**TECHNISCHE UNIVERSITÄT DRESDEN**

Sense⁴ Fire

Estimating vegetation fuel loads for the quantification of fire emissions by integrating various Earth observation data

Christine Wessollek[1], Luisa Schmidt[1], Niels Andela[2], Wouter Dorigo[3], Matthias Forkel[1]
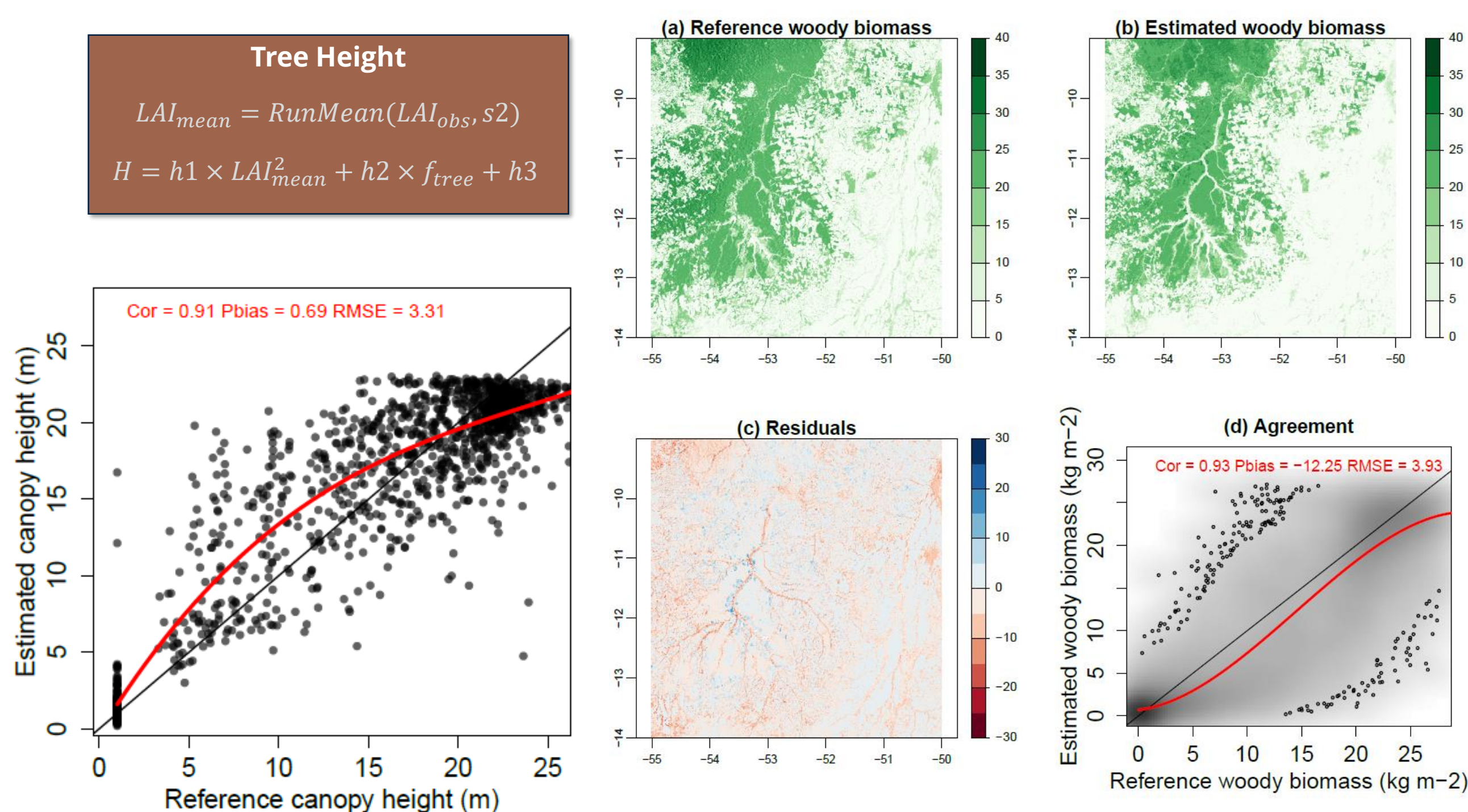
(1) Technische Universität Dresden, (2) Cardiff University, (3) Technische Universität Wien   email: christine.wessollek@tu-dresden.de
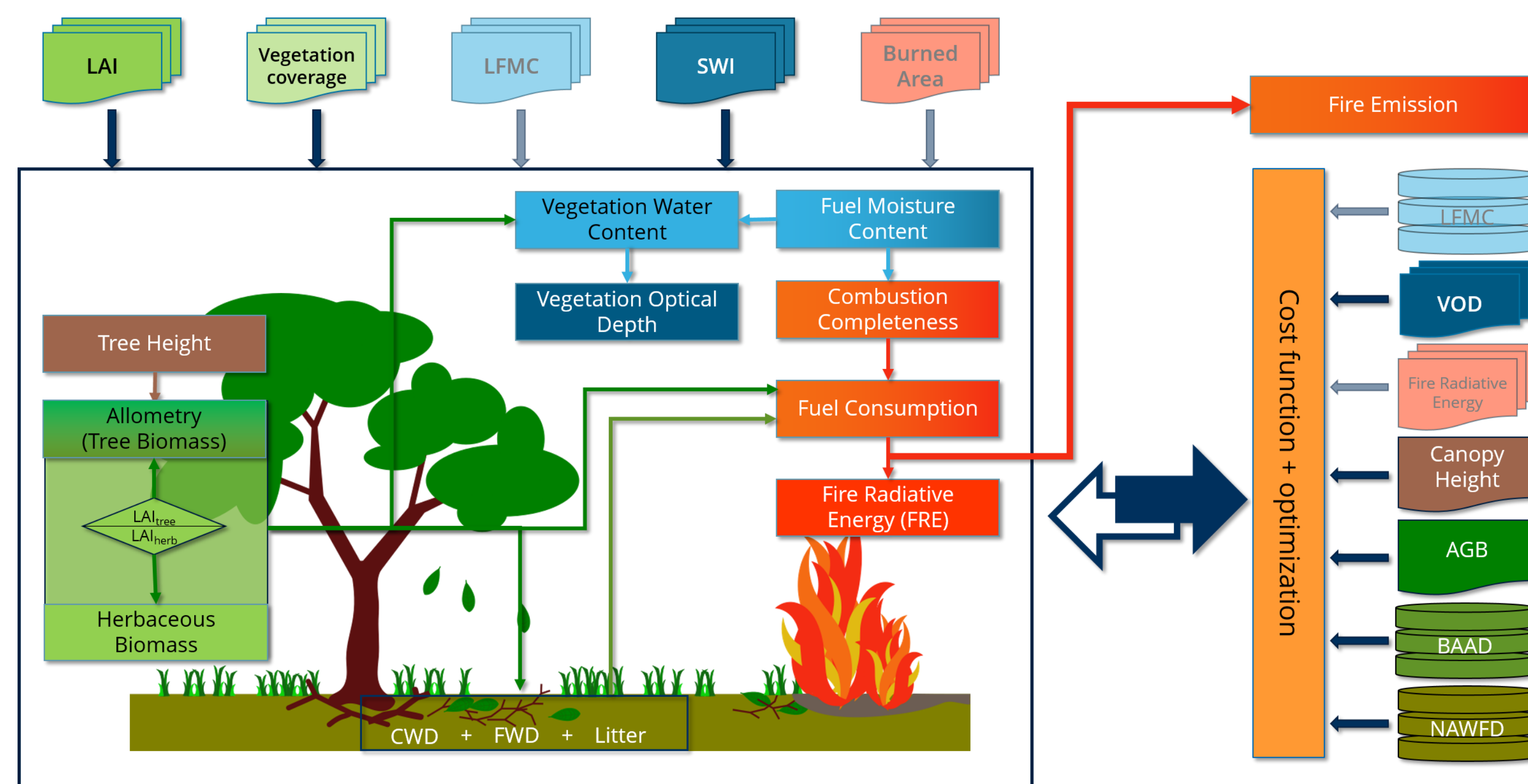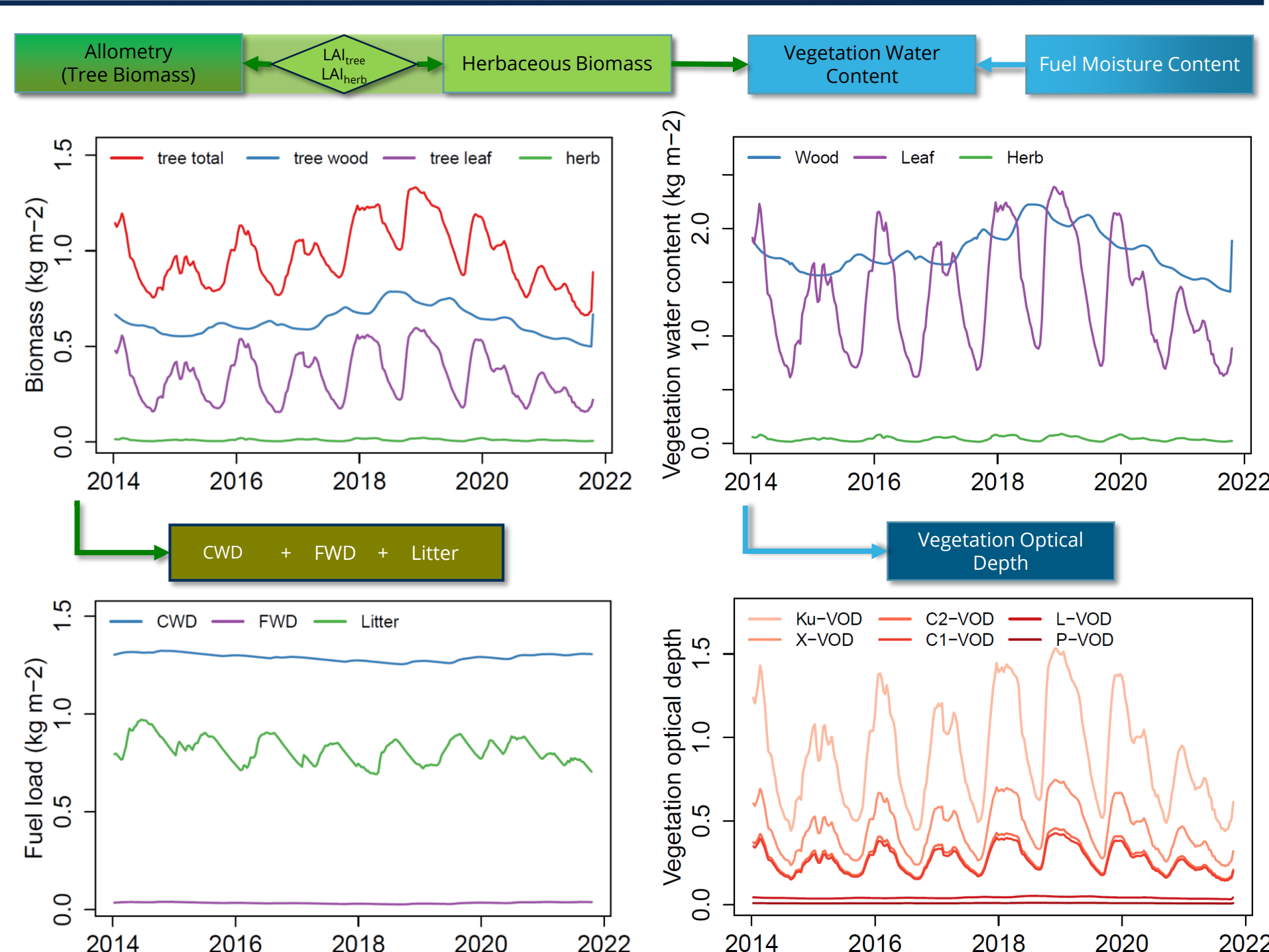
Summary

- Fuel loads and fuel moisture content are important controls on fire dynamics.
- Several satellite products are proxies of fuel properties but do not quantify the dynamics of fuel loads and fuel moisture directly.
- Combining satellite datasets with global databases of in situ-observations in an empirical fuel model allows to estimate pre- and post-fire fuel, fuel moisture content, and combustion completeness.

Tree Height

$$LAI_{mean} = RunMean(LAI_{obs}, s2)$$

$$H = h1 \times LAI_{mean}^2 + h2 \times f_{tree} + h3$$

(a) Reference woody biomass

(b) Estimated woody biomass

(c) Residuals

(d) Agreement

Cor = 0.91 Pbias = 0.69 RMSE = 3.31

Cor = 0.93 Pbias = -12.25 RMSE = 3.93

Estimation of fuel loads – Allometry Model

- Estimation of fuel and moisture content loads in leafs, wood, herbaceous vegetation, litter, fine and coarse woody debris using an data-driven model
- Using fractional vegetation cover and LAI as main input for the temporal dynamics of fuels
- Fuel moisture estimated from LAI, ASCAT Soil Water Index, or Sentinel-1
- Calibration of fuel components against ESA CCI biomass, canopy height, vegetation optical depth (VOD), and global databases of allometry and litter

Fuel model example (52.0178°W, 13.3065°S)

Calibration against canopy height, AGB and VOD

Technische Universität Dresden
Faculty of Environmental Sciences
Department of Geosciences
Institute of Photogrammetry and Remote Sensing
Junior professorship in Environmental Remote Sensing
www   https://tu-dresden.de/geo/envrs
Twitter   https://twitter.com/EnvRS_TUD