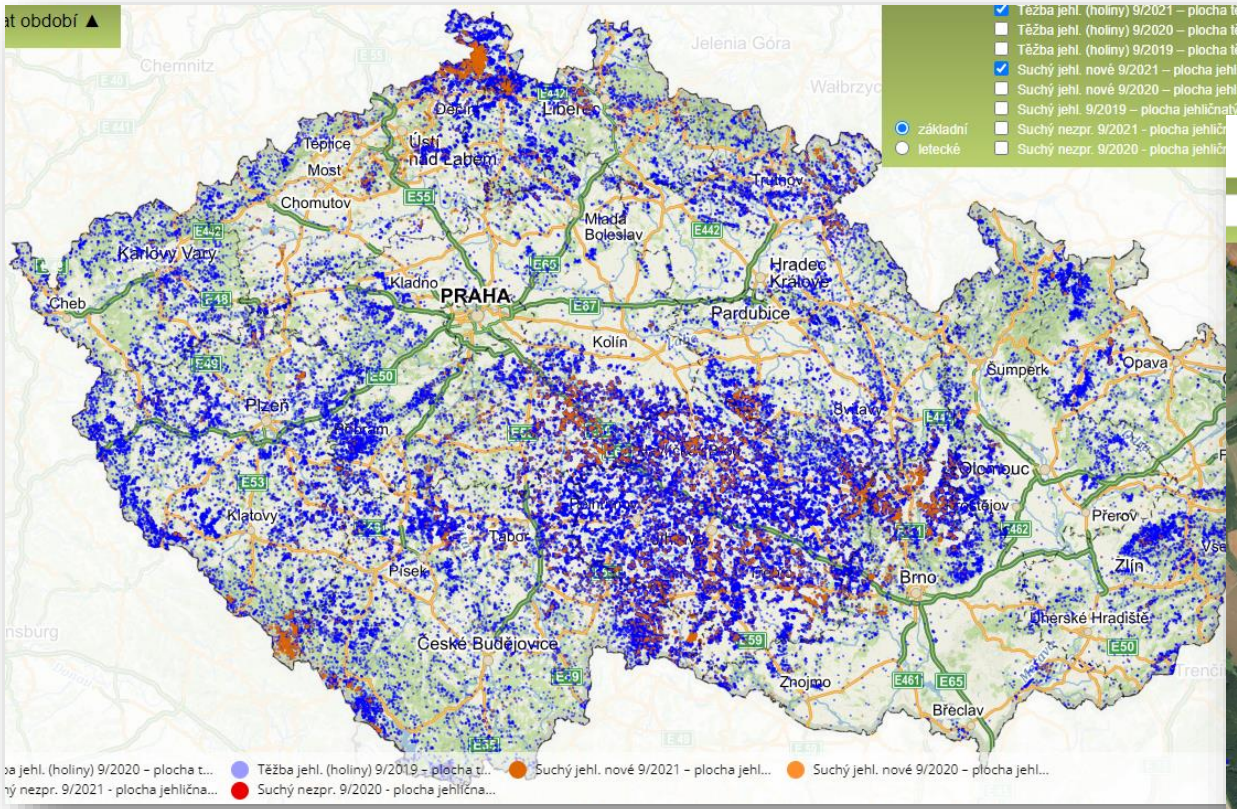
- Provided by the Ministry of Agriculture for forest owners
- Visual assessment and intervention planning
- Example: 3 hour flight, ca 40 000 ha, few people onboard

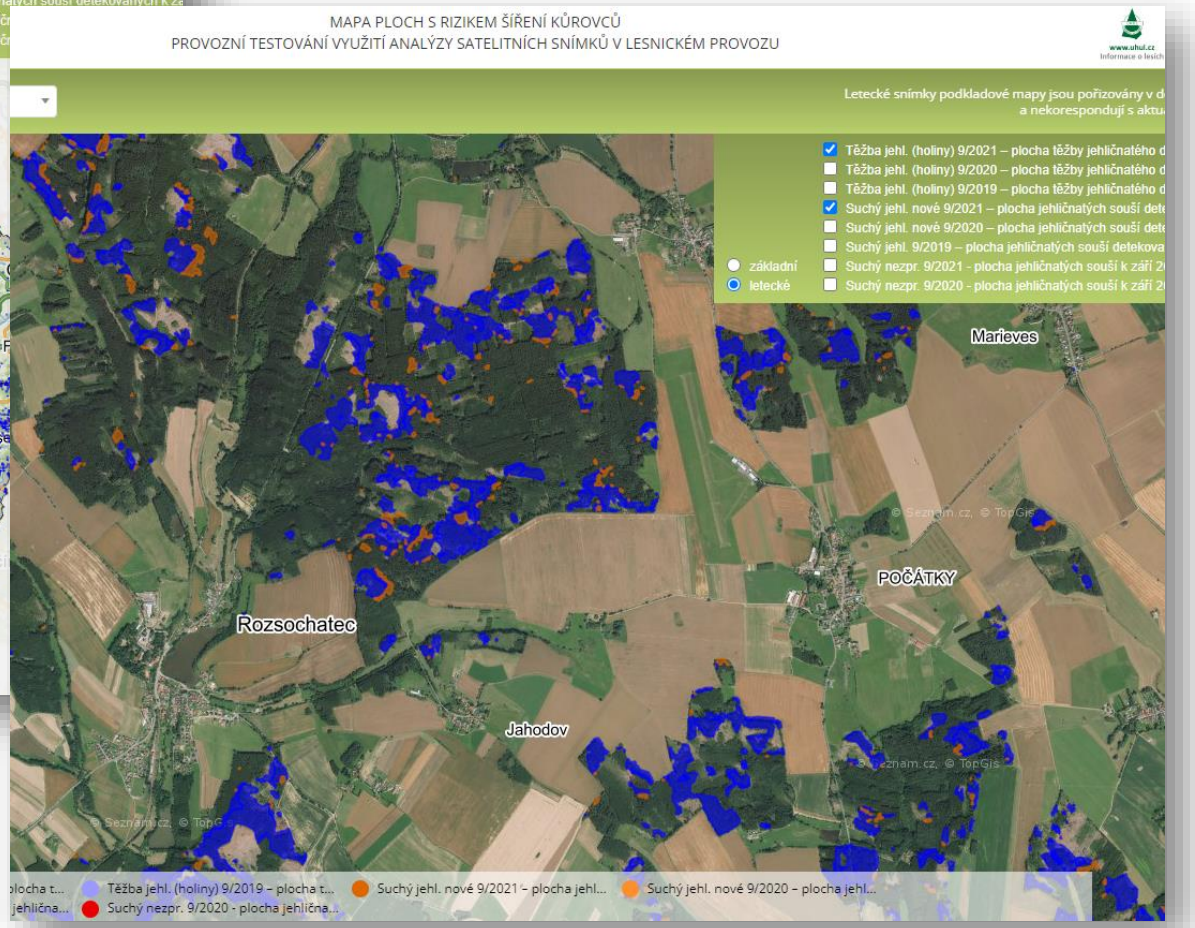
Online monitoring of beetle development





Annual satellite-based outbreak mapping





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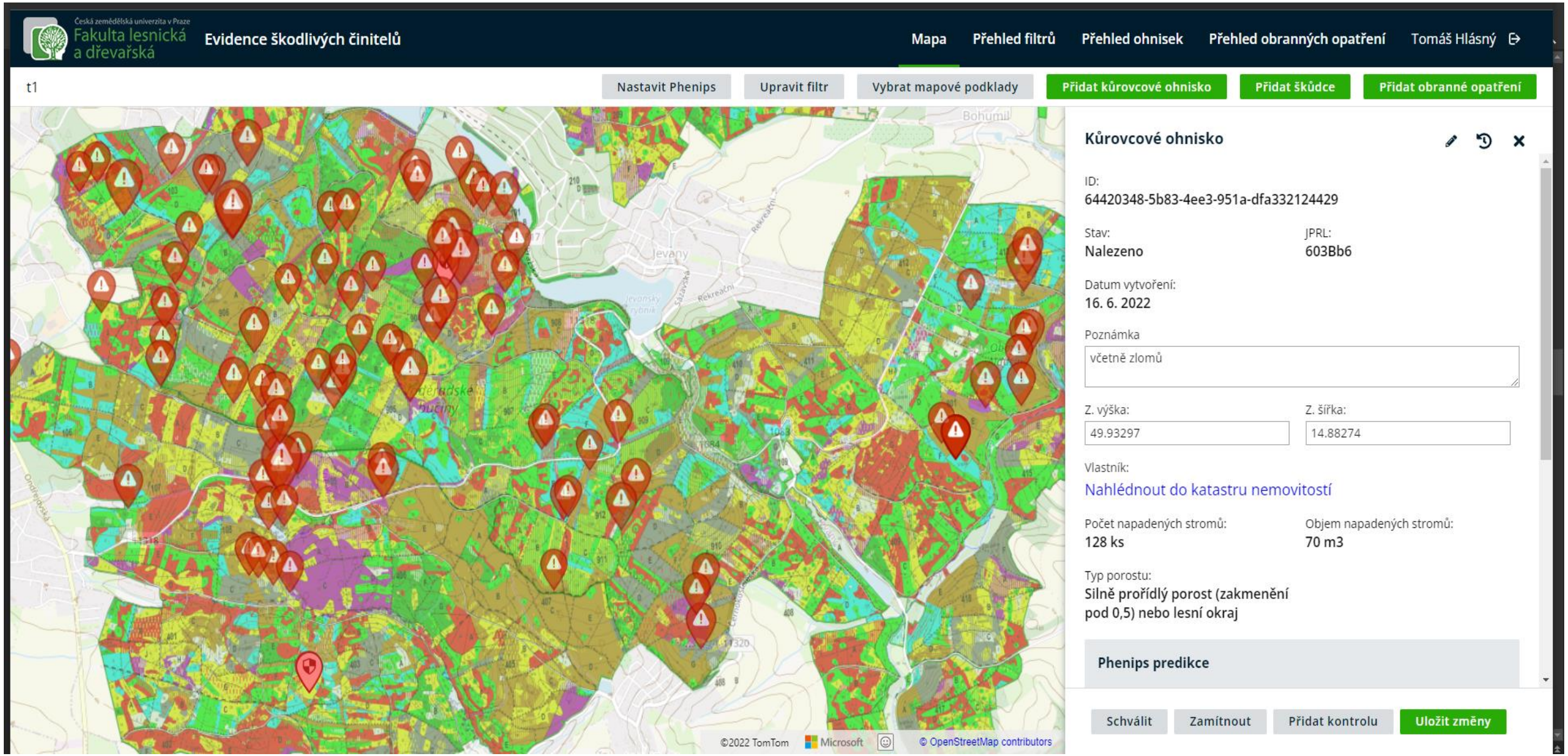
Experimental web-map application for outbreak mapping and management planning

- High-intensity visual detection of infestation spots
- Supported by trained sniffer dogs
- Real time data recording and sharing, including all interventions
- Coupled with a climate-sensitive model of bark beetle development

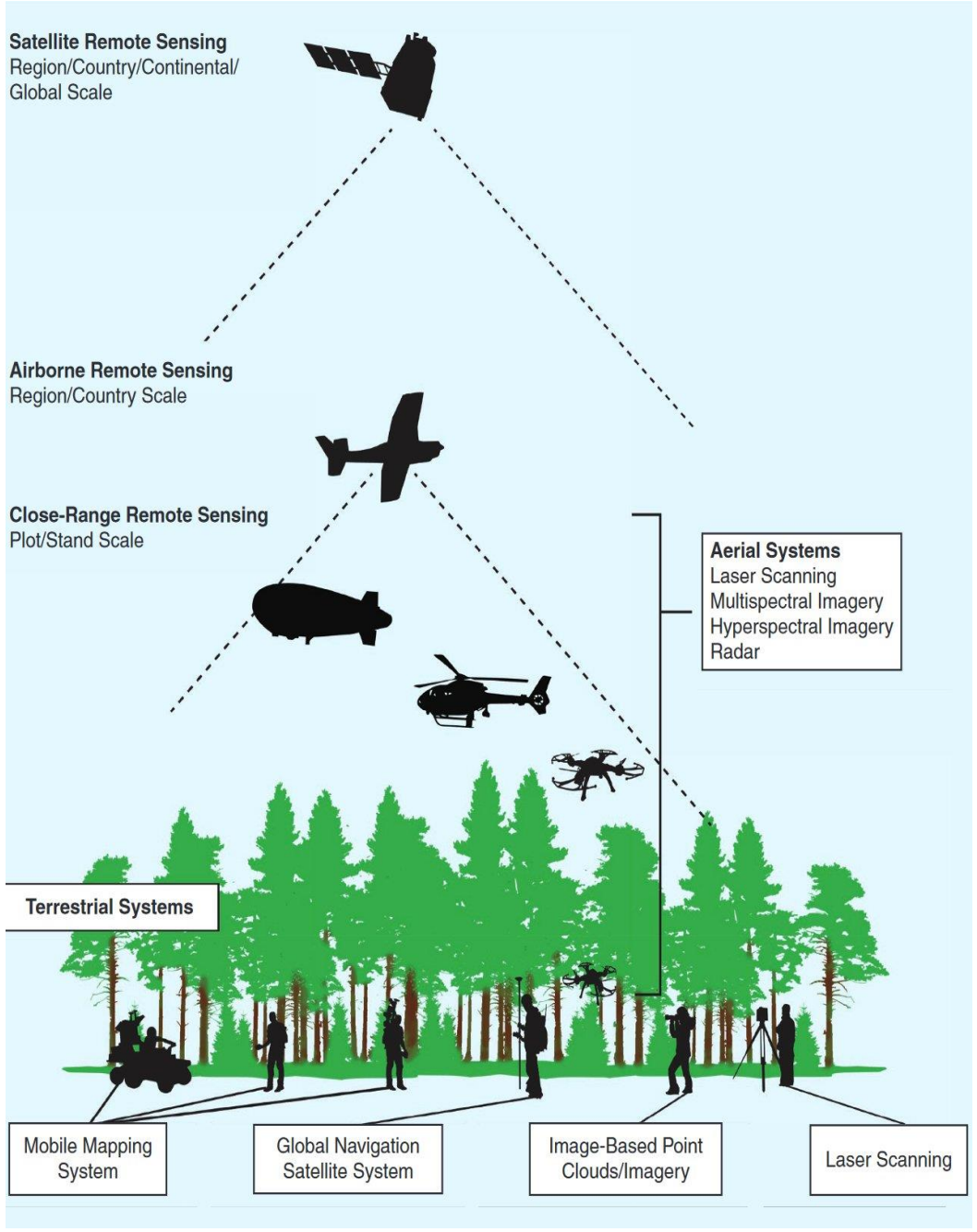
https://extemit.fld.czu.cz/en/r-12336-publicity/will-dogs-help-us-manage-bark-beetle-calamity.html



https://harmfulfactors.azurewebsites.net/

Ways forward

- Integrate existing systems and databases
- Support faster uptake of emerging technologies
- Collect and assess good practice examples
- Strengten the dialogue between forest managers and state administration, and technology developers and manufactures
- Define dialogue facilitator



https://ieeexplore.ieee.org/document/9797818

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