Drones for
Plant Ecology & Nature conservation

Juul Limpens

Jasper Steenvoorden, Sasja van Rosmalen, David Kleijn

Workshop Biodiversity monitoring through RS and AI techniques

Three cases

- **Peatlands**
  - Vegetation patterns

- **Coastal dunes**
  - Recreation impact on vegetation

- **Pasture land**
  - Flower cover and bee diversity



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Can we map peatland vegetation patterns?

Jasper Steenvoorden, Juul Limpens (WU-PEN), Harm Bartolomeus (WU-GRS),
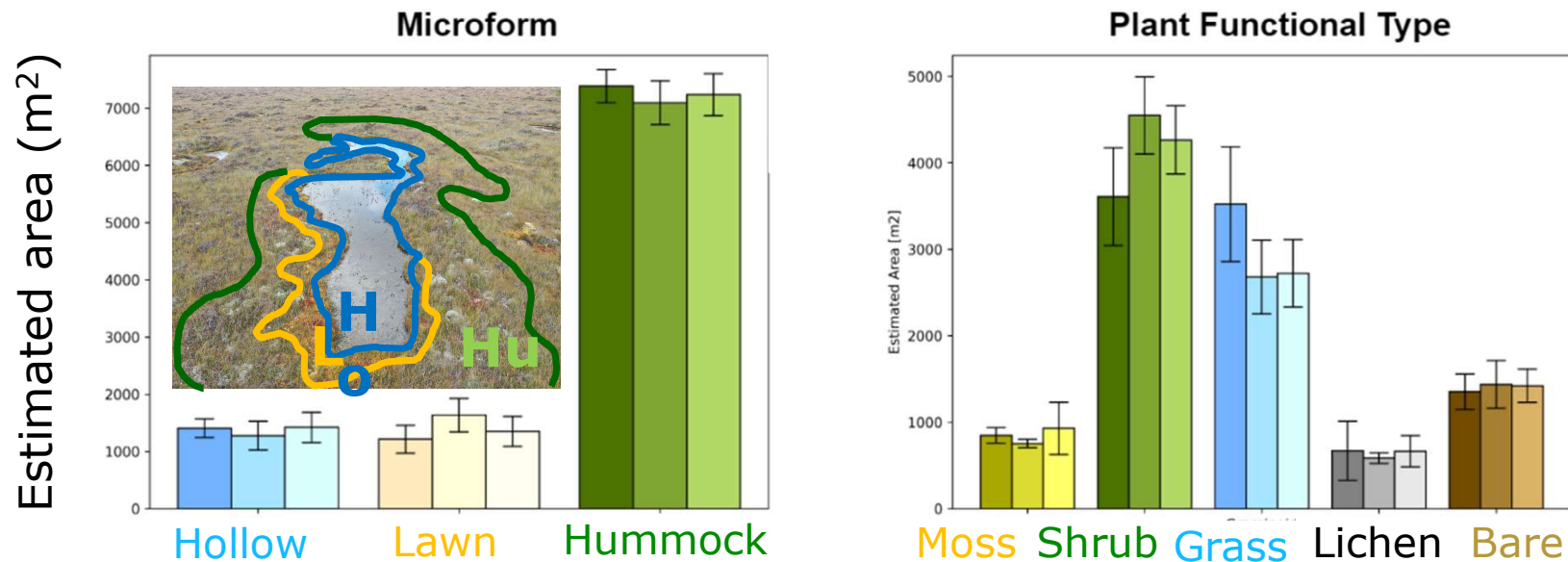
Field work across Ireland

- 12 peatlands across climate and land-use gradient in Ireland

- UAV RGB flights: 1) Orthomosaic: vegetation composition
                     2) DTM: microtropography

- Observer: 1) elevation (RTK),
                     2) vegetation cover (field & orthomosaic)
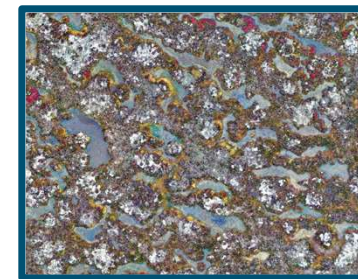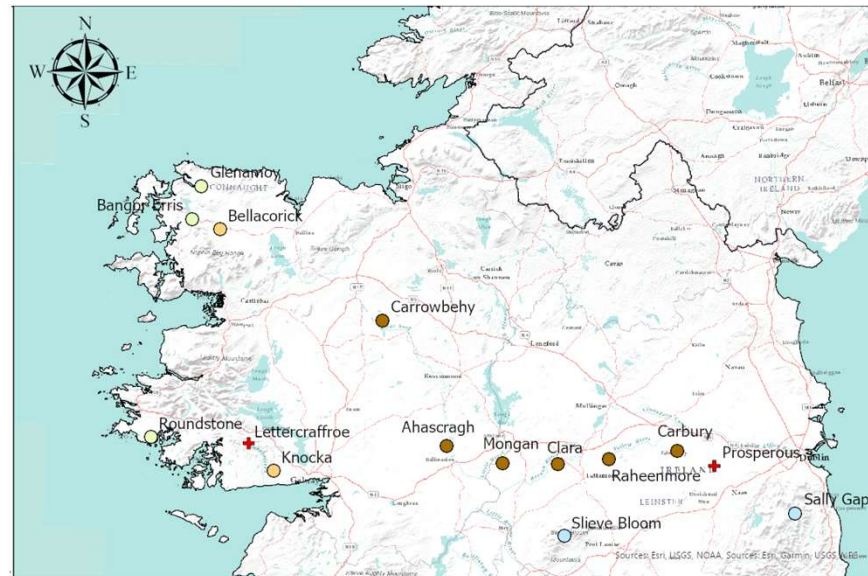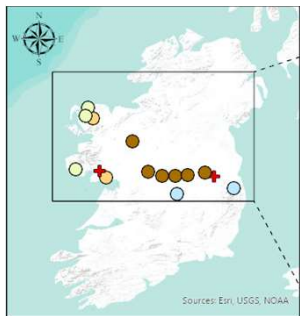
High consistency across altitudes & scales

- Estimates similar across flight altitudes (20m, 60m, 120m)

- For Microforms (1-10m) & Plant Functional Types (<1m)

- First step towards large-scale standardised monitoring of ecosystem functions and services?

Can we assess impact recreation on dune building & vegetation?

Sasja van Rosmalen, Juul Limpens (WU-PEN), Michel Riksen (WU-SLM), Lammert Kooistra (WU-GRS)

Field work along the Dutch coast

- 6 created dune fields along recreation gradient at two sites

- UAV RGB flights: 1) DTM: dune growth
                      2) Orthomosaic: vegetation response
                      3) Orthomosaic: recreation pressure

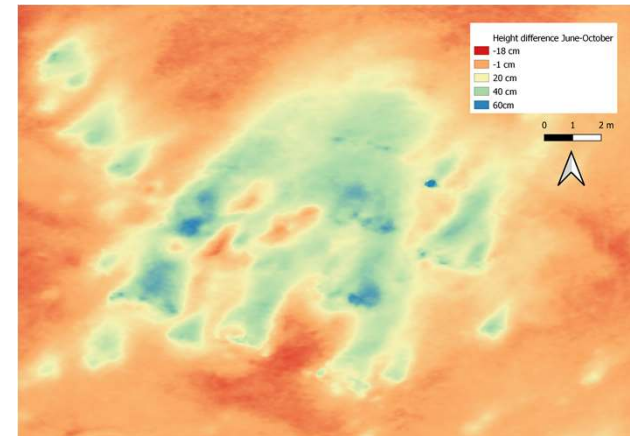- Observer: 1) elevation (RTK), 2) vegetation cover, 3) recreation

Vegetation cover & sedimentation

April

October

October - April

- Elevation changes DTM match RTK dune-growth/erosion

- Dense vegetation: interpolation terrain shape source of uncertainty

- Greenness index matches vegetation cover, not height

Recreation impact: work in progress

- Recognition sensitive to surface properties

Can we predict bee abundance from UAV images?

Michele Torresani (lead author) and Duccio Rocchini (University of Bologna),

David Kleijn and Reinier de Vries (WU-PEN) , Harm Bartolomeus (WU-GRS), et al.
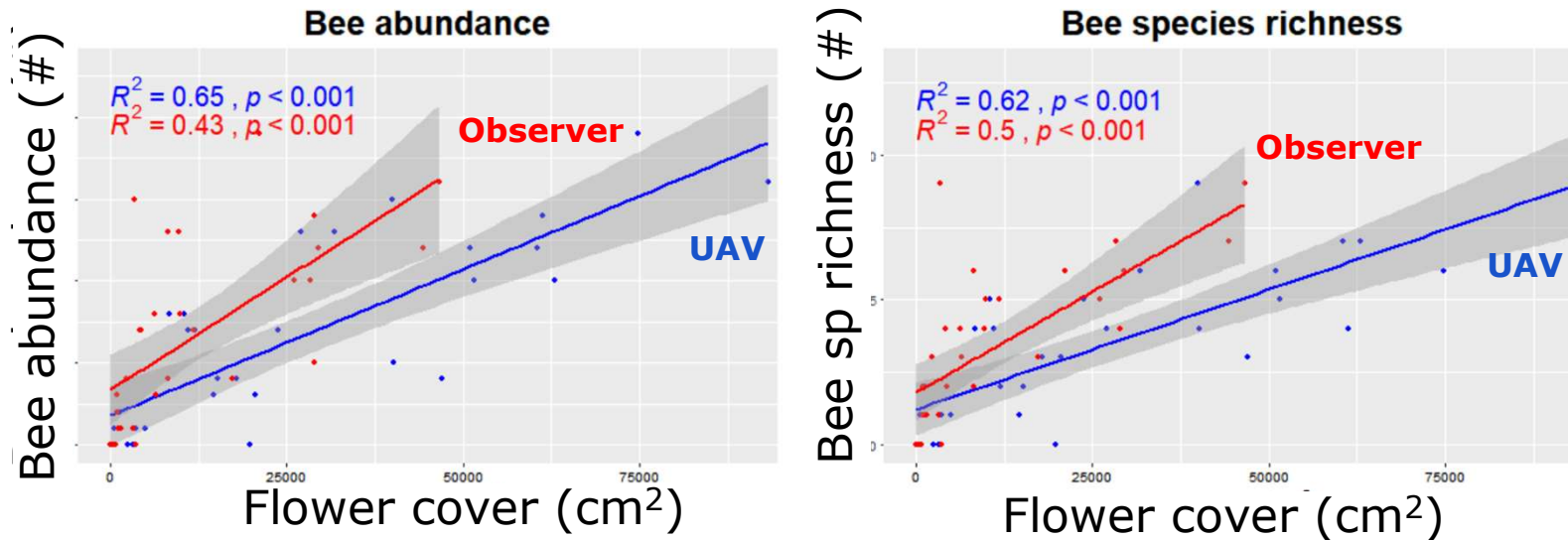
SHOWCASE
Synergies between agriculture, biodiversity and ecosystem services to help farmers capitalising on native biodiversity

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Field work in Zuid-Limburg

- 30 grasslands with gradient in flower cover

- RGB NIR images & UV images

- Observers   1) flower cover & diversity
              2) bee abundance & diversity

Drone sees like bees?

- UAV flower cover correlates better with bee abundance, species richness & diversity then observer flower cover.

- First step towards standardized large-scale monitoring of bee habitat quality!?

Connection to biodiversity monitoring

- Peatlands
  - Vegetation proxy for functions, incl biodiversity at larger spatial scales

- Coastal dunes
  - Dune building – habitat building

- Pasture land
  - Flower & bee diversity

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