
SLU
SCIENCE AND EDUCATION FOR SUSTAINABLE LIFE

Cybergrass - Crop modelling WP

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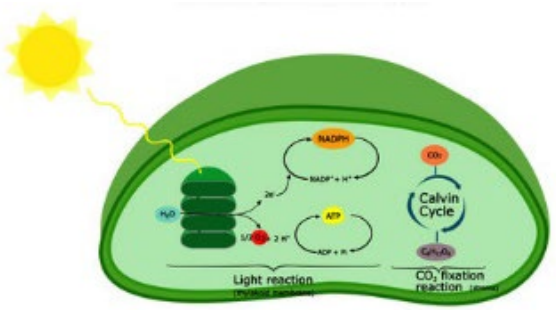
Yield

Solar radiation

Photosynthesis



Biomass growth

Quality

Temperature

Phenological development

Forage quality

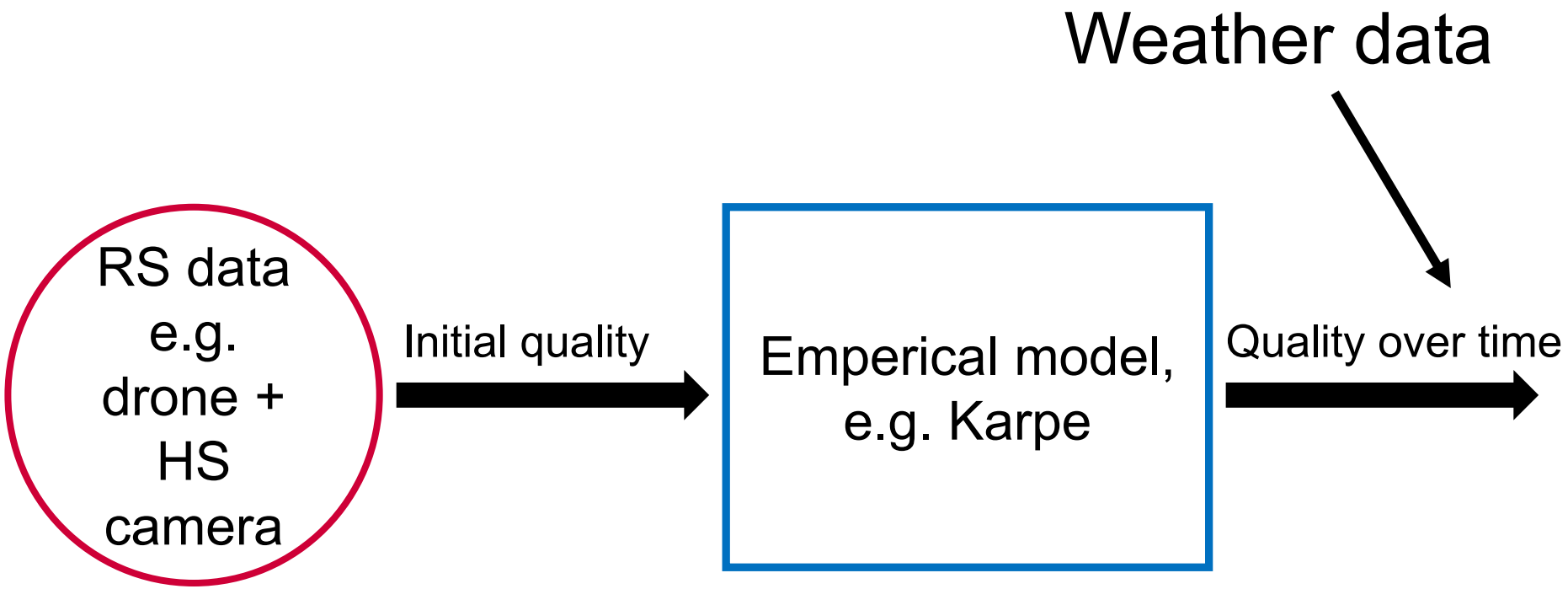
Types of models

Empirical	Simulation
Less mechanistic	More mechanistic
e.g. Vallprognos, Karpe	e.g. Basgra, Stics
Quality	Biomass, quality
Simple	Complex
Little information needed	Much information needed
Period: single cut	Period: whole season

Vallprognos.se

- Sum of growing degree days (GDD)
- Base 5 GDD
- 250 GDD = 76% OMD = 11 MJ/kg

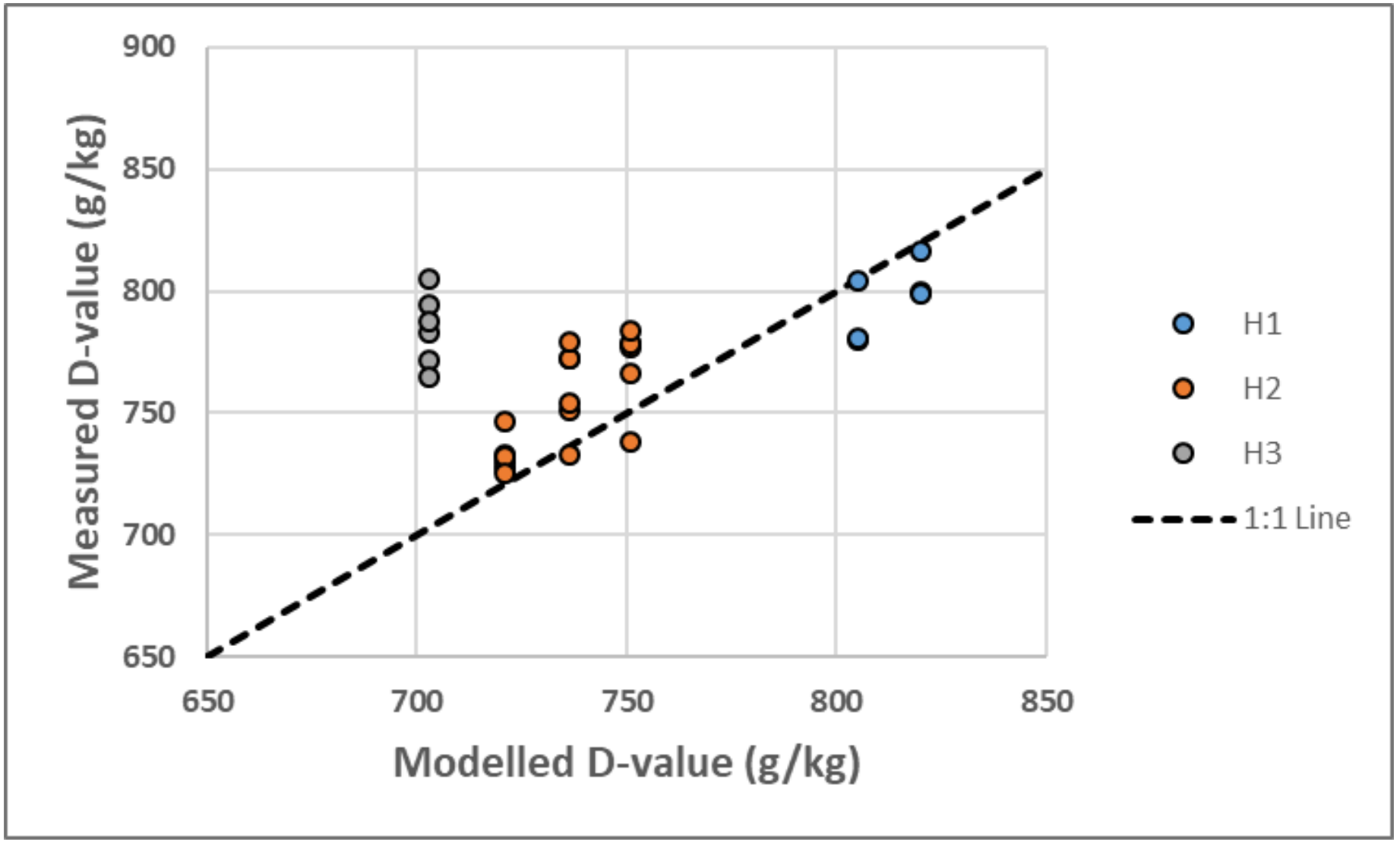
Why do this?


Weather data
RS data e.g. drone + HS camera
Initial quality
Emperical model, e.g. Karpe
Quality over time

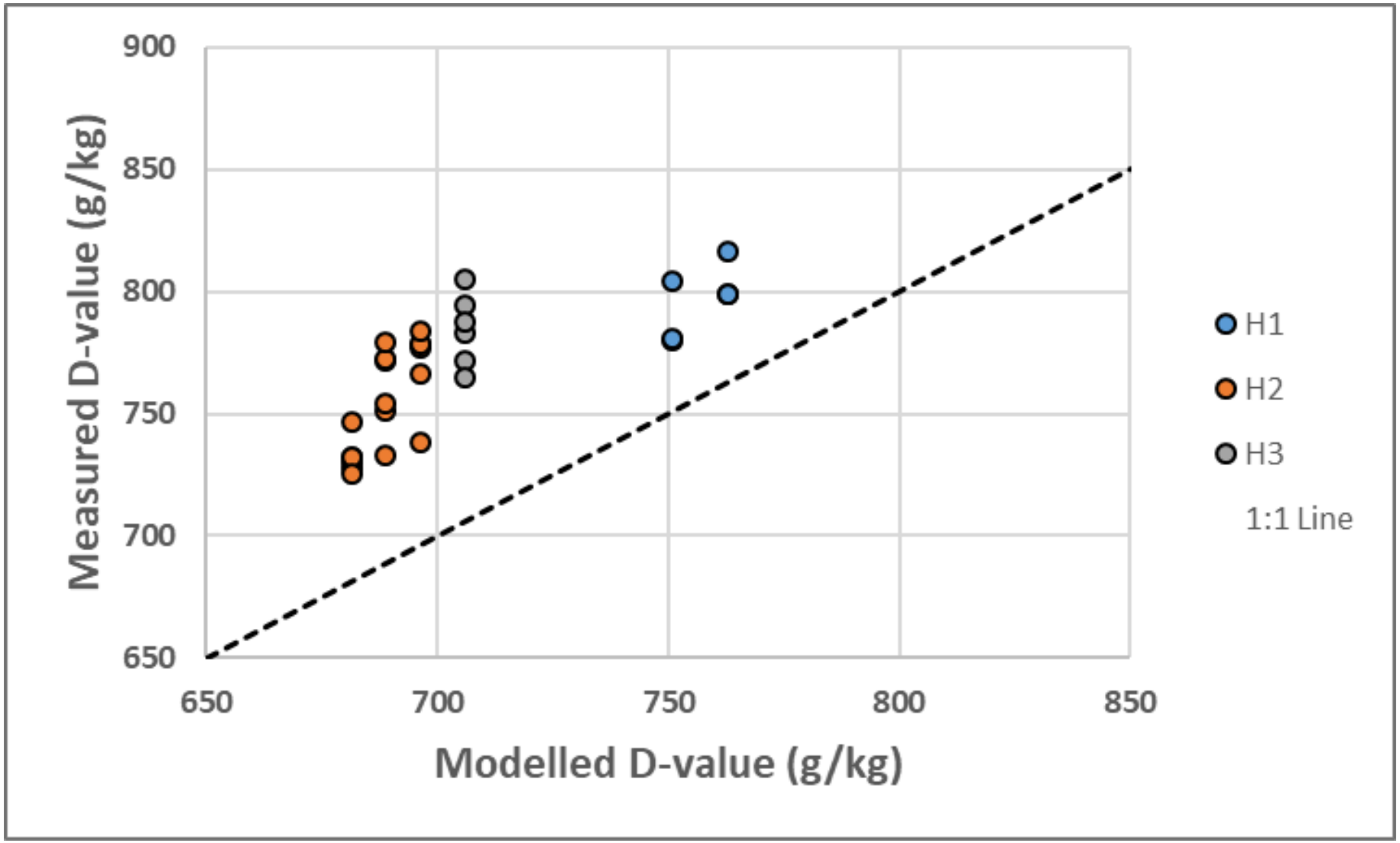
Quality models for 2nd and 3rd harvest

- Don’t work very well because:
  - Unknown harvest date
  - Other factors become important, e.g. rainfall
- A. County-specific models (Ragnmark 2012)
  - Use known harvest dates to calculate GDD
- B. Finland models (e.g. Hyrkäs et al. 2018):
  - Quality models
  - Temperature for 28 preceding the growing season
  - Number of days from 1 May until the 2nd cut
  - Daily mean precipitation during development of the third yield.

Ragnmark (2012) models. *Västerbotten 2021 data.*



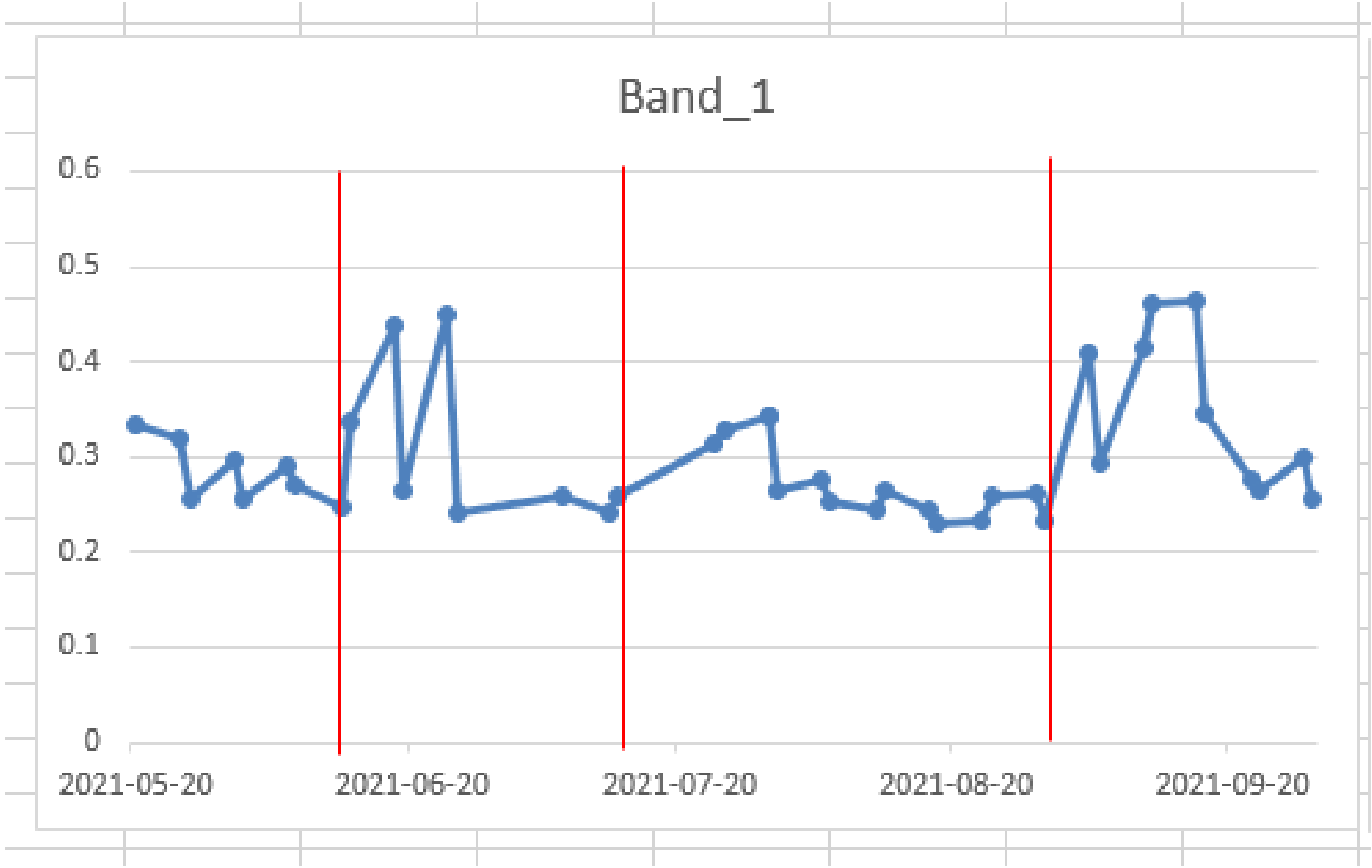
Hyrkas et al. (2018) models. *Västerbotten 2021 data.*



Detecting cutting dates

- Purpose: to develop an automated way to update mechanistic models
- Use Radar data from Sentinel 1 to detect cutting dates
- Unaffected by clouds, sensitive to biomass changes
- Amplitude of the complex correlation coefficient between two images
- Using method of Tam et al. 2016 : “Relating Sentinel-1 Interferometric Coherence to Mowing Events on Grasslands”

Sentinel 1 – Complex coherence coefficient



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