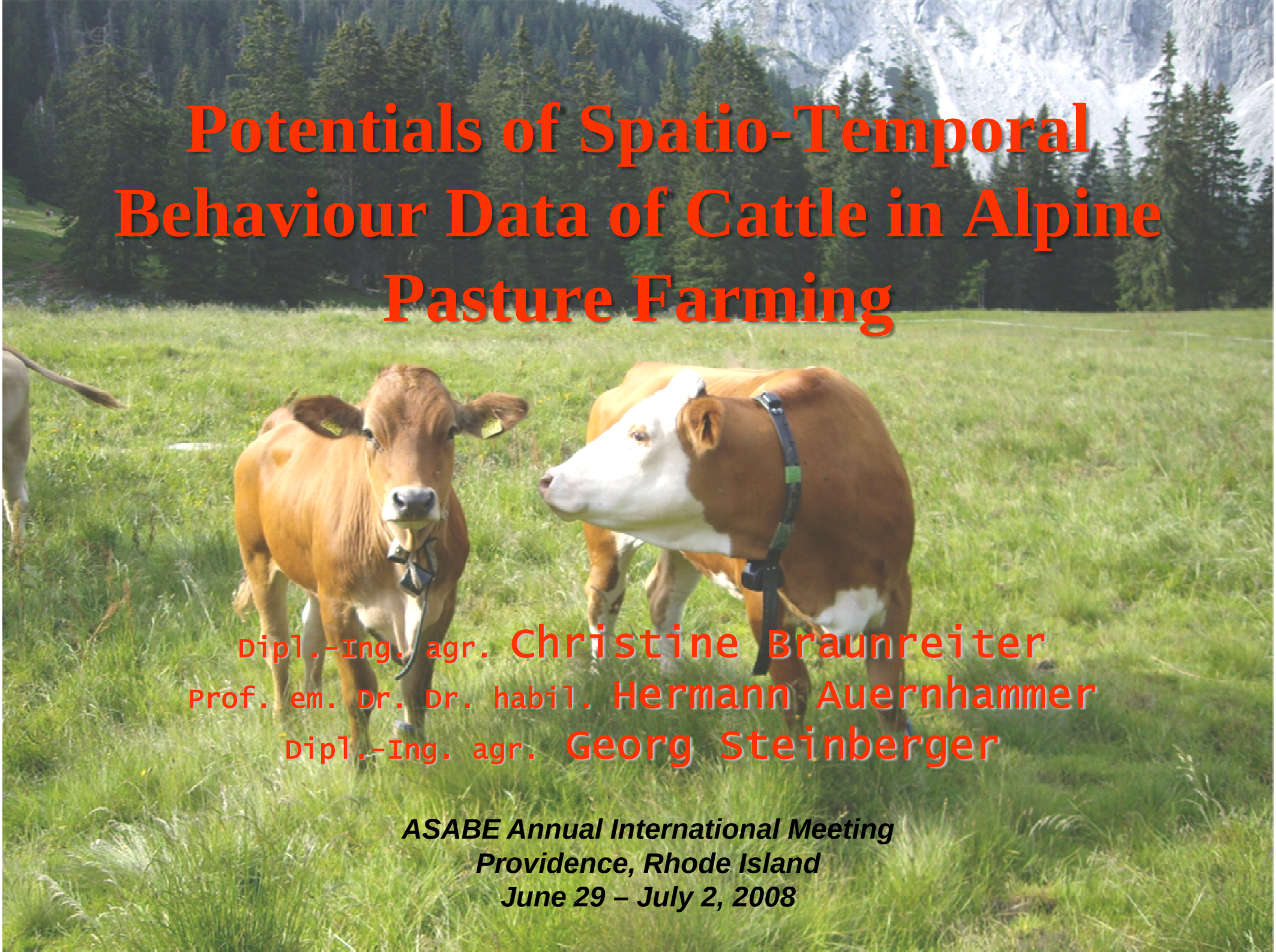
Potentials of Spatio-Temporal Behaviour Data of Cattle in Alpine Pasture Farming



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Two examples of summer pasturing in European Alps

- In **Austria** there are more than 12.000 alps, where 70.000 farmers keep about **500.000 cattle, sheep and goats**
  The total area accounts 851.128 ha (a quarter of farmland in Austria).
- Grassland and forage production accounts in **Bavaria** (Germany) for nearly 50% (40.000 hectares) of the mountainous farmland
  - divided into 1.380 alpine fields
  - with about **50.000 cattle, sheep and goats**.

But:

- Since about 100 years, more and more alpine fields are no more used for pasturing (willingness of stuff, isolation, economics, …).
- Areas have to be kept open to preserve the man-made landscape (hiking, tourism, landscape, ...).

How can we react to depopulation and to have open landscape ?

Animals in pasture farming (in alpine regions)

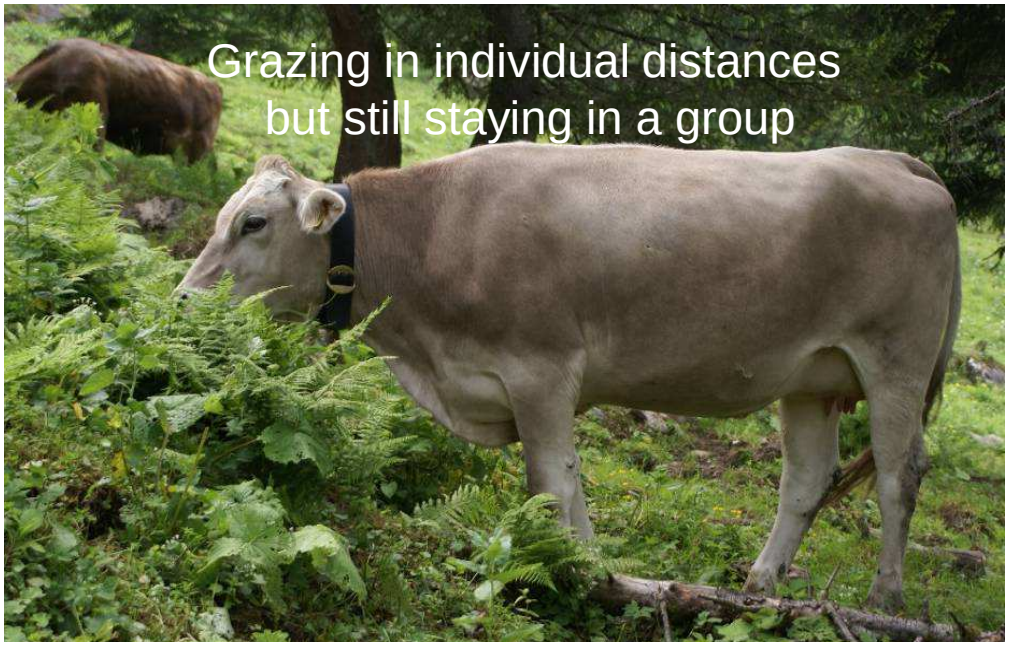
Herbivores (wildlife and farm animals) choose their home ranges appropriate to their evolutionary specification

- Grazers (cattle, sheep)
- Browsers (roe deer)
- Intermediate types (goats, ibex, chamois)

→ The potential for alternating and different pasturing strategies is founded here

→ Furthermore a lot of (environmental) parameters influence land use behaviour of the animals

Grazing behavior



Objectives

Acquiring and processing of ...

... precision behavioral and position data of (free) grazing farm animals with adapted technology to generate mappings via Geographical Information System (GIS) to know …

… where animals are ?

… what animals do ?

Deriving strategies for ...

... sustainable pasture management

... pasture documentation

... operational herd management

... preservation of the man-made landscape

Material and methods – data gathering

Kalkalpen National Park, Austria (1370 m N.N. ≈ 4500 ft) :

Herd size 62 cattle

3 free grazing cattle with GPSplus and ALT

2 free grazing cattle only with GPSplus

GPSplus

+

ALT-Pedometer

Recording of spatio-temporal activity data

GPS position:
32 s interval

Activity (steps),
Laying time,
Temperature:
64 s interval

Material and methods – equipment in use

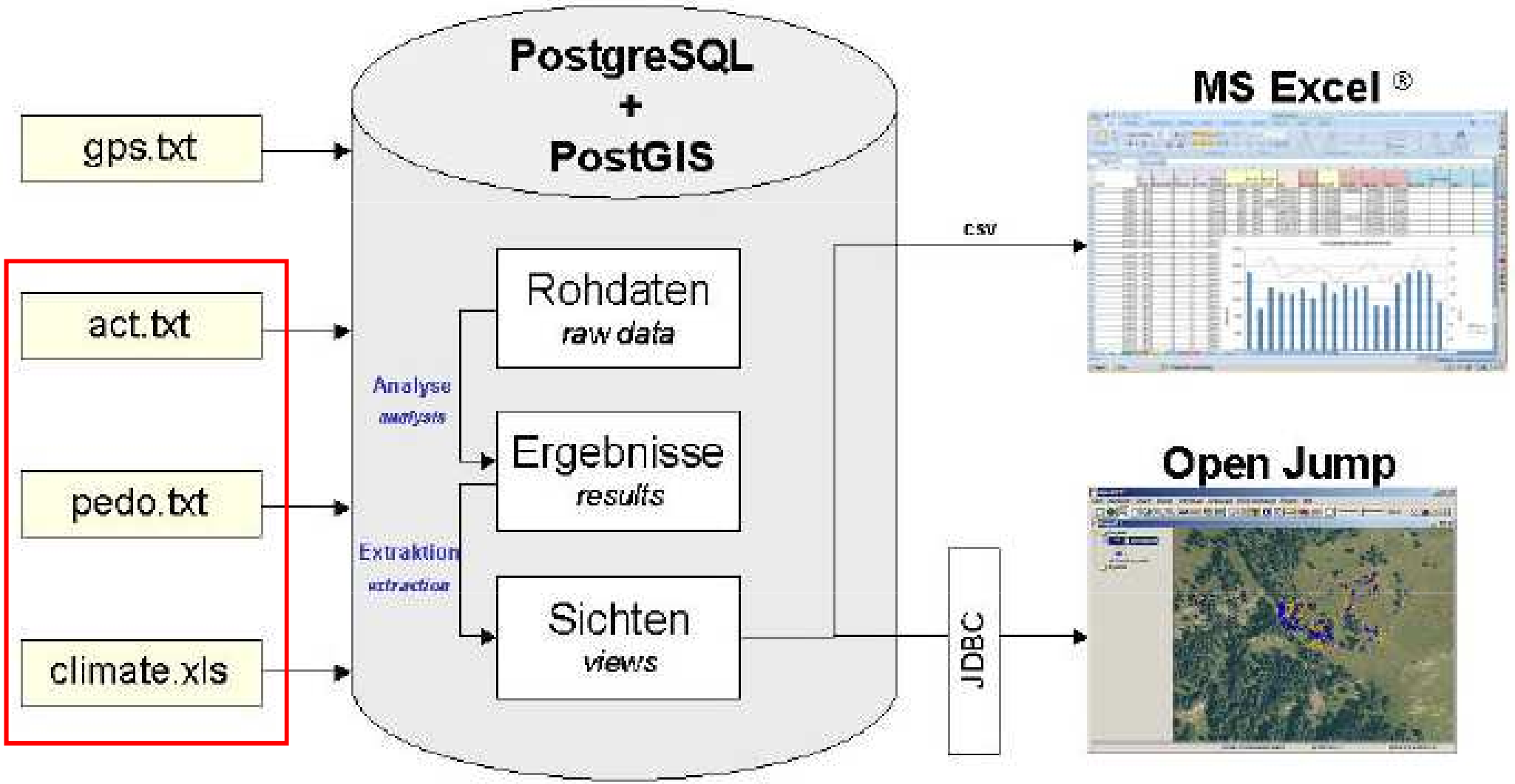
- Activity data from the ALT pedometers have to be transferred every 3-5 days via modem (max. distance of 3 m)

- GPS data were transferred every 21 days by wired connection, and by this batteries were changed (collars were removed and fixed again or changed to another animal)

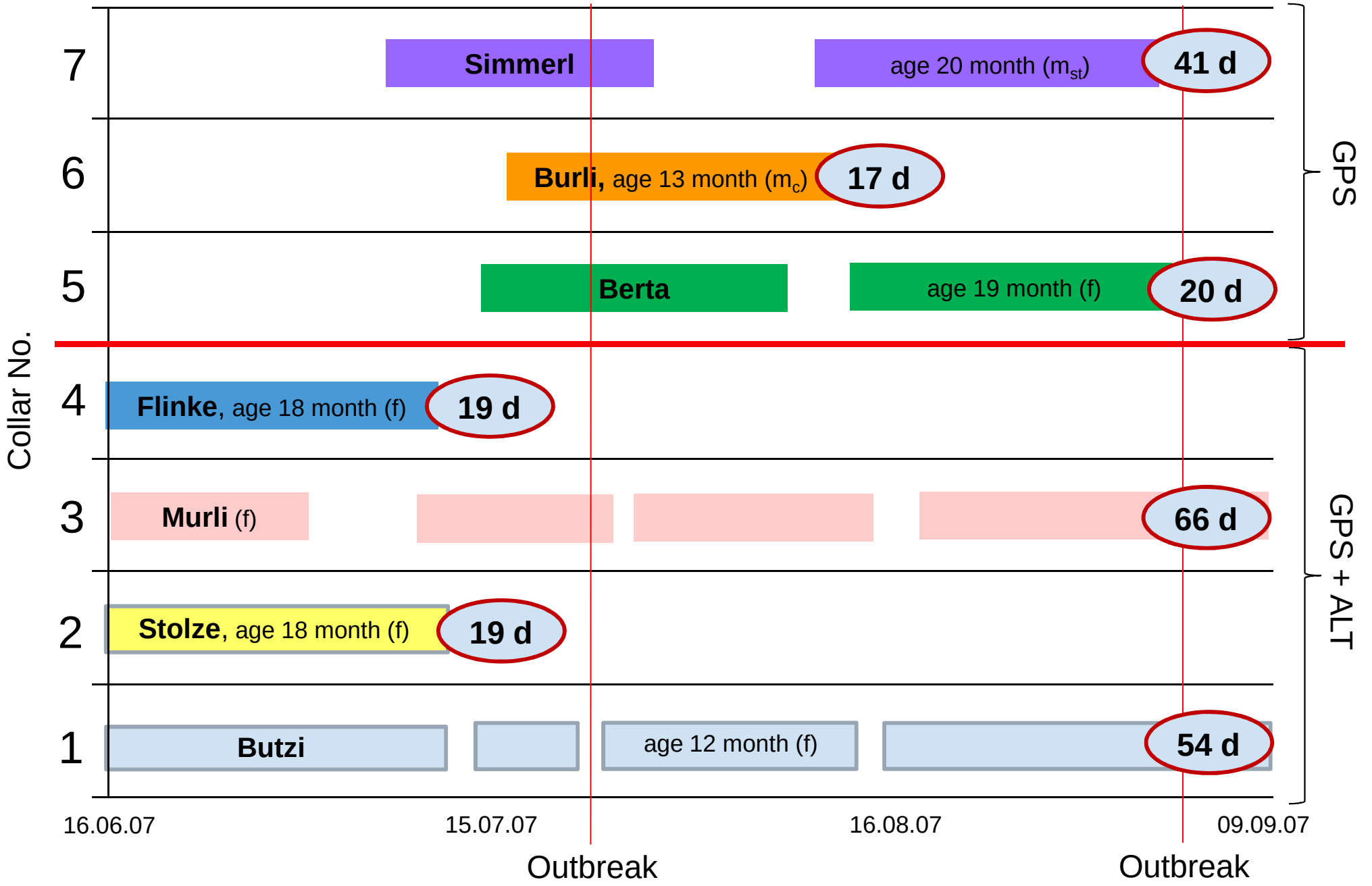
Problems:

- Two times of data losses for some days because of software problems
- Modem – Laptop communication failed one time
- not all animals could be found for three times because of bad weather conditions

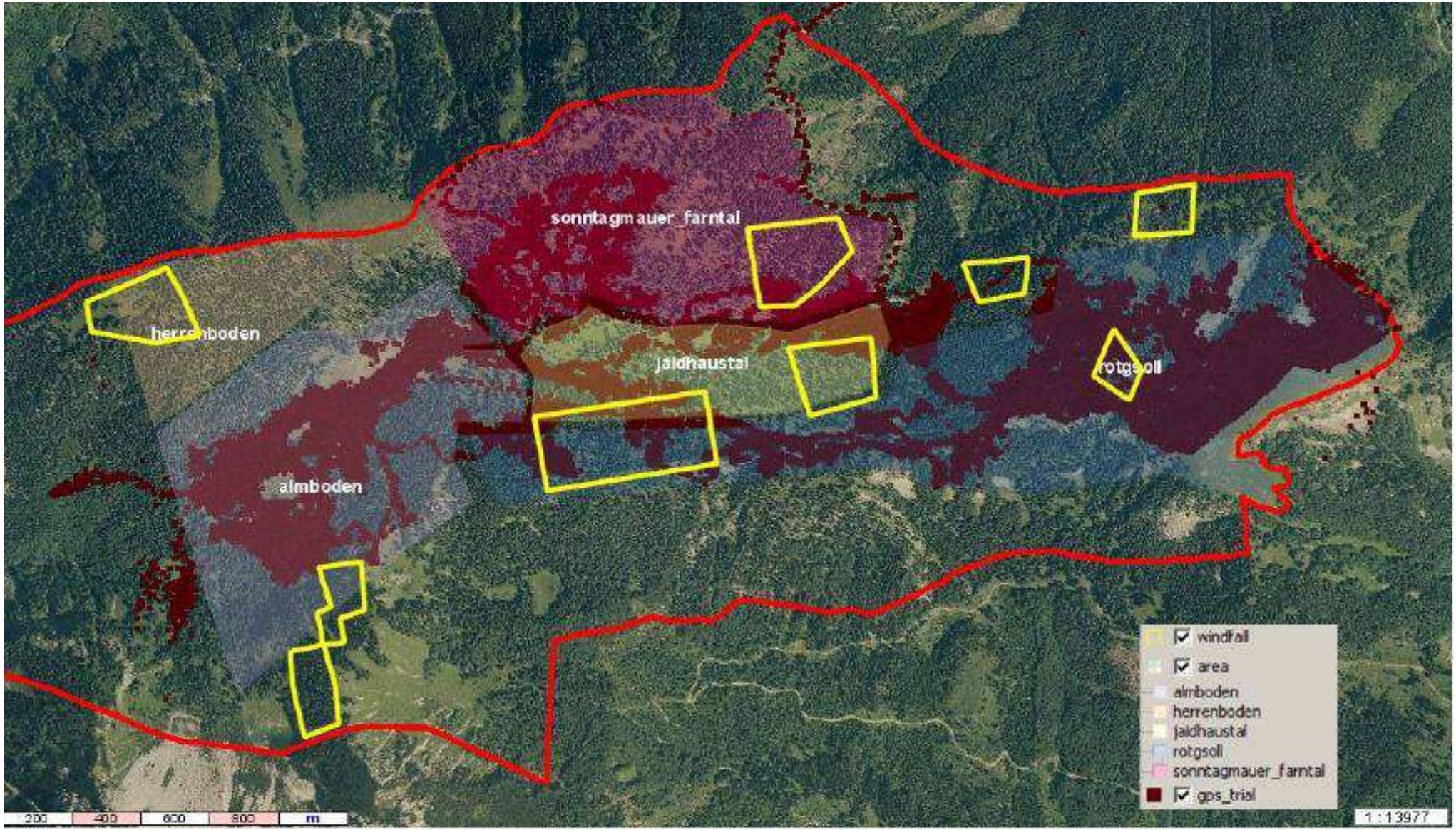
Material and methods – data analysis



Pasturing season (86 d) and data collection

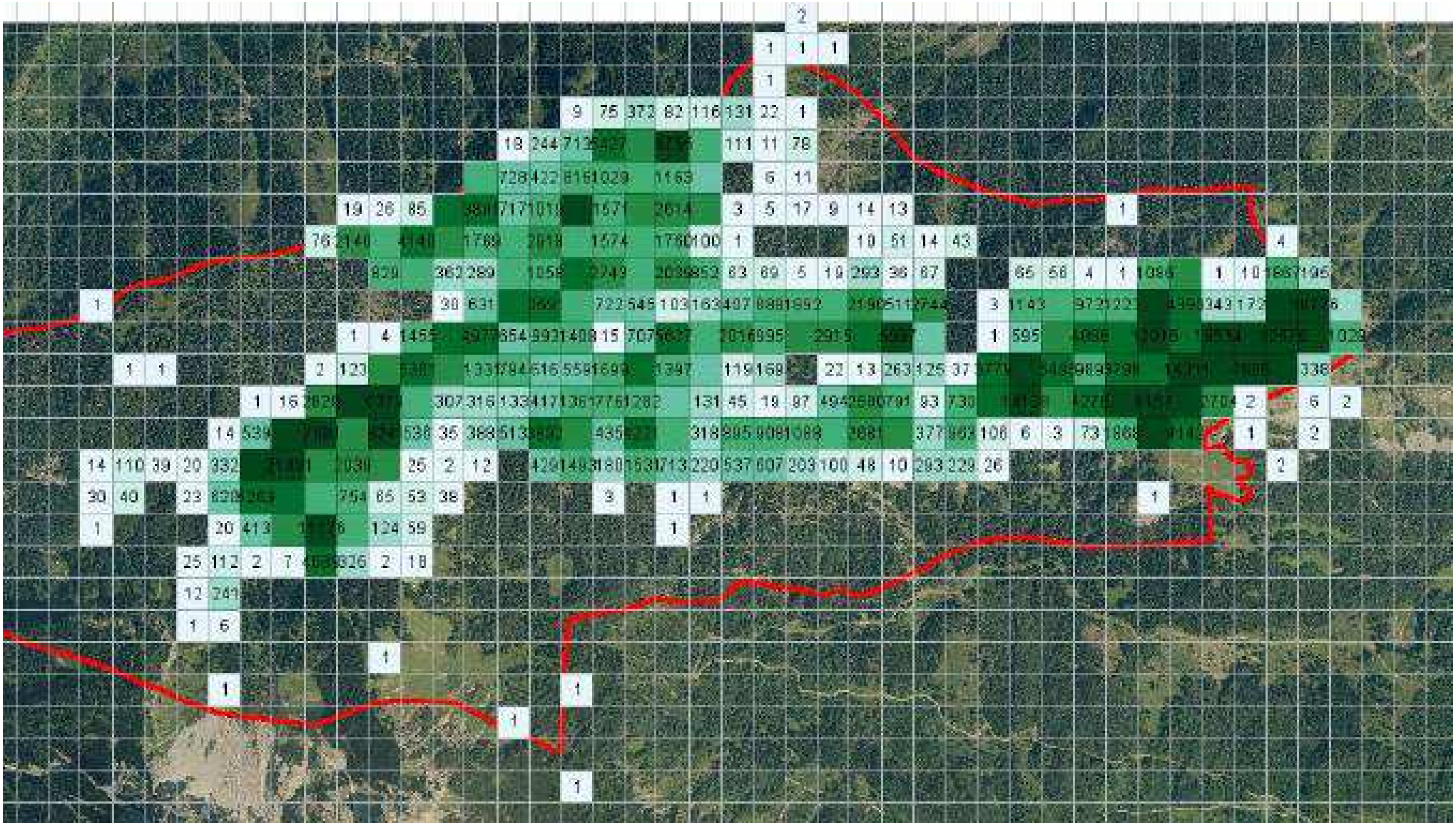


Pasture area and land use of all observed animals



Windfall areas influence the behavior of cattle

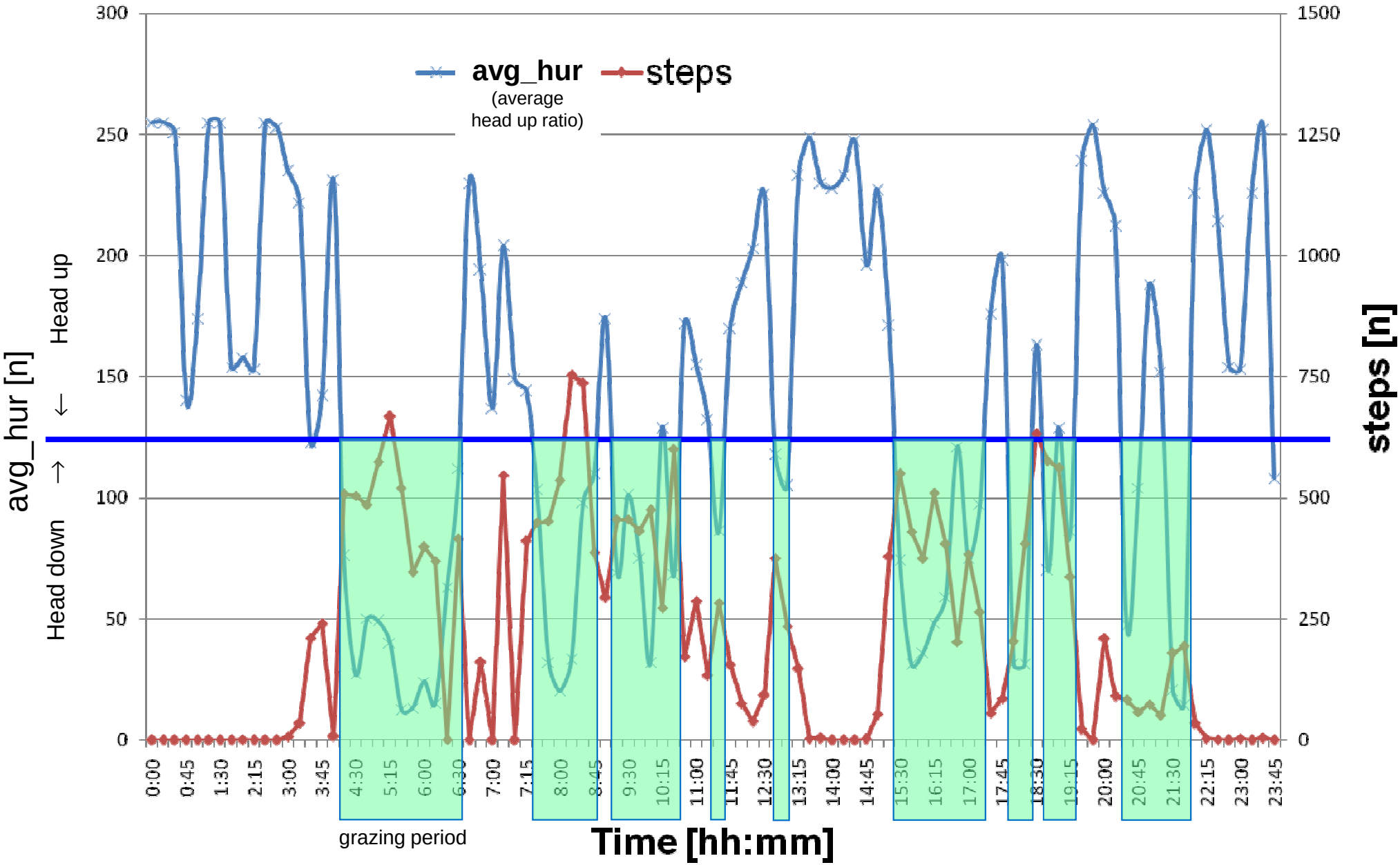
Intensity of land use (50 x 50 m grids)



Intensity of land use differs in a wide range !

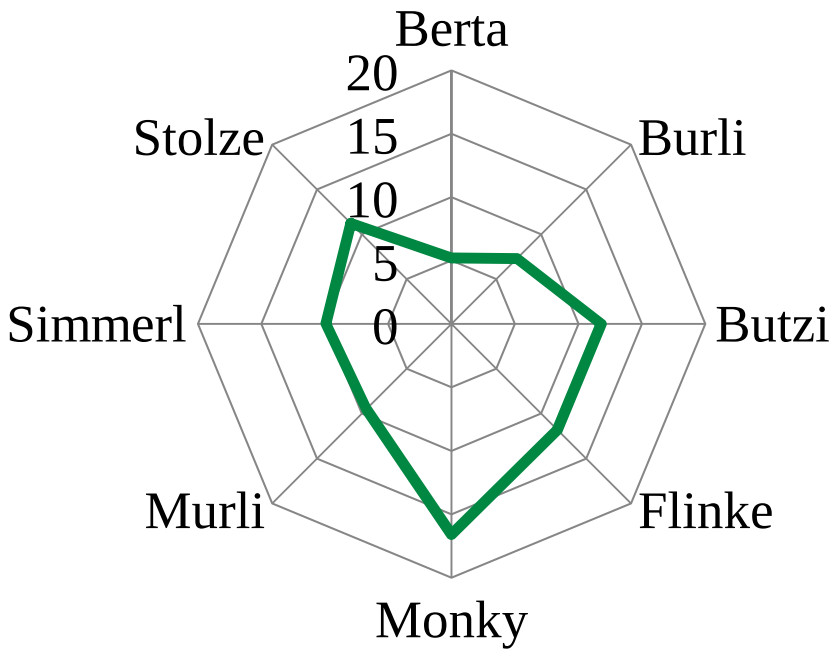
Distances and sum_steps of ‚Butzi‘ per day

Activity of ‚Butzi' at June 21, 2007 !



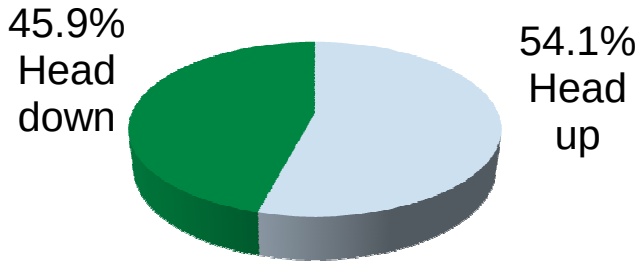
Distances of all animals and activity of ‚Butzi‘

Walking distances all animals
[km/d; June 17, 2007]

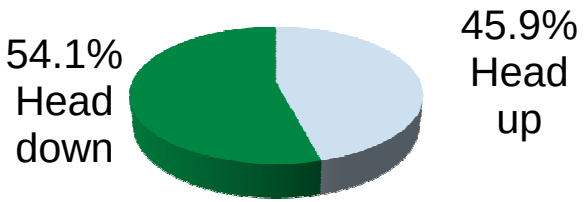


Activity of “Butzi”
(grazing and not grazing)

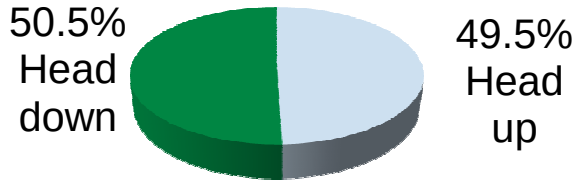
Butzi, June 17



Butzi, June 18



Butzi, June 19



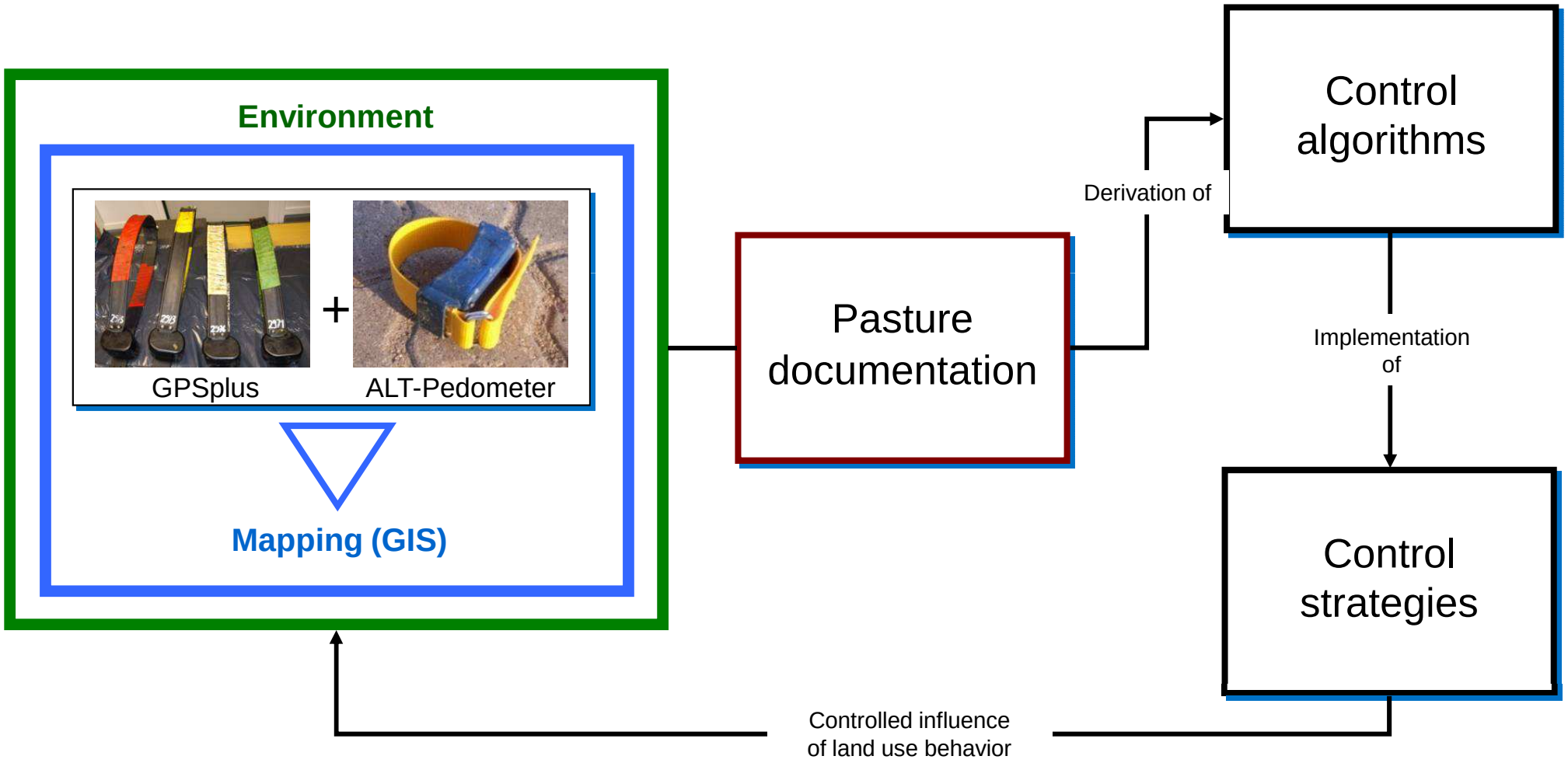
Results

- Behavior of animals on alpine pastures differs widely (age, experience, …)
- Small groups behave very similar and homogenous, even small groups establish fast after the beginning of the grazing period
- Environmental factors influence animals´ behavior (windfall, rainfall, fog, …)
- Management measures can be worked out with the chosen technology
- Research attests that a sustainable discharge of environment can be reached by improving pasture management
- Preservation of the man-made landscape can be assured by grazing cattle

Conclusions

- GPS collars together with ALT-Pedometers are able to observe and monitor animals and its behavior on alpine pastures
- Herds of animals can unattended remain an alpine pastures and controlled remotely
- Project made a concrete contribution according to the aims of agricultural policy
- It will be feasible to use specific control strategies based on these algorithms.

Outlook



→ Intelligent landscape conservation with farm animals can be yet another strategy in nature protection (Precision Nature Protection Farming) !

Thank you for your attention!

The Deutsche Bundesstiftung Umwelt DBU is one of Europe's largest foundations and promotes innovative and exemplary environmental projects.