Characterizing Alpine peatlands from drones: a case study

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CHANGED Project:
"CHAracteriziNG pEatlands from Drones"
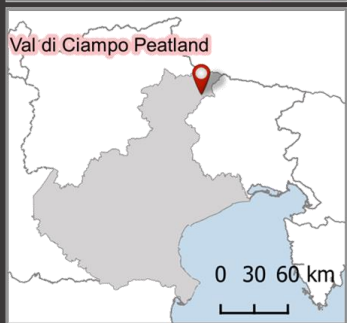
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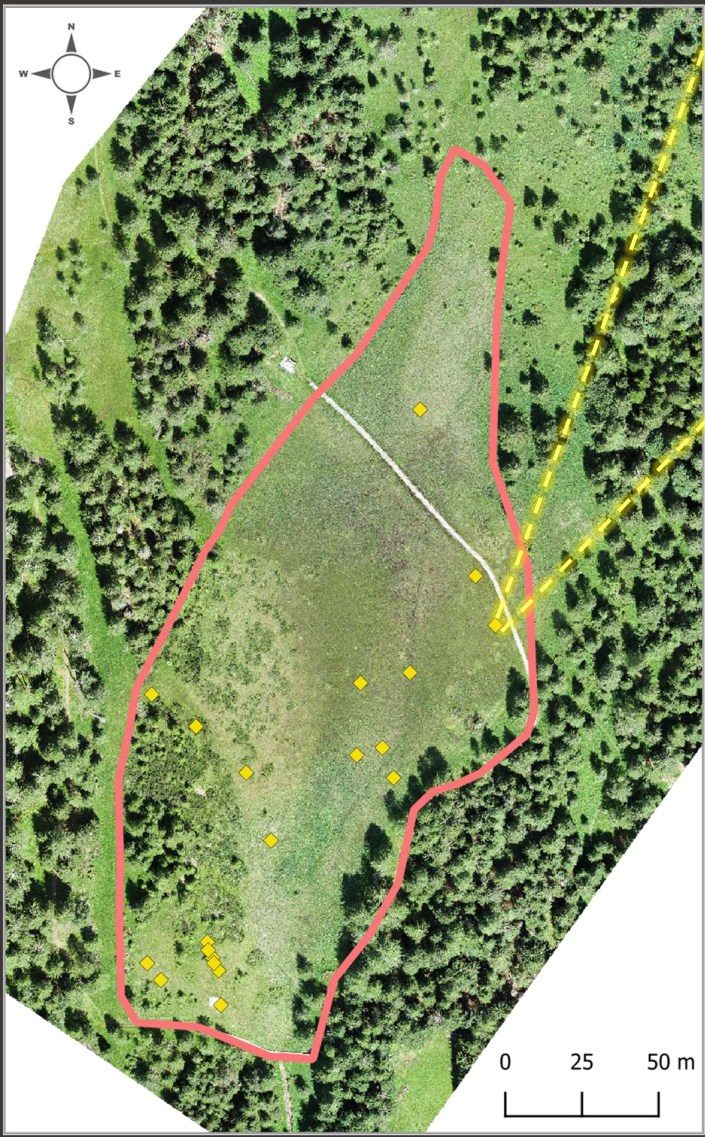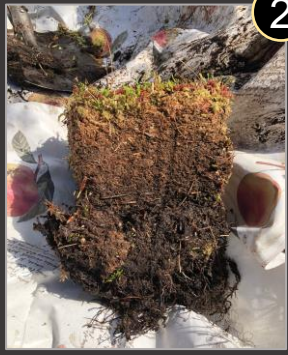# Data collection and Lab analysis

Val di Ciampo Peatland

0 300 600 km

0 30 60 km

☐ Study area

0 25 50 m

Data collection and Lab analysis

Vegetation attributes

Data collection and Lab analysis

Val di Ciampo Peatland

0 300 600 km

0 30 60 km

Study area
Plot
Boreholes

0 25 50 m

Vegetation attributes

- Species composition
- AG biomass
- Vegetation height
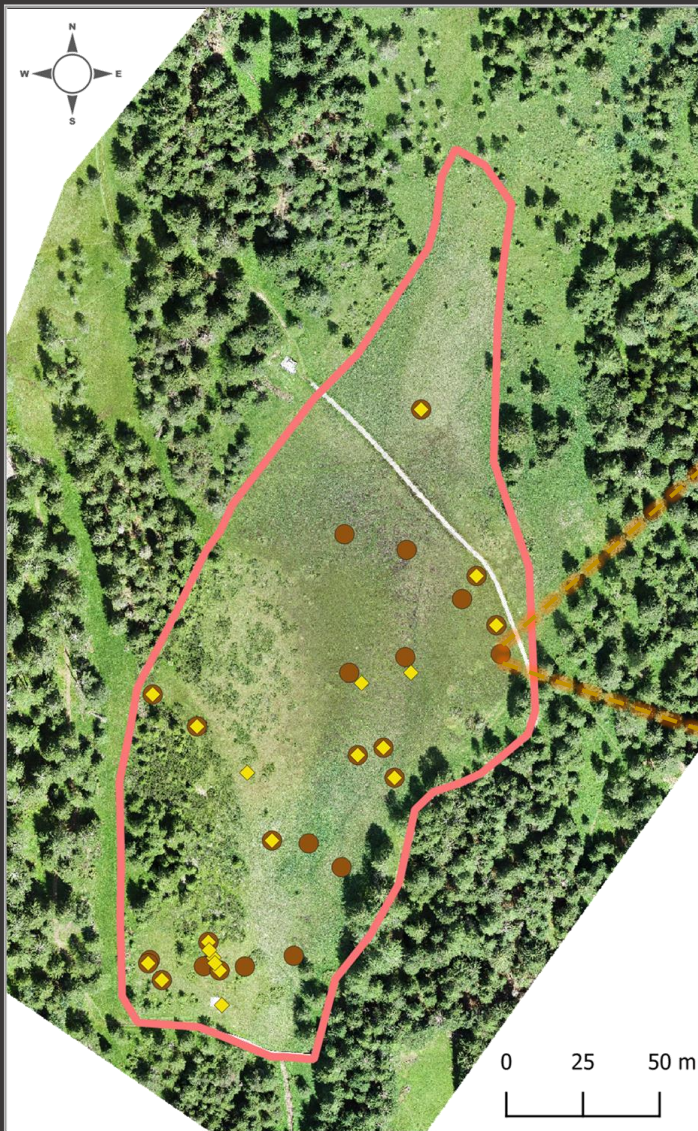
(sites = 20)

- Bulk density
- BG biomass
- Carbon content

(sites = 15)

Peat properties

- Bulk density
- Carbon content

(sites = 20; sample units = 46)

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Data collection and Lab analysis

Val di Ciampo Peatland

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Study area

◆ Plot

● Boreholes

→ Flightlines

0   25   50 m

Vegetation attributes

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Peat properties

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Data from drone

DJI Matrice 300 + Camera L1
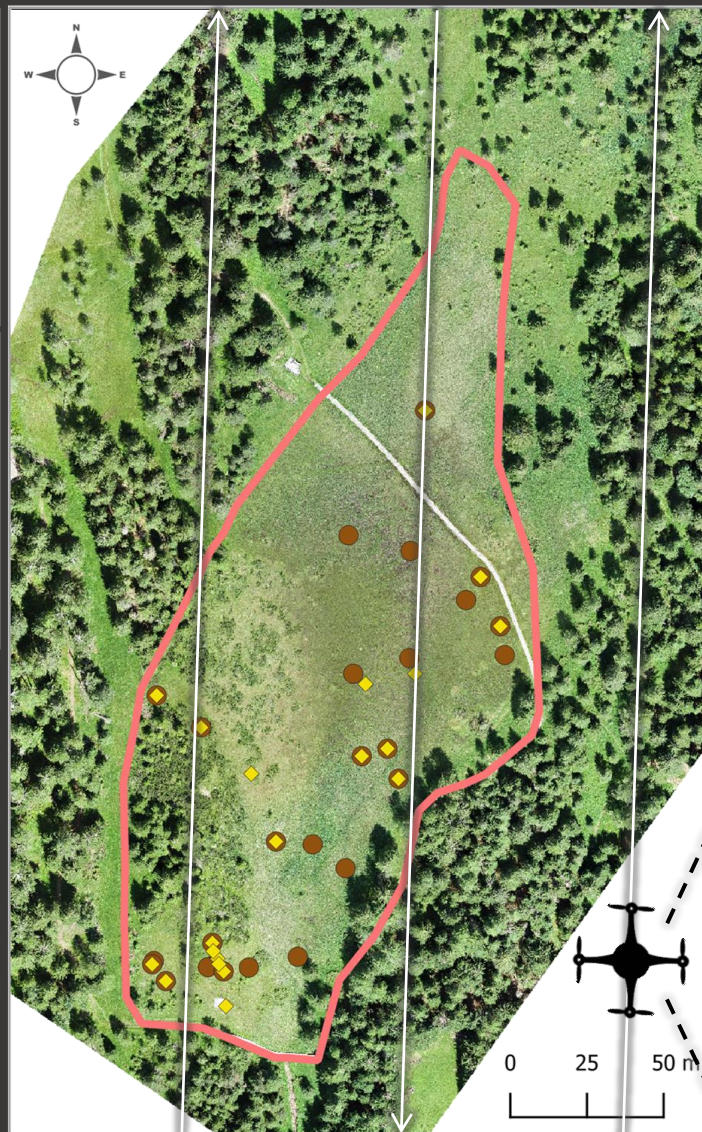
⬇

- LiDAR (3 returns)
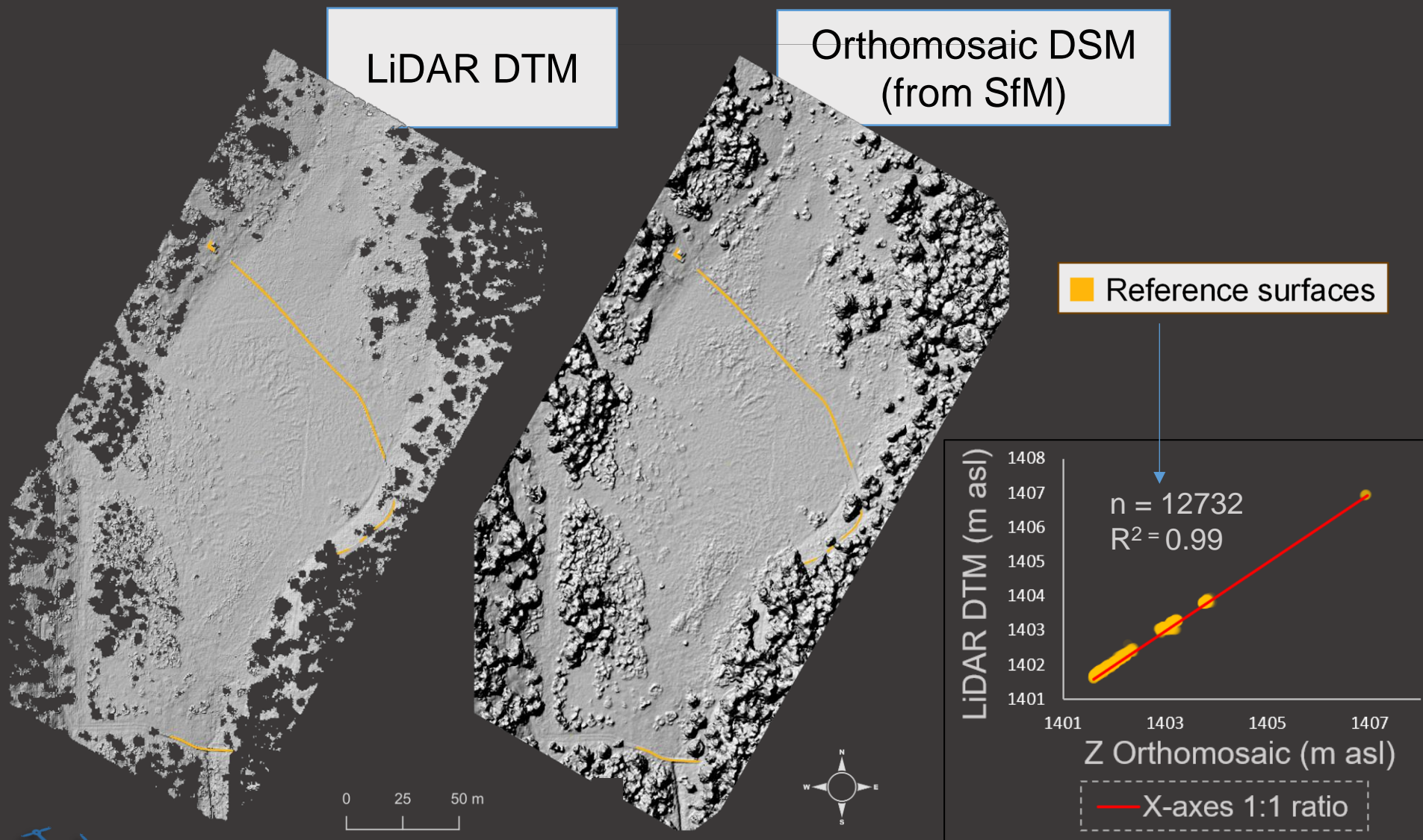- Orthomosaic (20 mpx)

DJI Matrice 600 + Nano Hyperspec

⬇

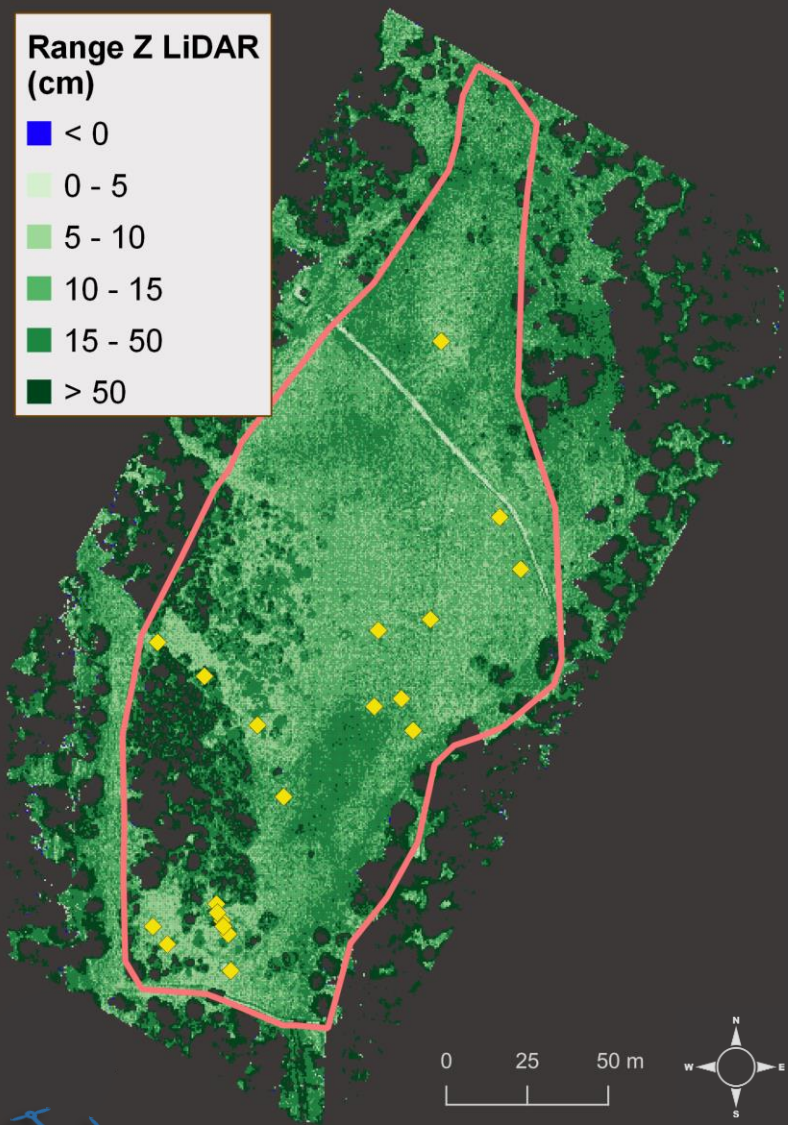- 273 spectral bands (400:1000 nm)

Preliminary results: LiDAR DTM

LiDAR DTM

Orthomosaic DSM
(from SfM)

■ Reference surfaces

n = 12732
$R^2 = 0.99$

LiDAR DTM (m asl)

Z Orthomosaic (m asl)

— X-axes 1:1 ratio

0   25   50 m

Preliminary results: LiDAR vegetation heights

Range Z LiDAR (cm)
- ■ < 0
- ■ 0 - 5
- ■ 5 - 10
- ■ 10 - 15
- ■ 15 - 50
- ■ > 50

$$Range\ Z\ LiDAR = Max(Z) - DTM$$

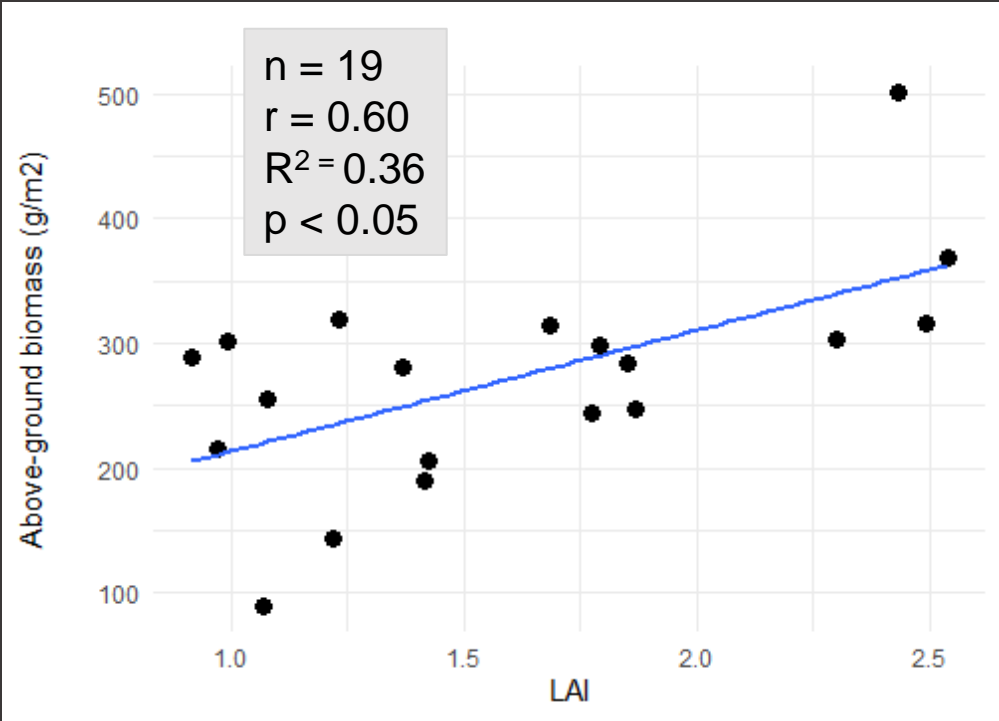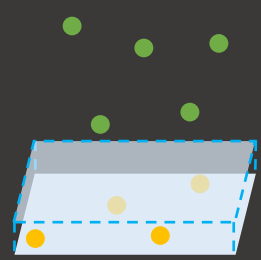n = 19
r = 0.82
$R^2 = 0.68$
p < 0.001
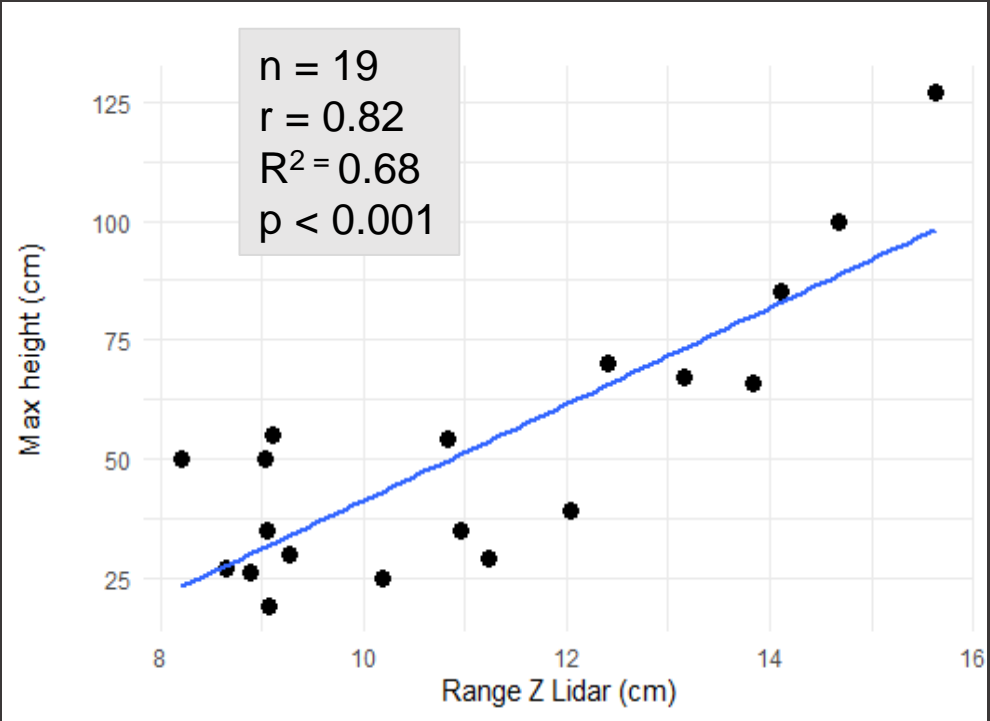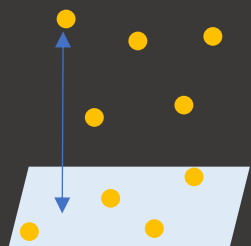
Preliminary results: LiDAR Leaf Area Index
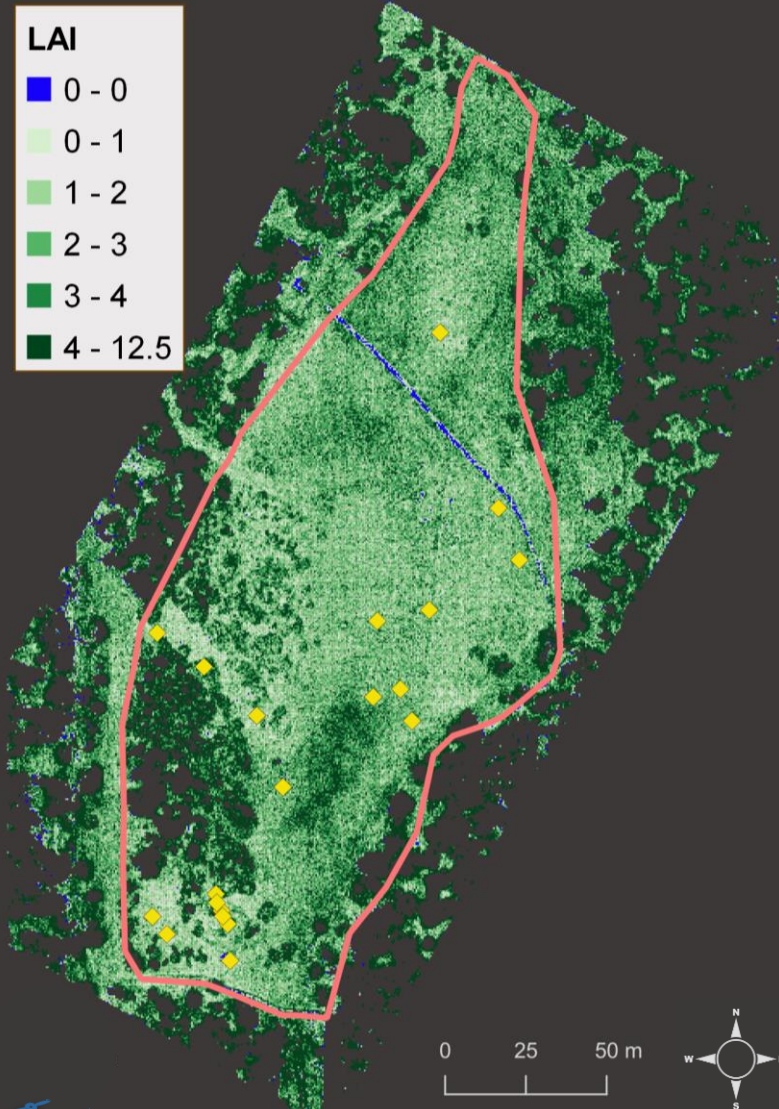
$$\text{LAI} = -\frac{\cos(\theta)}{k} * \ln(Rg/Rt)$$

$$\approx -\frac{\cos(0)}{0.5} * \ln(Rg/Rt)$$

Richardson et al. (2009)

n = 19
r = 0.60
$R^2 = 0.36$
$p < 0.05$

Thank you for your attention

… and them for cooperation