A soundscape study using wildlife acoustic indicators

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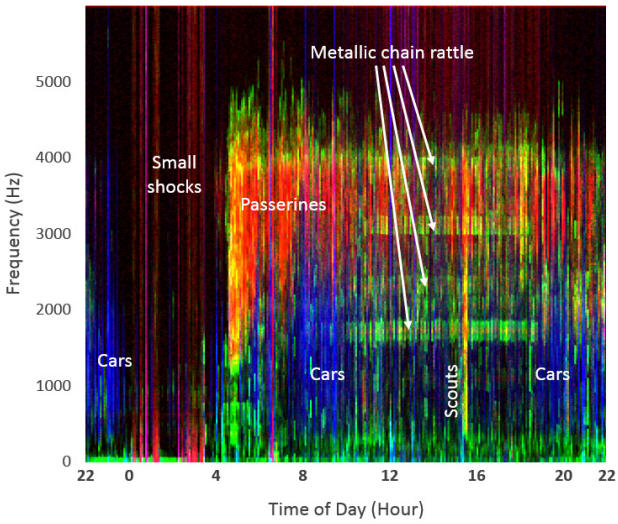
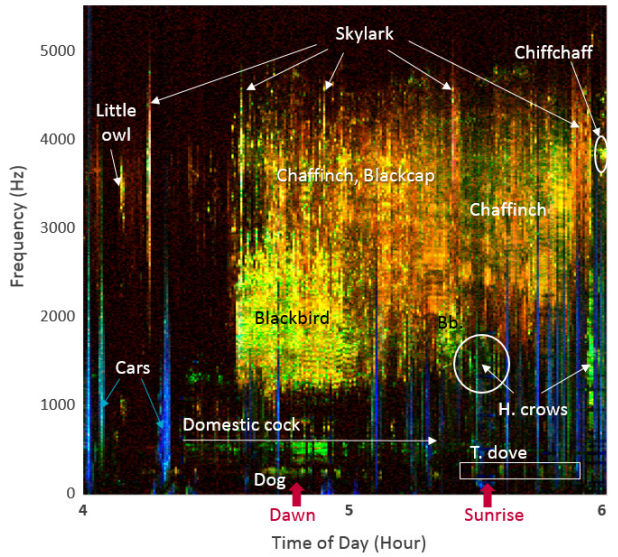
Outline

Through the presence or absence of vocal species, soundscapes unveil information about ecosystems. The charts below show sound records collected in a nature park. Color-composite images (spectrograms) are built from acoustic descriptors that target birds. The visualization is computed for up to 24 hours at once.

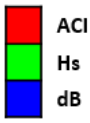
Sound recording in Chevetogne, Belgium, on July 3rd, 2014. Microphone in a prairie, on the edge of a wood patch, 200 m from the wind turbine, 300 m from the road. Sunny and warm weather.





Results

- Thirteen common bird species are identified from the records
- The Acoustic Complexity Index **(ACI)** captures elaborate passerine songs well (e.g. *Turdus merula*)
- A modified spectral entropy indicator **(Hs)** highlights more monotonous bird calls (e.g. *Streptopelia turtur*)
- Mammal calls mostly escape detection
- Both ACI and entropy measures tame the anthropogenic noises (e.g. cars) which otherwise mask wildlife sounds



Skylark, *Alauda avensis*
Little owl, *Athene noctua*
Chaffinch, *Fringilla coelebs*
Blackcap, *Sylvia atricapilla*
Blackbird, *Turdus merula*
Hooded crows, *Corvus corone corone*
Turtle dove, *Streptopela turtur*

Conclusion

- Audio niches of species are visible
- Scanning of large sound databases aims to help species recognition algorithms

References

[1] Towsey M., Zhang L., Cottman-Fields M., Wimmer J., Zhang J. and Roe P. (2014) *Visualization of long-duration acoustic recordings of the environment.* 2014 International Conference on Computer Science, Procedia Computer Science 29: 703-712.
[2] Pieretti N., Farina A. and Morri D. (2011) *A new methodology to infer the singing activity of an avian community: the Acoustic Complexity Index (ACI)*. Ecological Indicators 11: 868-873.
[3] Sueur J., Pavoine S., Hamerlynck O. and Duvail S. (2008) *Rapid Acoustic Survey for Biodiversity Appraisal.* PLoS ONE 3(12): e4065.

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