Using R as an environment for automatic extraction of forest growth parameters from terrestrial laser scanner data

Dortmund

13.08.2008

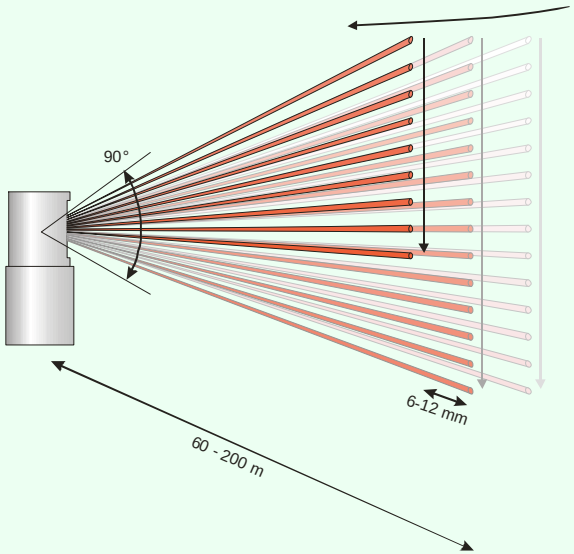
Dr. Hans-Joachim Klemmt

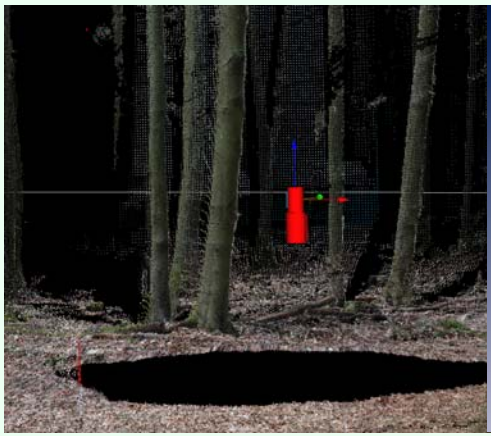
TECHNISCHE
UNIVERSITÄT
MÜNCHEN

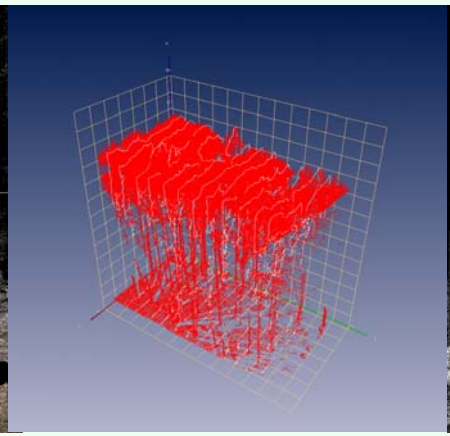
Contents

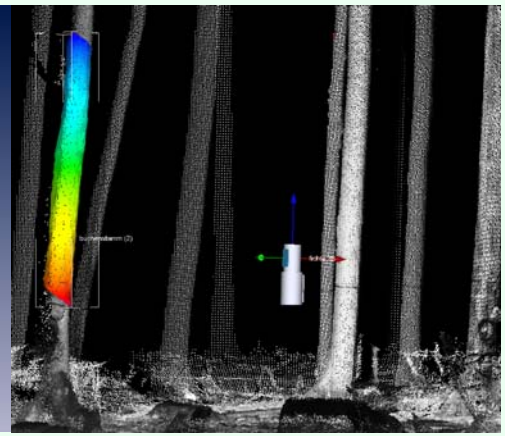
- Introduction
- Relevant parameters for forest inventory purposes
  - Determination of stem positions
  - Calculation of tree heights
  - Estimation of diameters in breast height (DBH)
  - Calculation of volume of stem axis
- Performance of the developed system (case study „Selb“)
- Summary and perspectives

Terrestrial Laserscanner



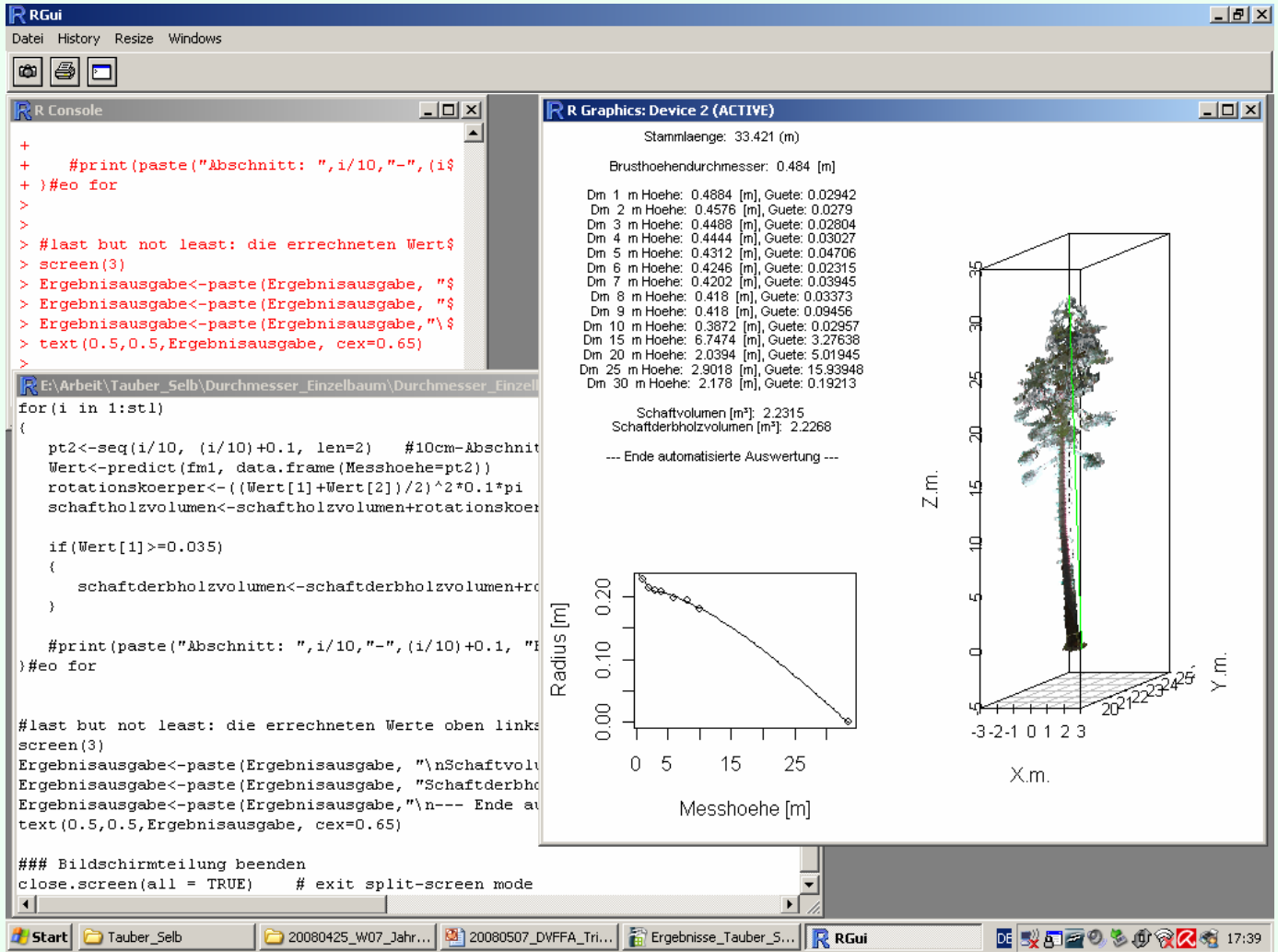




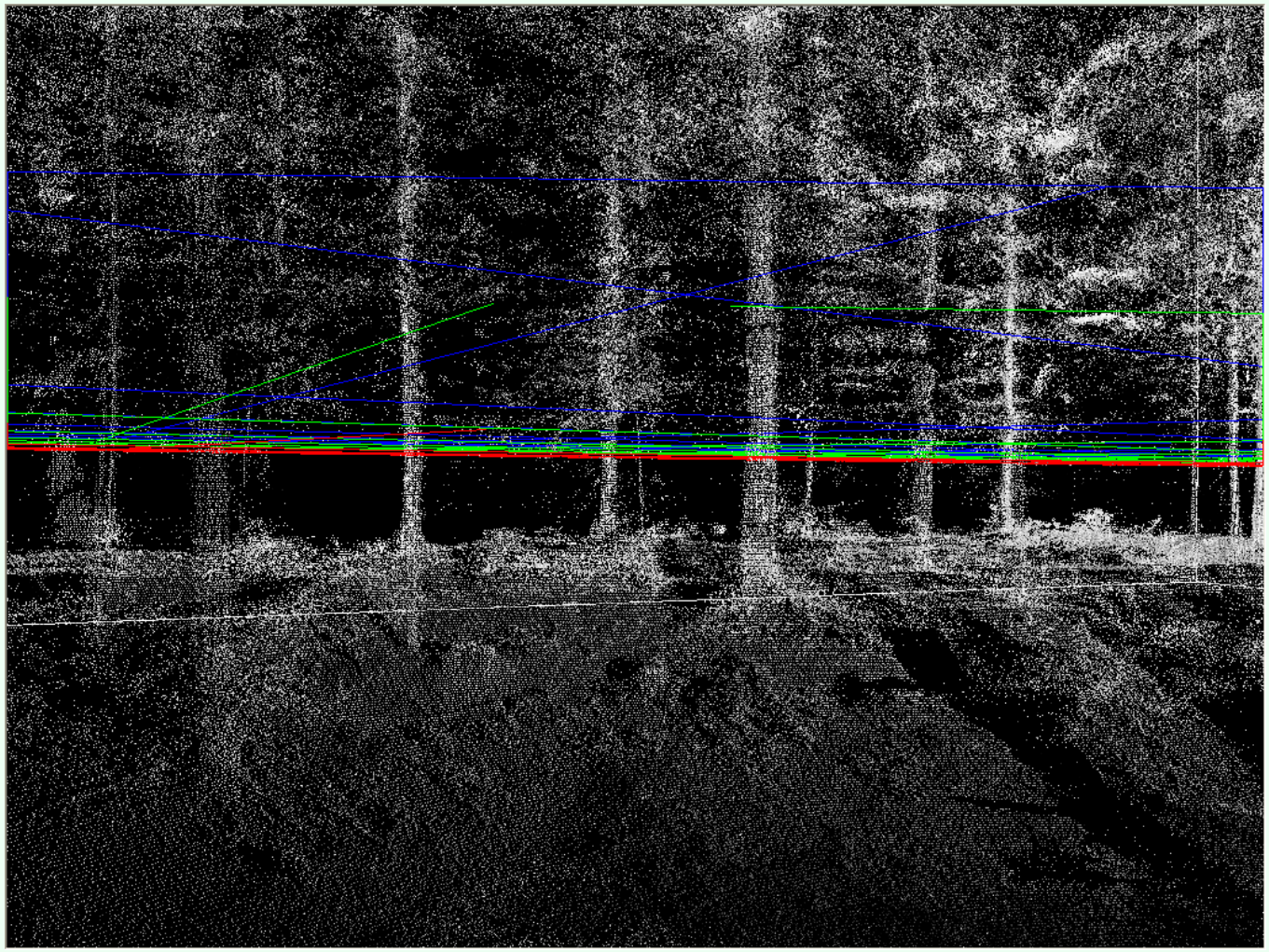


TECHNISCHE
UNIVERSITÄT
MÜNCHEN

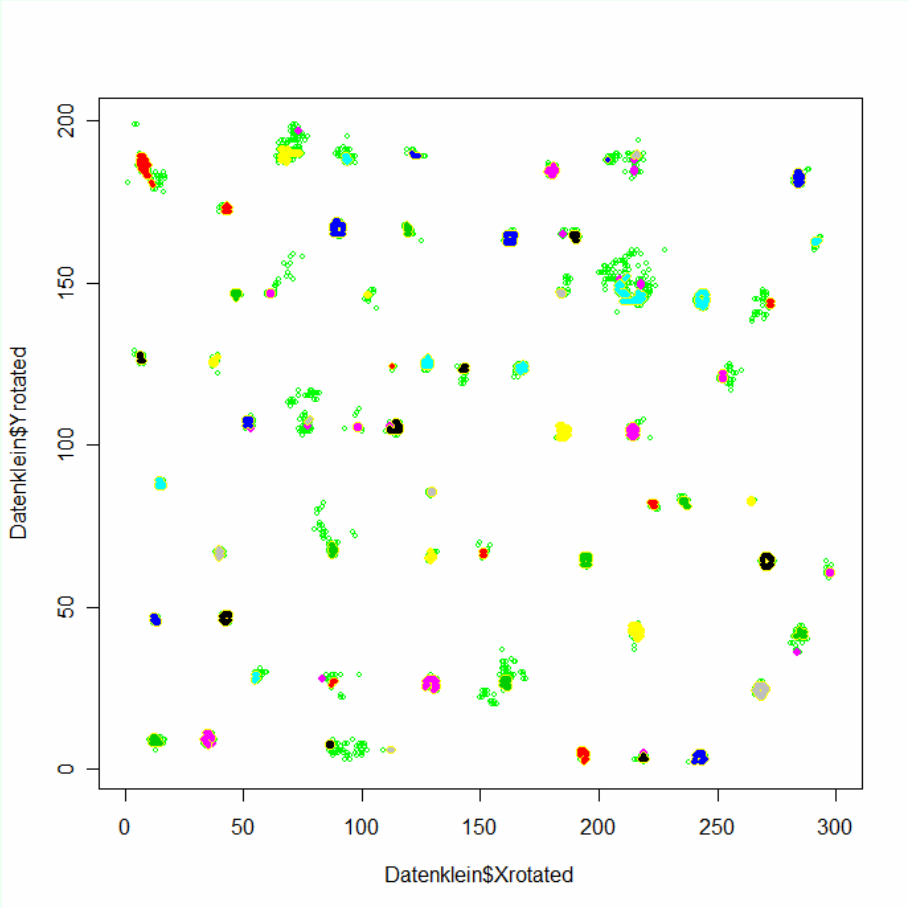
R-Package „RLaserForest“



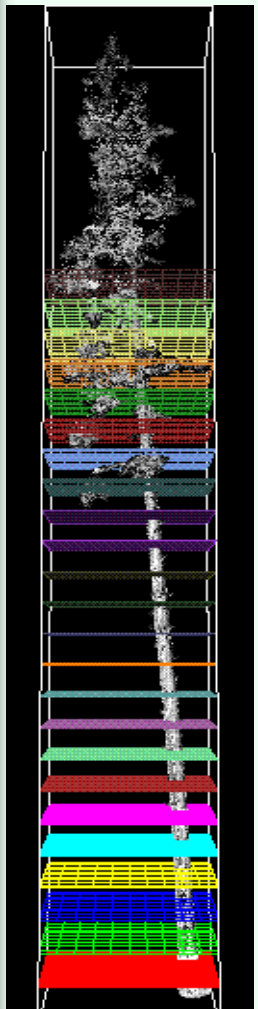
R-Package RLaserForest: Determination of stem positions (slide 1)

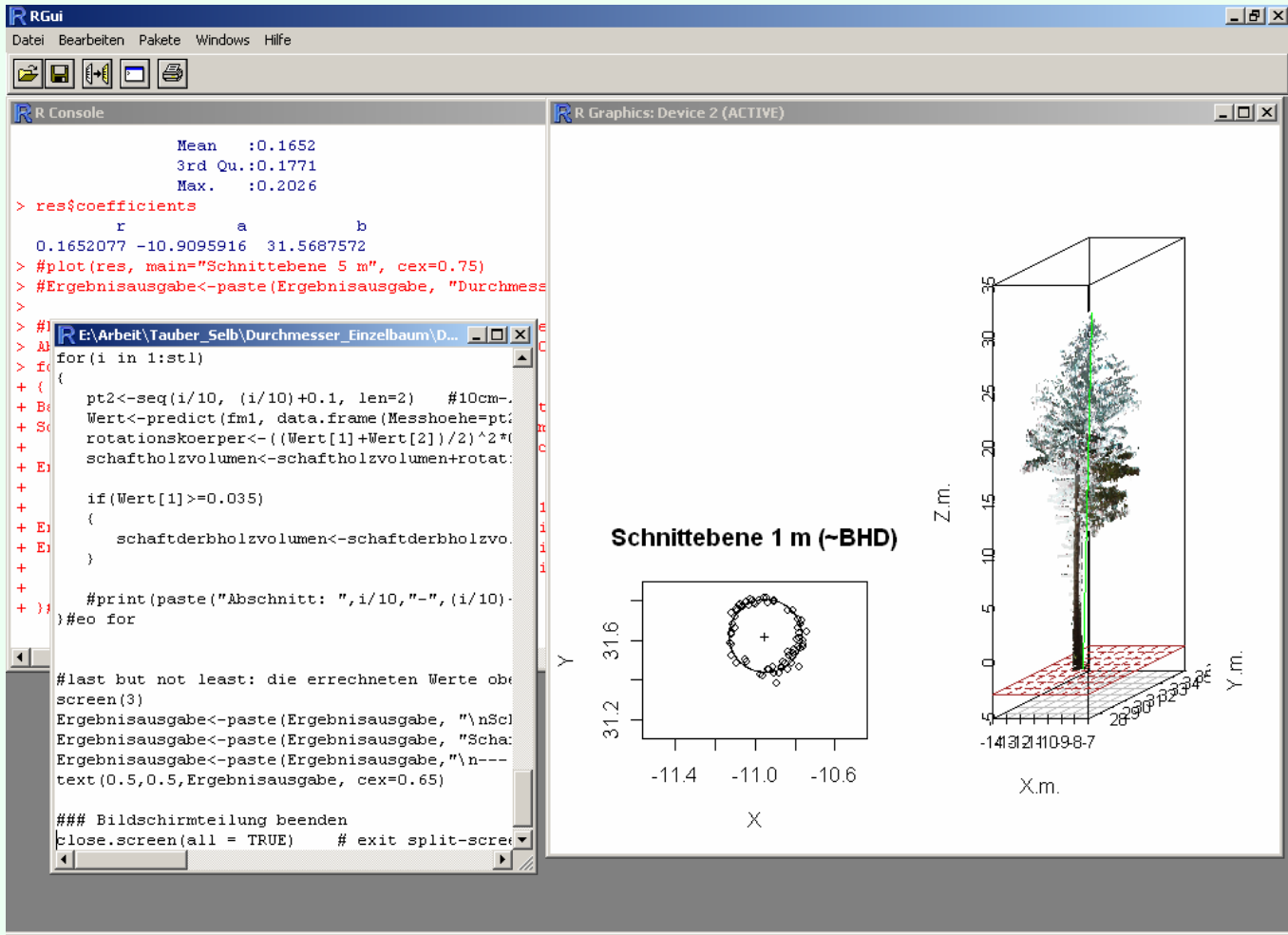


R-Package RLaserForest: Determination of stem positions (slide 2)



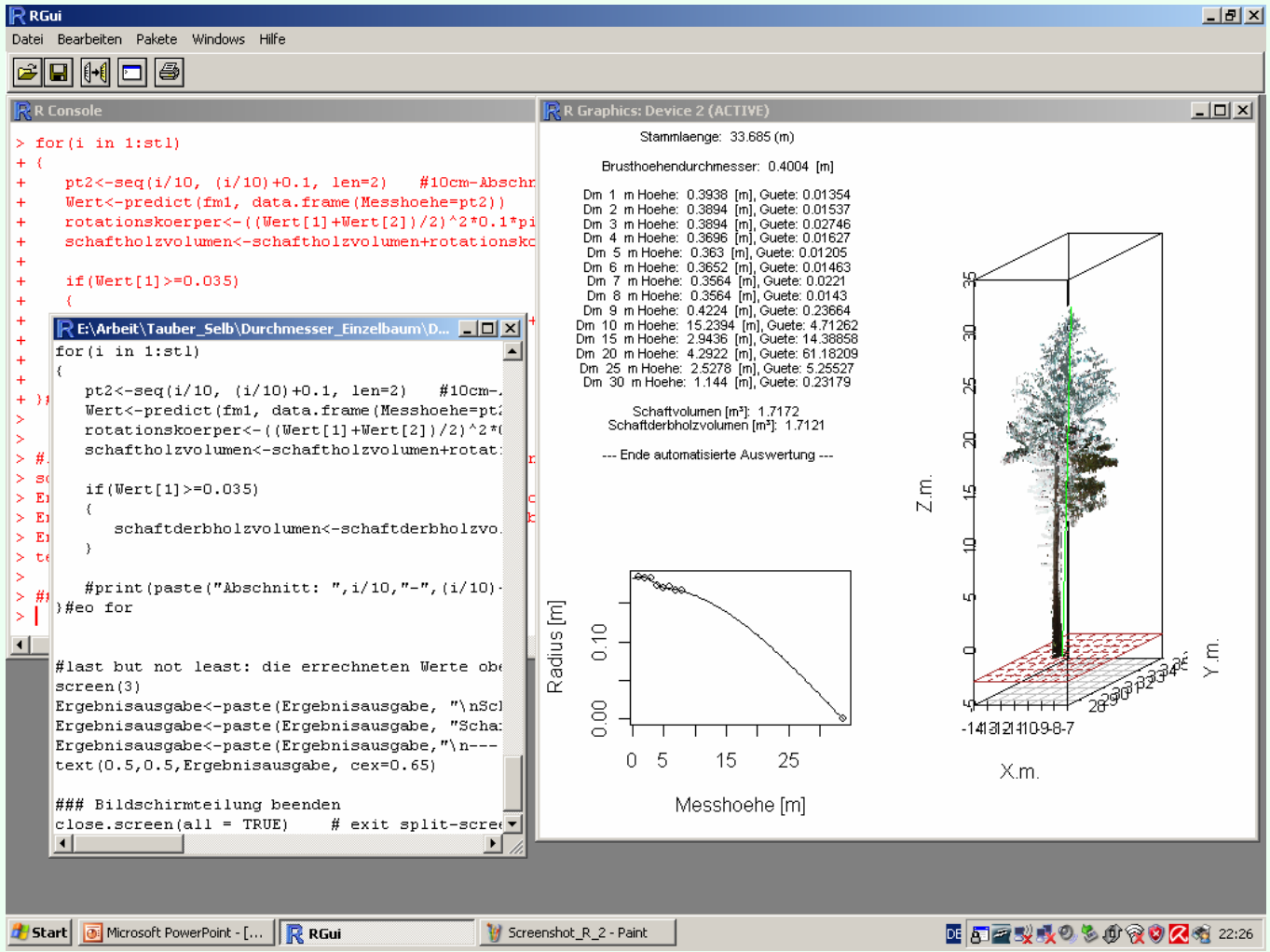
R-Package RLaserForest: Height calculation and Determination of diameters in breast height (DBH)



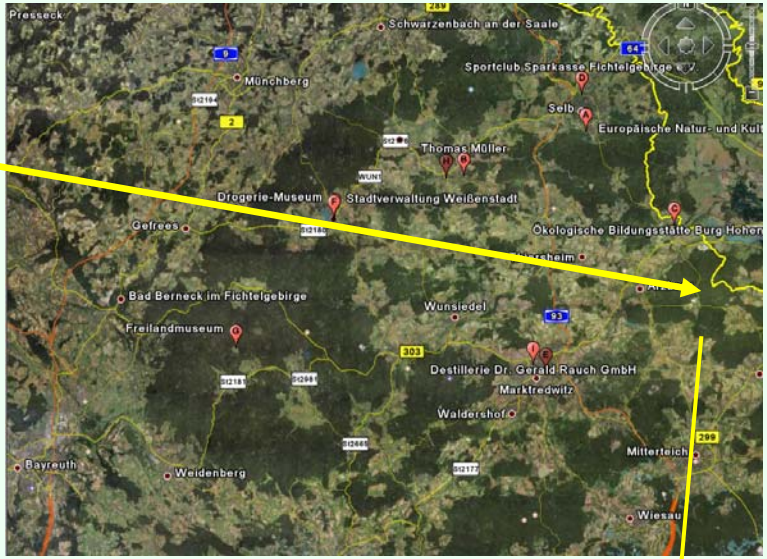


TECHNISCHE
UNIVERSITÄT
MÜNCHEN

R-Package RLaserForest: Calculation of stem volume



case study „Selb“



50°09’12“ N

12°11’55“ O

Images of case study stand





description of data

measurement in field

- 37 Norway spruce trees + 13 Scots pine trees

Applicated in RLaserForest

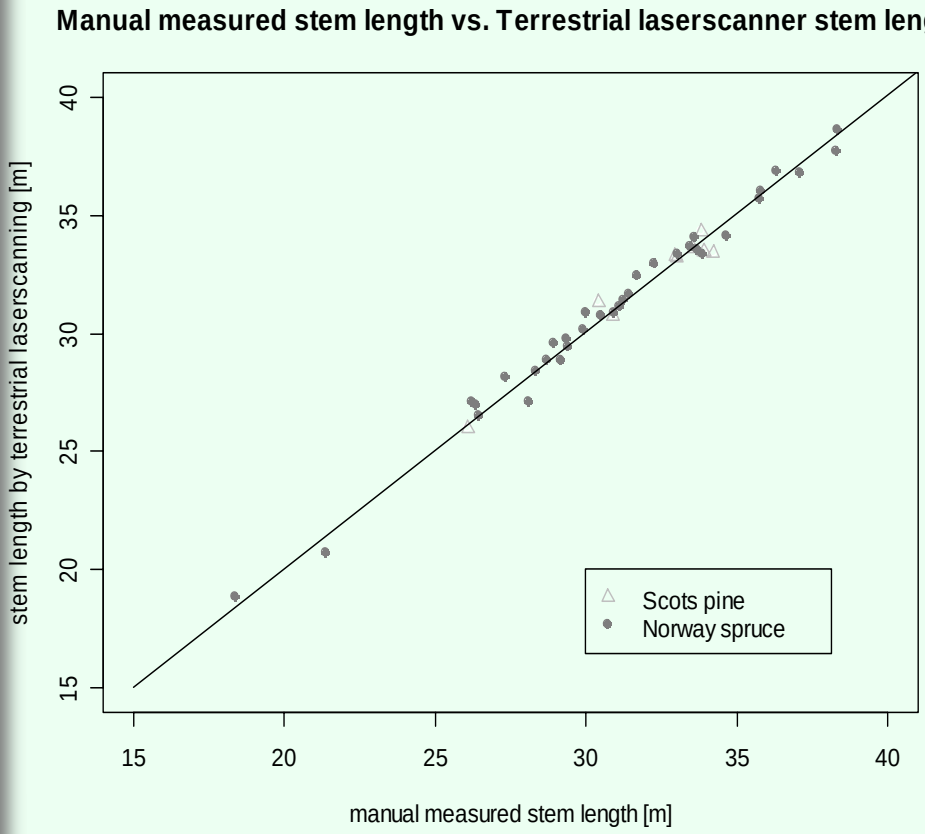
37 Norway spruce trees + 9 Scots pine trees

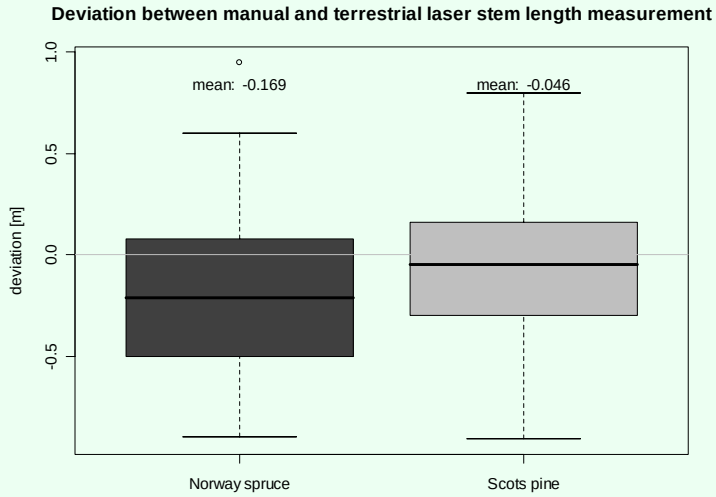
Norway spruce: mean DBH 38,54 cm (20,65-61,25cm); mean height: 30,9m (21,35-38,32)

Scots pine: mean DBH 38,07 cm (31,25-49,9cm); mean height: 32,10m (26,08-34,22)

Results (case study „Selb“)

here: length of stems

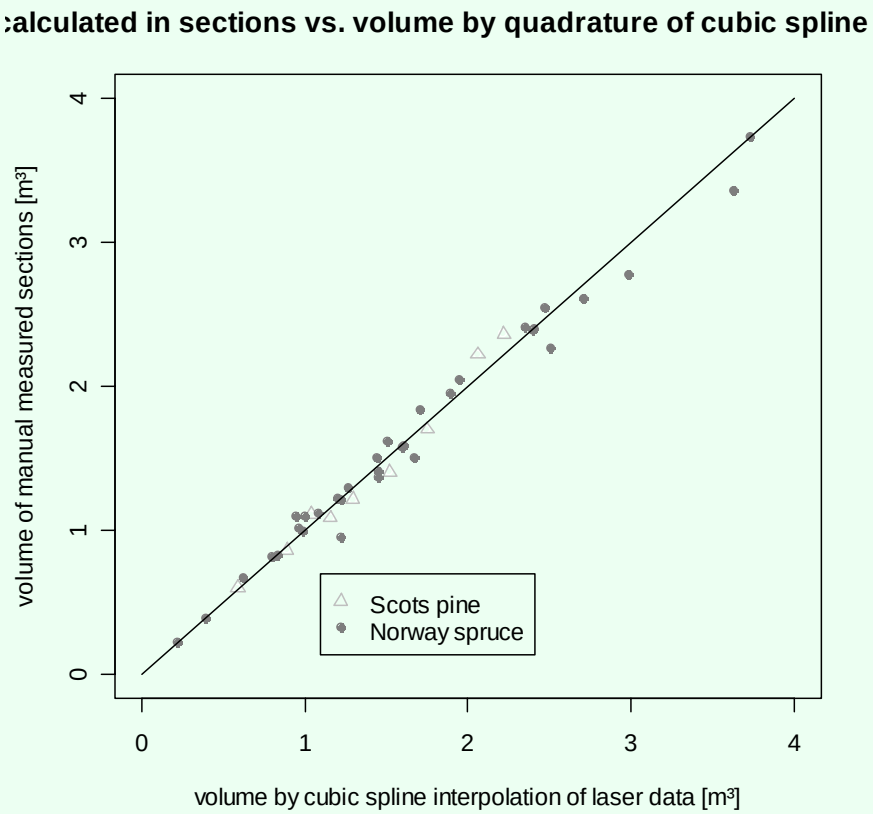




TECHNISCHE
UNIVERSITÄT
MÜNCHEN

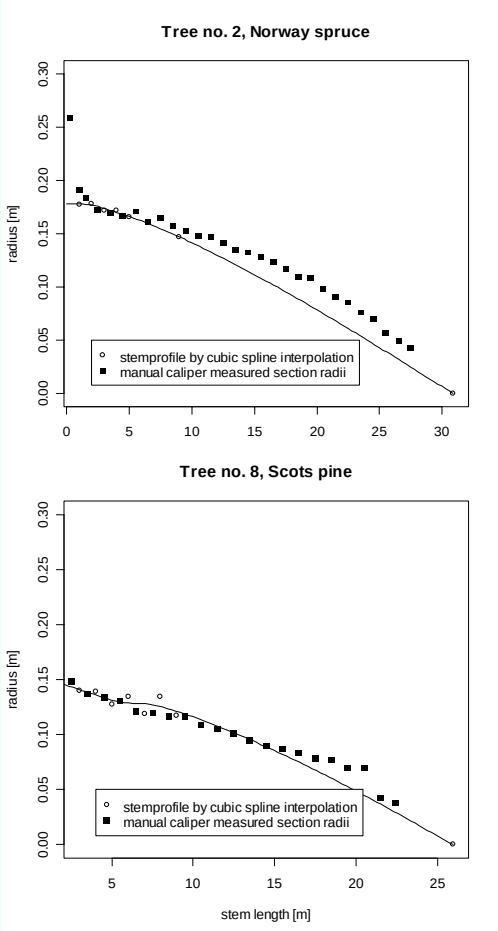
Results (case study „Selb“)

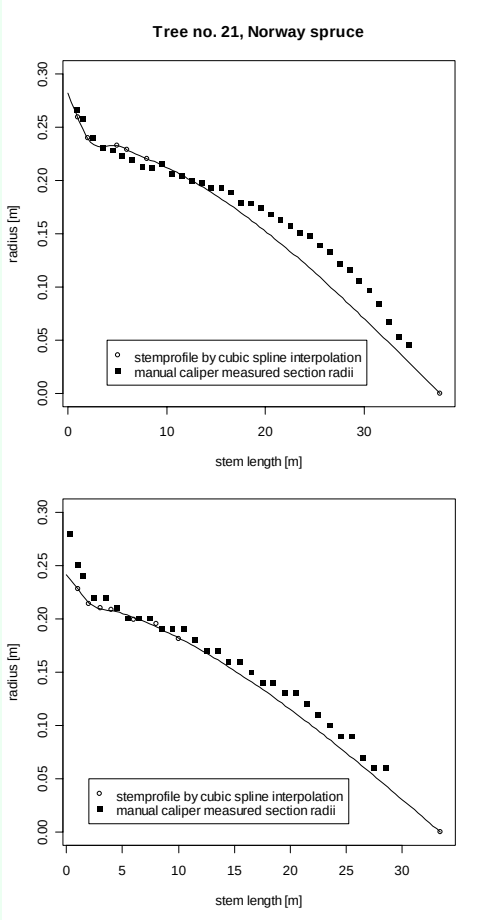
here: volume of stem axis



Results

here: attempt to explain the deviation between real and calculated volume





Summary and perspectives

TODOs: improvement of volume calculation

improvement of diameter estimation for excentric stems

afterwards: automated determination of tree species (classification)

afterwards: automated separation of crown parameters (spectral clustering)

Objective: modular built R-Package „RLaserForest“ for automatic extraction of forest growth relevant inventory parameters by the use of the statistic programming language R

I want to say thank you to:

- BaySF: Forstbetrieb Selb (insbes. Herrn Michael Grosch und Herrn Hubert Fellermeyer) for enabling case study in field

- LfWwk: Herrn Stefan Seifert, Herrn Thomas Seifert, Herrn Istvan Pal, Herrn Gerhard Schütze, Frau Andrea Oumeddah as well as Herrn Sebastian Seibold and Herrn Martin Stary

- colleagues from FMI UHUL from Czech republic

(cooperation within a common Interreg IIIa-project)

Thank you very much for your attention!

I am looking forward to a fruitful discussion …