

MOTUS-Europa: Automatische VHF Telemetrie

- Zug über die Grenzen beobachten –
Tests und erste Erfahrungen



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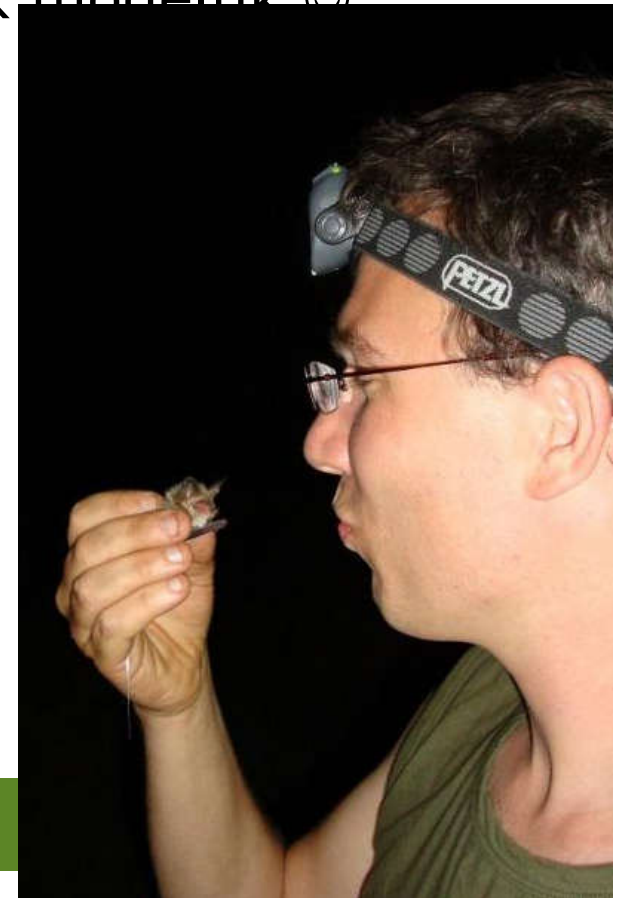
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- Warum automatische Telemetrie?
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- Wie funktioniert es?
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Präsentation zum downloaden:
www.bionetnatuur.eu/Rossla2017

Ich bin Holländer

- Leider ist mein Deutsch nicht so gut... (Danke Martin & Werner!!!)
- In het Nederlands is het natuurlijk ook mogelijk 😊
(auf holländisch ist es natürlich auch möglich)



Warum automatische Telemetrie?

- GPS ist zu schwer und/ oder Wiederfang nicht immer möglich
- mehrere Tiere gleichzeitig
- bei Migration: Timing unvorhersehbar
- alle 10 Sekunden ein Piep
- Einsatz an unzugänglichen Orten (z.B. Offshore)
- Remote access (WiFi, LAN, 3G)

Journal of Animal Ecology



Journal of Animal Ecology 2012, **81**, 377–385

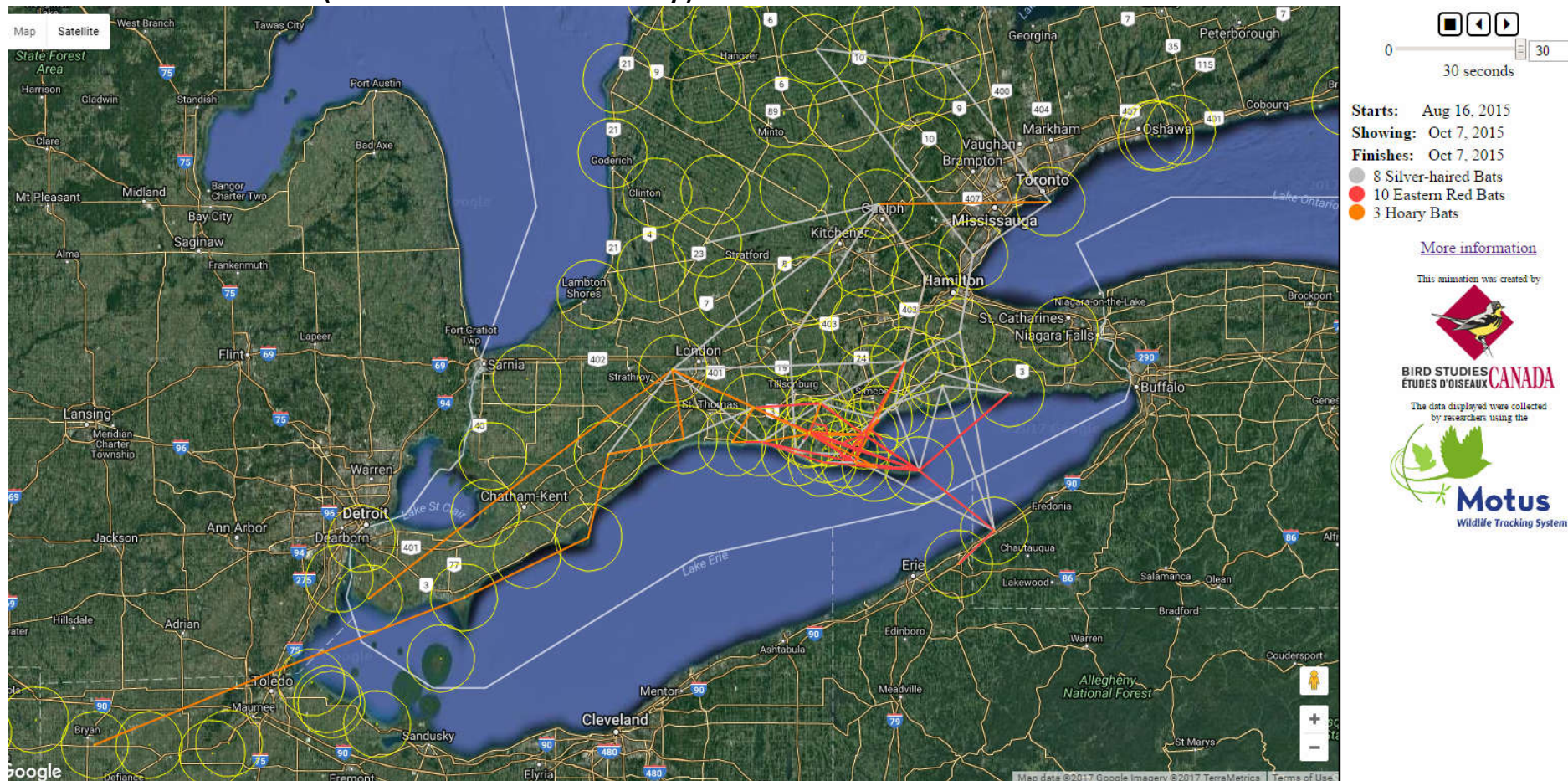
doi: 10.1111/j.1365-2656.2011.01912.x

Migratory stopover in the long-distance migrant silver-haired bat, *Lasionycteris noctivagans*

Liam P. McGuire^{1*}, Christopher G. Guglielmo¹, Stuart A. Mackenzie^{1,2} and Philip D. Taylor^{2,3}


Beispiel 2015


[Migratory bat movements](#) in southern Ontario during the fall of 2015. These data were compiled from a cross-lake bat migration project led by Stu Mackenzie and Jon McCracken (Bird Studies Canada), Dr. Chris Guglielmo, Dr. Yolanda Morbey, and Kristin Jonasson (Western University), and Dr. Liam McGuire (Texas Tech University).



Was ist Motus?

Welcome guest | [Login](#) | [Register](#) | [Français](#)

 **Motus**
Wildlife Tracking System

 BIRD STUDIES CANADA
ÉTUDES D'OISEAUX

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Shared infrastructure and data.

[Network Map...](#)

Photo: Motus Receiver Station: David Bell

The Motus Wildlife Tracking System is a collaborative research network that uses coordinated automated radio telemetry arrays to study movements of small animals. Motus is a program of Bird Studies Canada in partnership with Acadia University and collaborating researchers and organizations. [Learn more about Motus.](#)

Was ist Motus?

- so viele Antennen aufbauen wie möglich und gemeinsam nutzen
- je grösser das Netzwerk, desto wahrscheinlicher der Empfang
- je mehr Empfangs-Stationen ein "Tag-Owner" hat, desto billiger sind die Preise pro Tag.

Zusammen erreicht man mehr!

Motus in Europa

<http://www.canmove.lu.se/research/migration-patterns/radio-telemetry-studies-on-bird-migration/animal-tracking-across-borders>

Animal tracking across borders

- AUTOMATED RADIO TELEMETRY IN EUROPE

Radio telemetry and automated radio telemetry.

Traditional radio telemetry allows researchers to track or estimate the position of animals carrying a radio tag. The tags transmit a radio signal on a pre-defined frequency that can be detected by handheld or permanent antenna. Tags vary greatly in size, but this is determined by the battery size and duration. The smallest tags, which can be used with songbirds and even insects, usually have a maximum battery life of several weeks, however, this can be affected by altering the burst rate of the transmitter. In automated radio telemetry, all tags operate on the same frequency and transmit a coded identification signal to enable multiple tags and therefore animals to be tracked simultaneously. Signals are received by permanent or fixed antenna arrays and coded tags are the same size as conventional tags.

A European Network and MOTUS

Many current studies focus on highly mobile species such as migratory birds and bats. As even the smallest tags are functional for almost 1 month, it is conceivable that it can be detected far from the antenna arrays at the study site. With coded tags all operating on the same frequency, tags could be detected by

FURTHER INFORMATION



Photo: Björn Malmhagen

If you are currently using, or planning a project using automated radio telemetry, please get in touch and join our network or researchers:

RadioTelemetryEurope@gmail.com

USEFUL LINKS



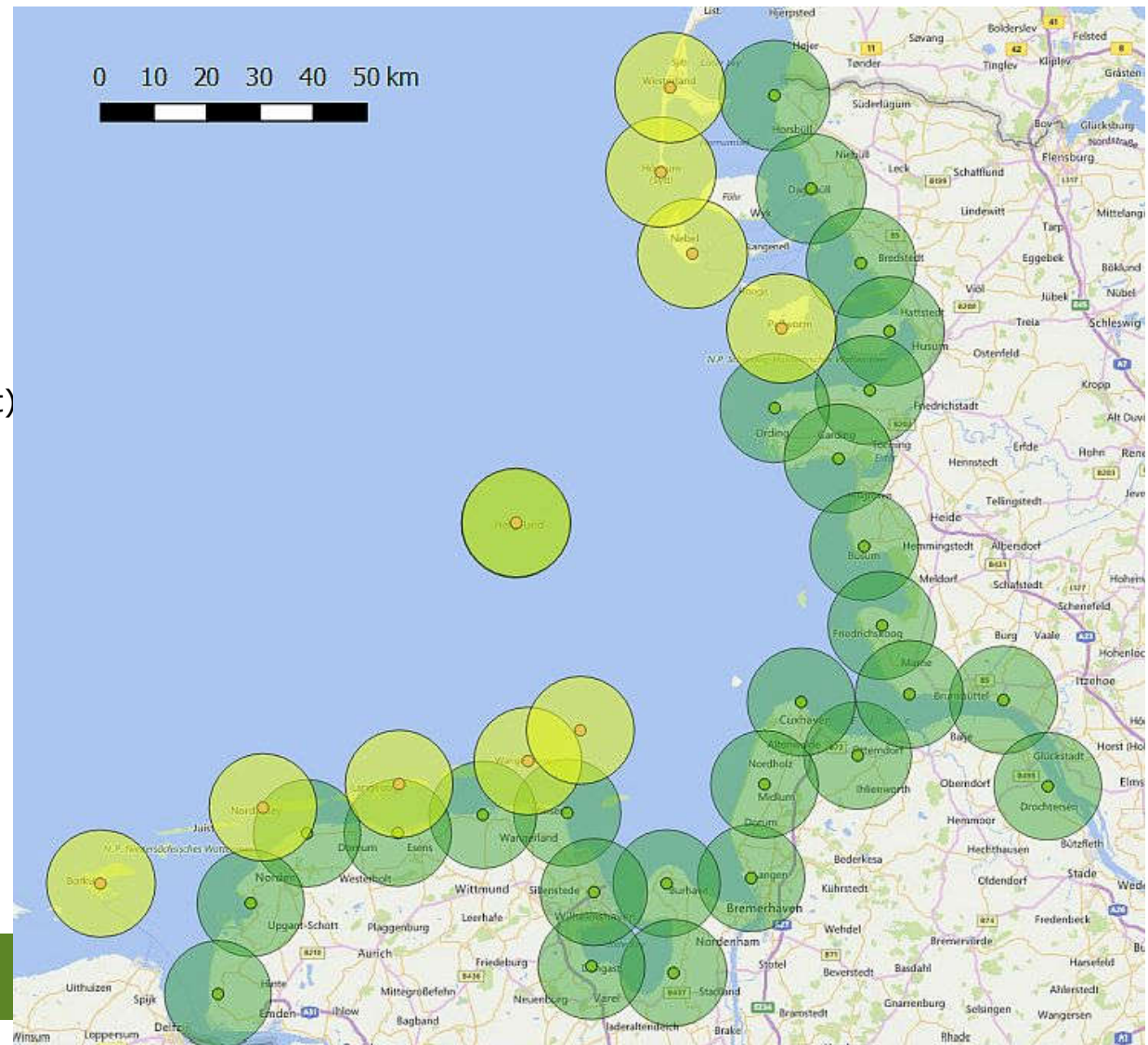
Motus im Deutschland – installiert und geplant von der Vogelwarte Wilhelmshafen

Info: **Vera Brust**

vera.brust@ifv-vogelwarte.de

Gelb: Inseln (4 bereits installiert)

Grün: Festland (9 bereits installiert)



Wie funktioniert es – “kurze Version”

- coded-Tag: nur Nanotags von Lotek/ Biotrack – Europa 150.100
 - Code aus 4 kurzen Pulsen
- Beeper-Tags anderer Hersteller nur an eigenen Stationen
- coded-Tags registriert von “Tag owner” in MOTUS-Datenbank
- autom. Empfänger (SensorGnome (SG) / Lotek SRX-800's DataSika / ...)
- alle Empfänger laden Aufnahmen auf den MOTUS-Server
 - in Real-Time (3G, WiFi, LAN)
 - SD-card z.B. von zu Hause aus
- der “Tag owner” erfährt, wo welches Tag empfangen wurde
- “Receiver owner” erfährt, welches Tier empfangen wurde



SensorGnome zum Selberbauen

- Microcontroller (Raspberry pi zero/2/3 or BeagleBone)
- Funcube+ dongles
- USB-Hub (wenn mehrere Antennen parallel betrieben werden sollen) → 7-port DLink
- USB-GPS-Receiver oder "GPS Adafruit-hat" für exakte synchronisation
- SD card oder USB-Stick als Datenspeicher
- WiFi, 3G, LAN möglich
- mehrere Antennen parallel überwachen

The screenshot shows the SensorGnome web interface. At the top, there is a navigation bar with links for "My Page", "Recent Changes", "Reports", "Tools", and "Help". A "Log in" button is visible in the top right corner. Below the navigation bar, there is a "Recent pages" section on the left with a search box and a "Find" button. The main content area features a heading "SensorGnome - fresh data from the field to your plate" and a sub-heading "An open source system for moderate-bandwidth data acquisition, processing, and sharing." The interface also includes a "Page last modified" notice and a "Page Notifications Off" button.

Sensorgnomads- GoogleGroup

<https://groups.google.com/forum/#!forum/sensorgnomads>

NIEUWE VRAAG ↻ Alles markeren als gelezen Filters ▾ 👤 ▾ ⚙️ ▾

sensorgnomads Openbaar gedeeld
30 van de 59 onderwerpen (28 ongelezen) ☆ G+ Leden · Over ▾

Hi,
You have joined the sensorgnomads mailing list. We (sensorgnome.org) will use this list to:

- answer your questions about building and using SensorGnomes
- send you news about changes to software and hardware
- coordinate deployments among projects hoping to share data




We hope you will feel free to contribute your knowledge and experience to the list, so feel free to jump in and answer questions, post observations others may find interesting, and suggest changes and improvements.

The wiki at <http://sensorgnome.org> will act as our reference site, documenting construction and operation of SensorGnomes in a more organized manner. It will also facilitate sharing of data.

sensorgnome.org is a project of the Phil Taylor Lab, Biology Department, Acadia University in Wolfville, Nova Scotia, Canada.

We wish you success in your busy field season!

Regards,
sensorgnome.org

 SensorGnomes are much better now... text on SensorGnome out of date? (1) Door mij - 3 berichten - 0 weergaven 15:09
 Tag Registration with beeper tag and biotrack (1) Door Bruno from FR - 2 berichten - 1 weergave 14:54
 Realtime Sensorgnome Status page not functioning? Door Webb, Matthew - 2 berichten - 7 weergaven 21 mrt.

Antennen

- Omni- directional
- Wie ein "Zaun" (kleine Öffnungswinkel = auch mehr Gewinn)
- Überwachung mit mehreren Yagiantennen: 180 oder 360 grad
- mehr Elemente, mehr Gewinn = höhere Reichweite = kleinere Winkel
 - Wie eine Taschenlampe: breiterer Reflektor oder gebündelter Strahl

Registrierungsgebühren für MOTUS

1) Jährliche Gebühr fuer die ersten 20 Sender = 1.000 EURO. Mehr Sender?

ab 5 permanente Empfangsstationen – 17 EURO pro Sender

2-4 permanente Empfangsstationen – 35 EURO pro Sender

≤ 1 permanente Station - 75 EURO pro Sender

permanente Station: >249 Tagen im Jahr

Probleme mit Kosten?

*While we have tried to be explicit about the plan to implement a tag fee, we understand that at present, it may be **difficult** for some users to manage based on existing **funding arrangements** or planning. If this is the case we will work with you to find other ways or mechanisms under which an equitable contribution can be made. We will continue **to work with collaborators** to find a **reasonable cost-sharing formula**, and will try to work **within any limitations** your project may face.*

<https://motus.org/wp-content/uploads/2016/01/MotusTagRegistrationFeeSchedule.January2016.pdf>

MOTUS in der Vogelwarte - © Vera Burst – Fachhochschule Nord Deutschland



MOTUS in der Vogelwarte - © Vera Burst - Wangerland



MOTUS in der Vogelwarte - © Vera Burst - Dornumersiel



MOTUS in der Vogelwarte - © Vera Burst - Carolinensiel



Tests 2016 - Empfang – Lagerveld et al, in prep

- Signal Stärke
 - Sender, Antenne, Empfänger, Öffnungswinkel, Landschaft, Wetter
- Reichweite under optimalen Bedingungen: > 10 km
- Je höher die Antenne, desto besser!
- Je mehr Elemente, desto grosser die Reichweite
- Längere Antenne – grössere Windlast



Tests 2016 - Flugrouten – Lagerveld et al, in prep



Estimation of spatial locations
(Smolinsky et al. 2013)

Flugrouten - Lagerveld et al, in prep

Berechneter Standort - Lagerveld et al, in prep

- Eine Flugroute bei state-space model (Patterson et al. 2008) ist eine Option für Verbesserungen

Möglichkeiten und Zukunftsmusik

- Alternative Anbieter für codierte Sender (Hansi 😊?)
- Höhere Sendeleistung
- RTL-based SDR DVB dongles (nicht nur Funcube+ Dongle (teuer!))

Möglichkeiten

Dankworte

- Werner Dreckmann, Martin Koch, A-J Haarsma, Sander Lagerveld, Maarten Platteeuw & Vera Burst

Frage?



Foto: René Janssen