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Predicting and comparing canopy biomass by satellite-extracted vegetation indices and a temperature-driven phenological modelling approach

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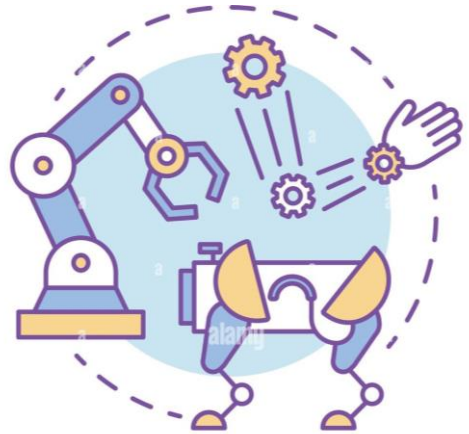
MOST 科技部 Ministry of Science and Technology

EGU22 session GI5.5 – 'Geo-infrastructure monitoring: complex data analysis and instrument application'

Capturing Dynamics of Urban Forest Canopy Biomass

Urban Forest

Remote Sensing



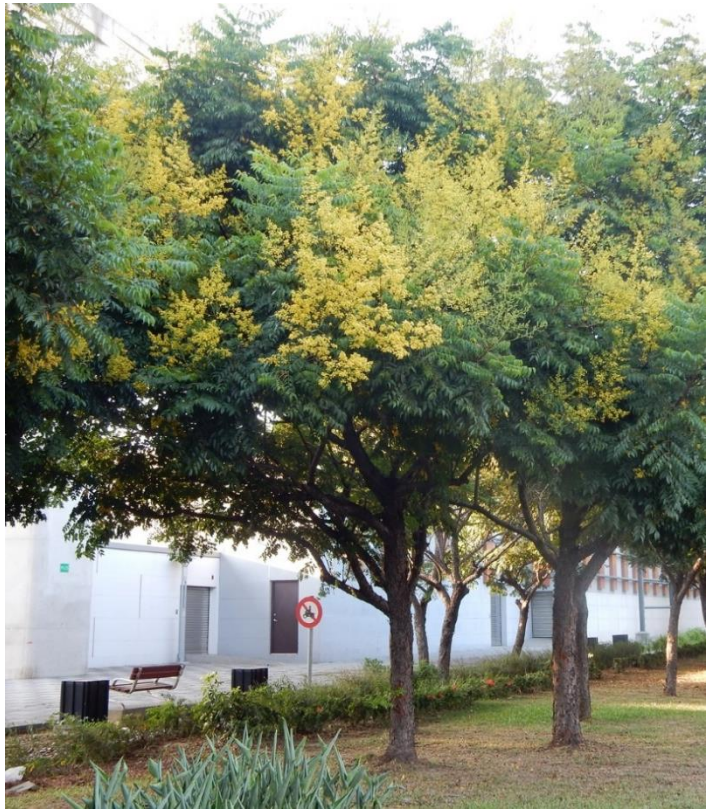
System Dynamics

Objective

- Predicting canopy biomass dynamics by system dynamics method
- Extracting vegetation indices by remote sensing approach
- Comparing the two methods in capturing tree phenological activities

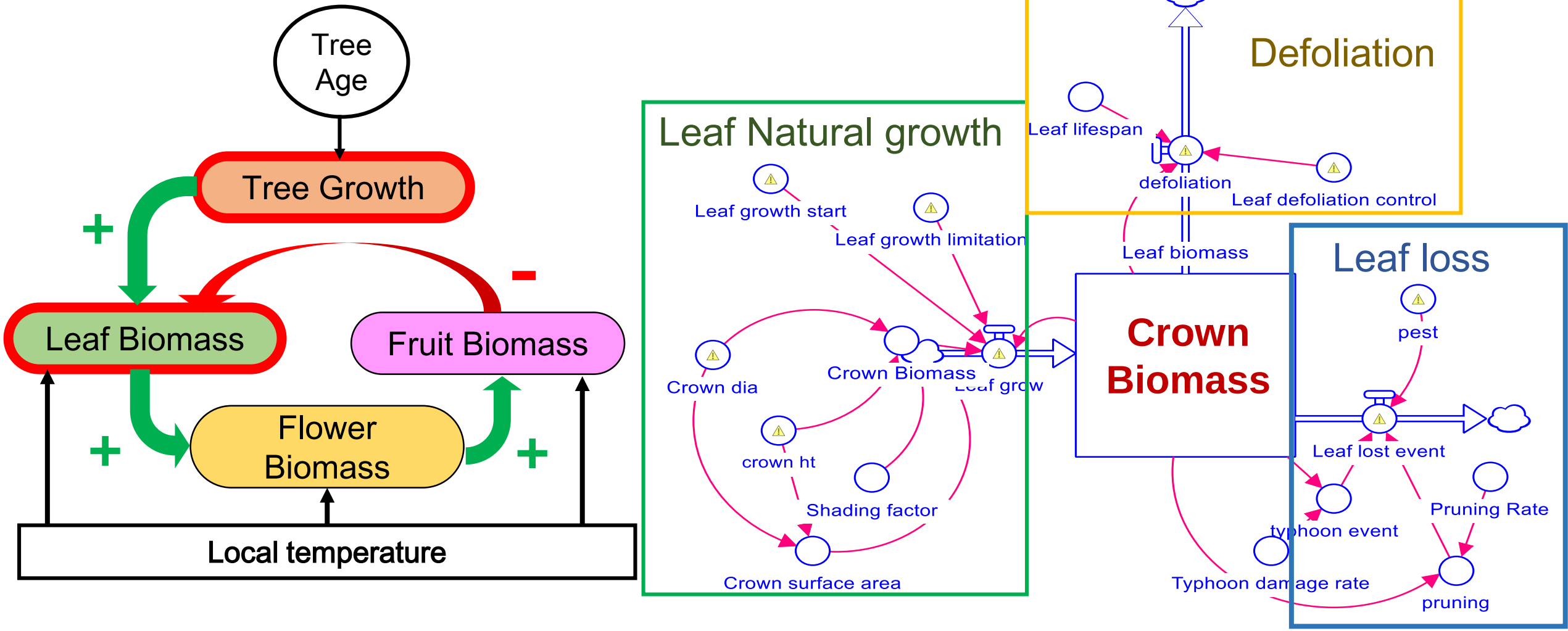
Research Area & Street Trees

Street Trees

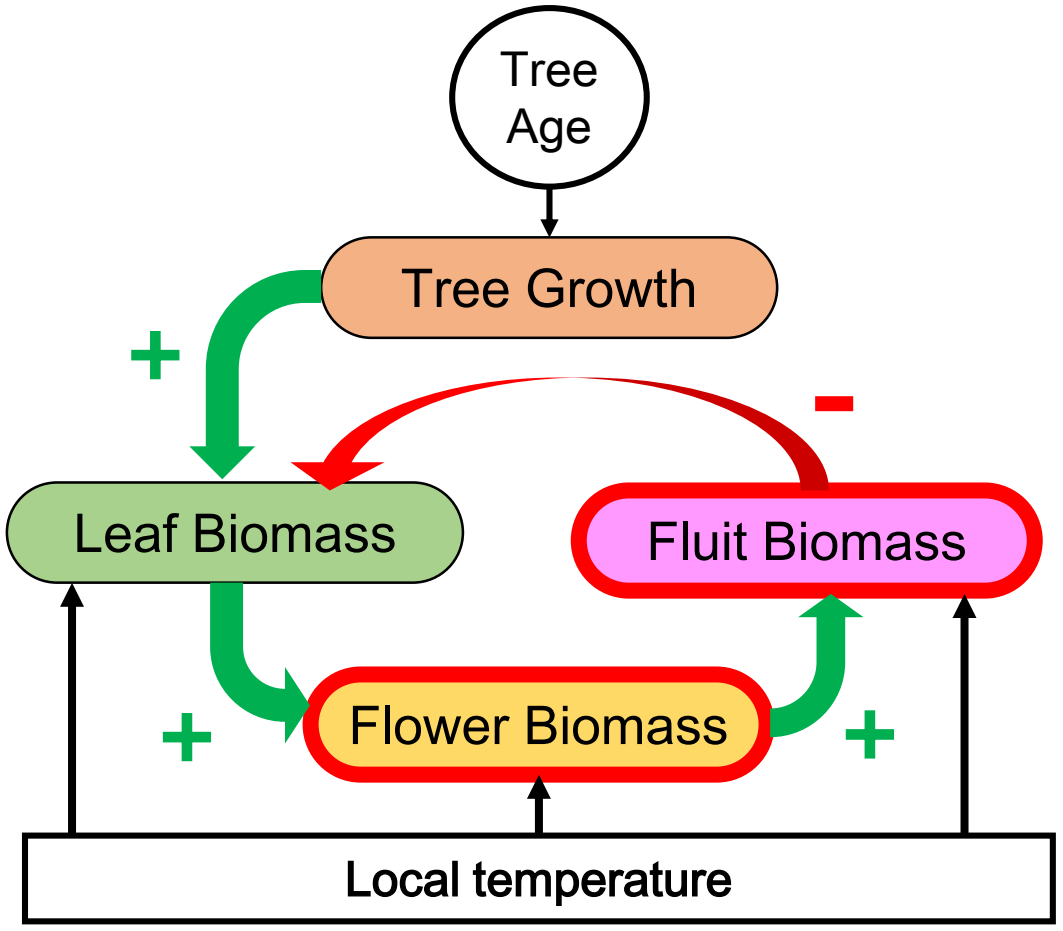


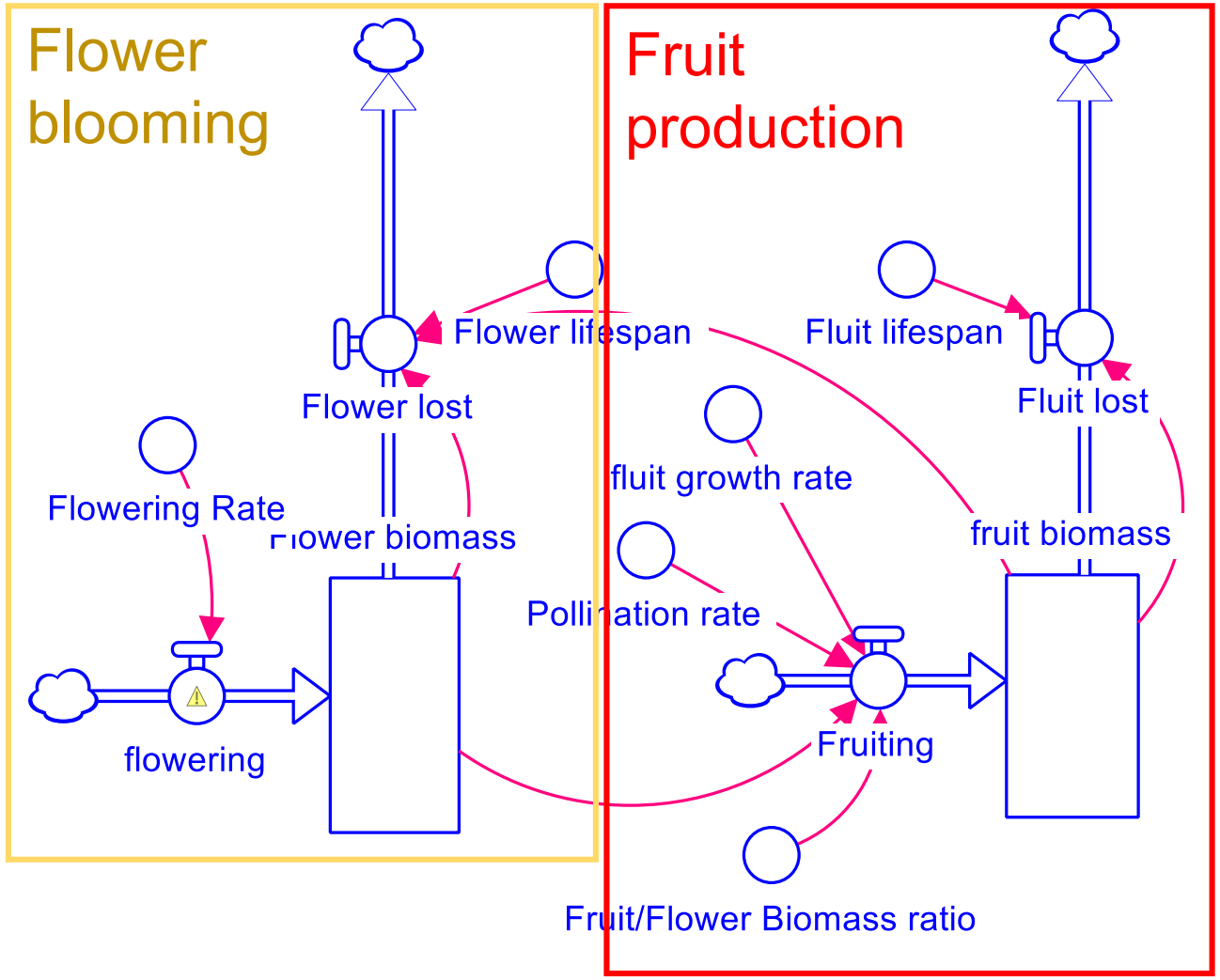
Koelreuteria henryi

Crown Biomass Model Structure

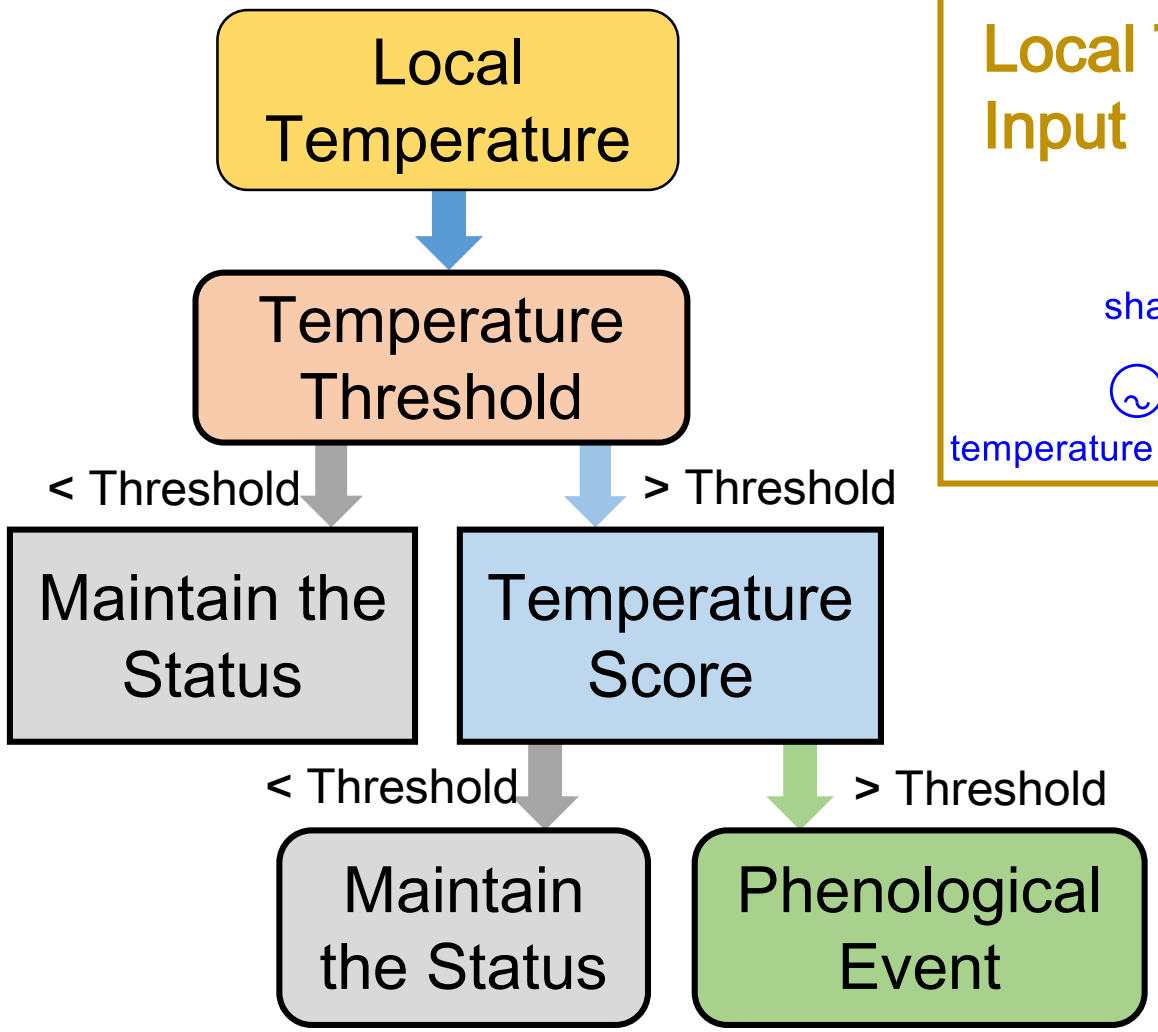


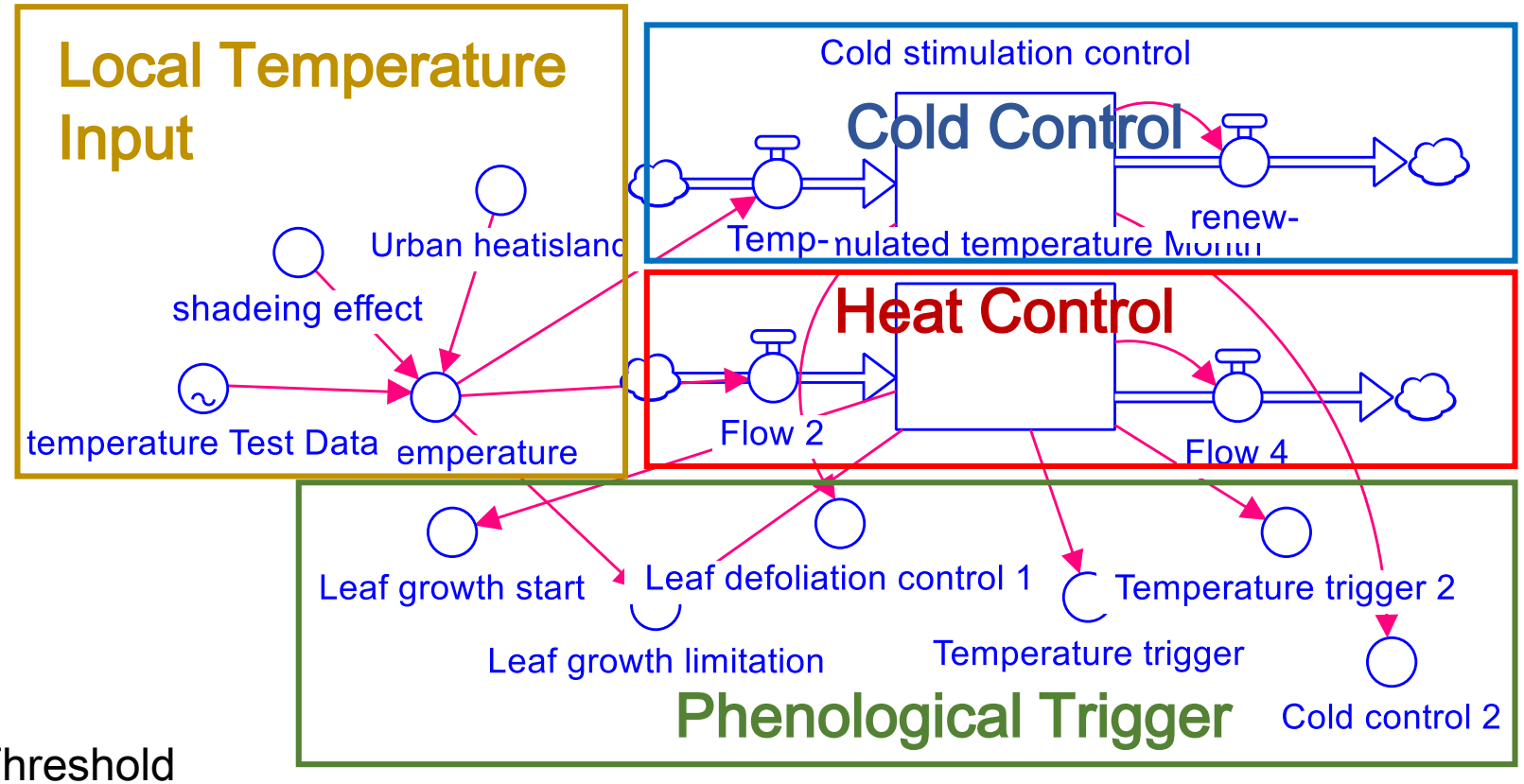
Crown Biomass Model Structure



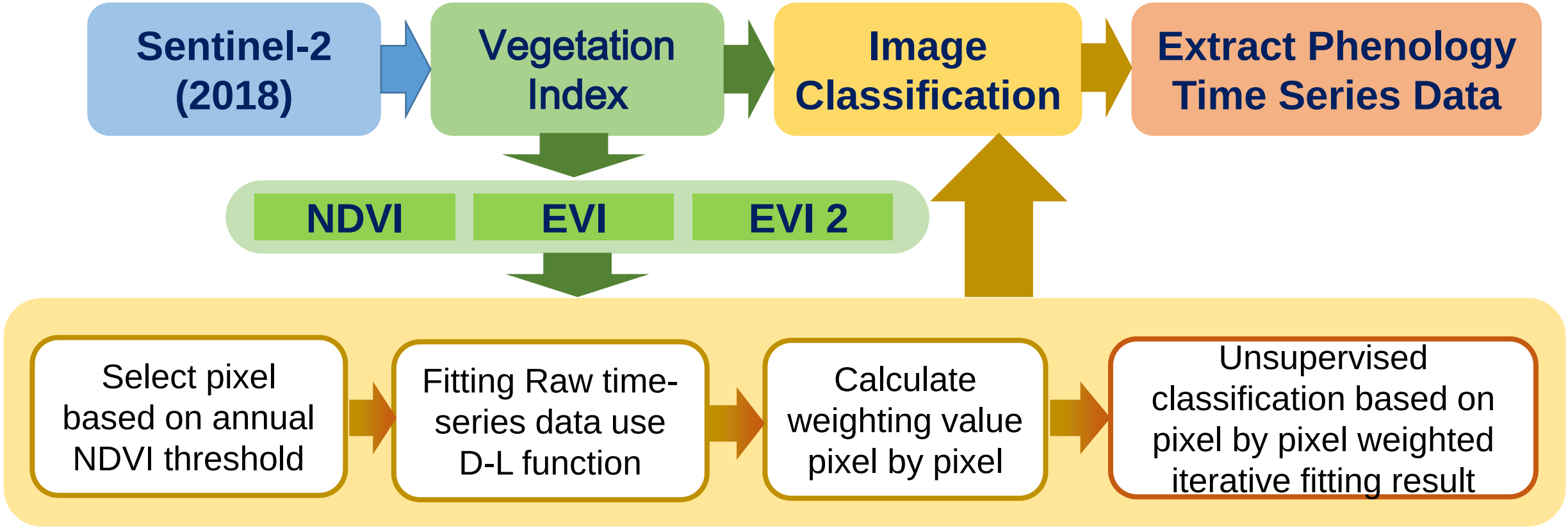


Thermal Time Control



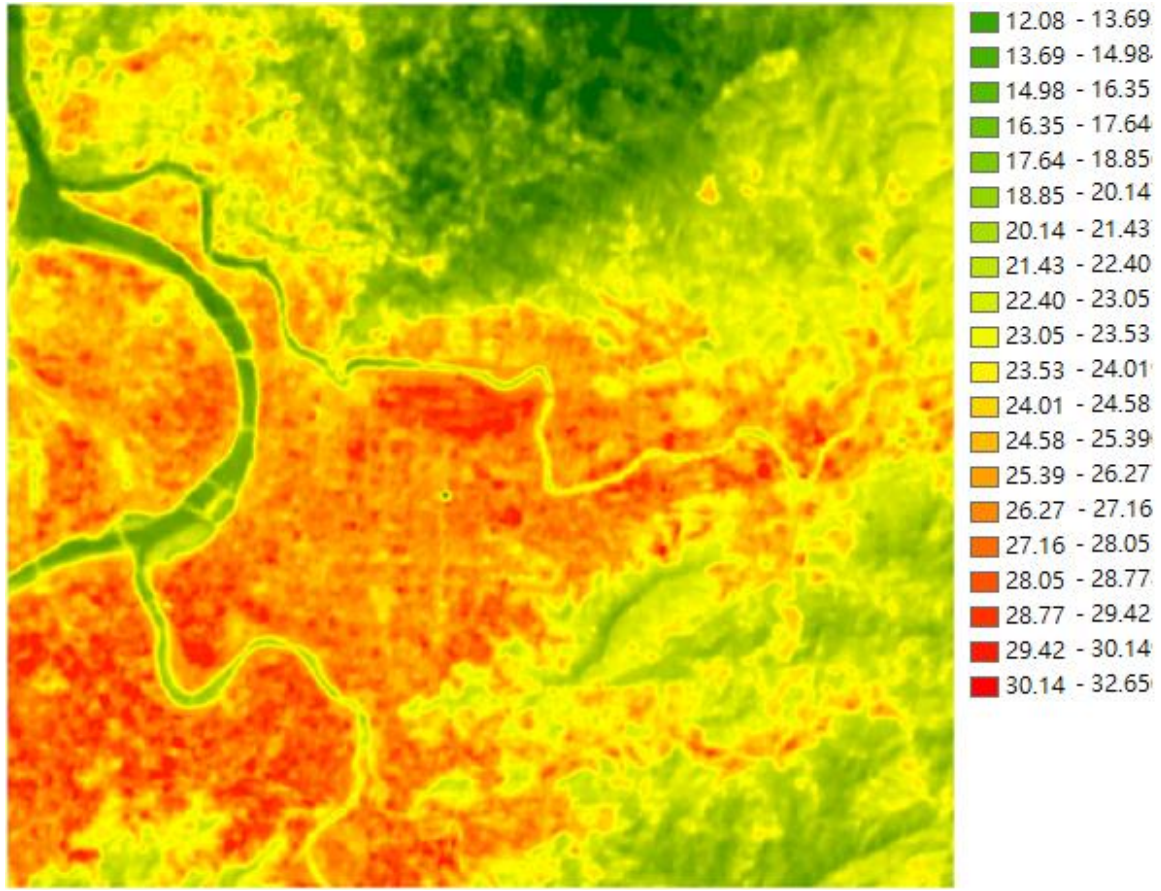


Remote Sensing Data Extract

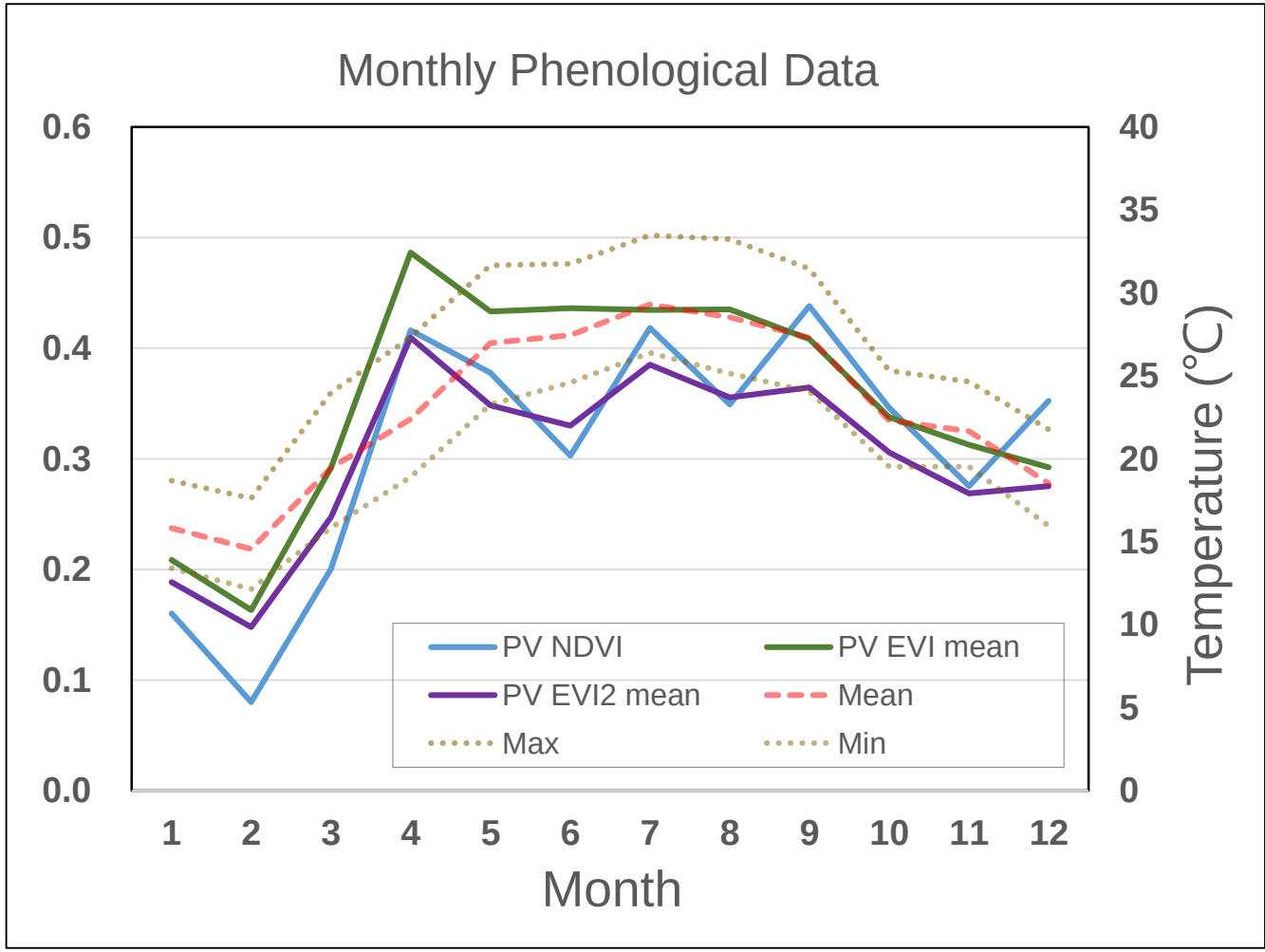


(Carlos et al., 2020)

Monthly Phenological Data

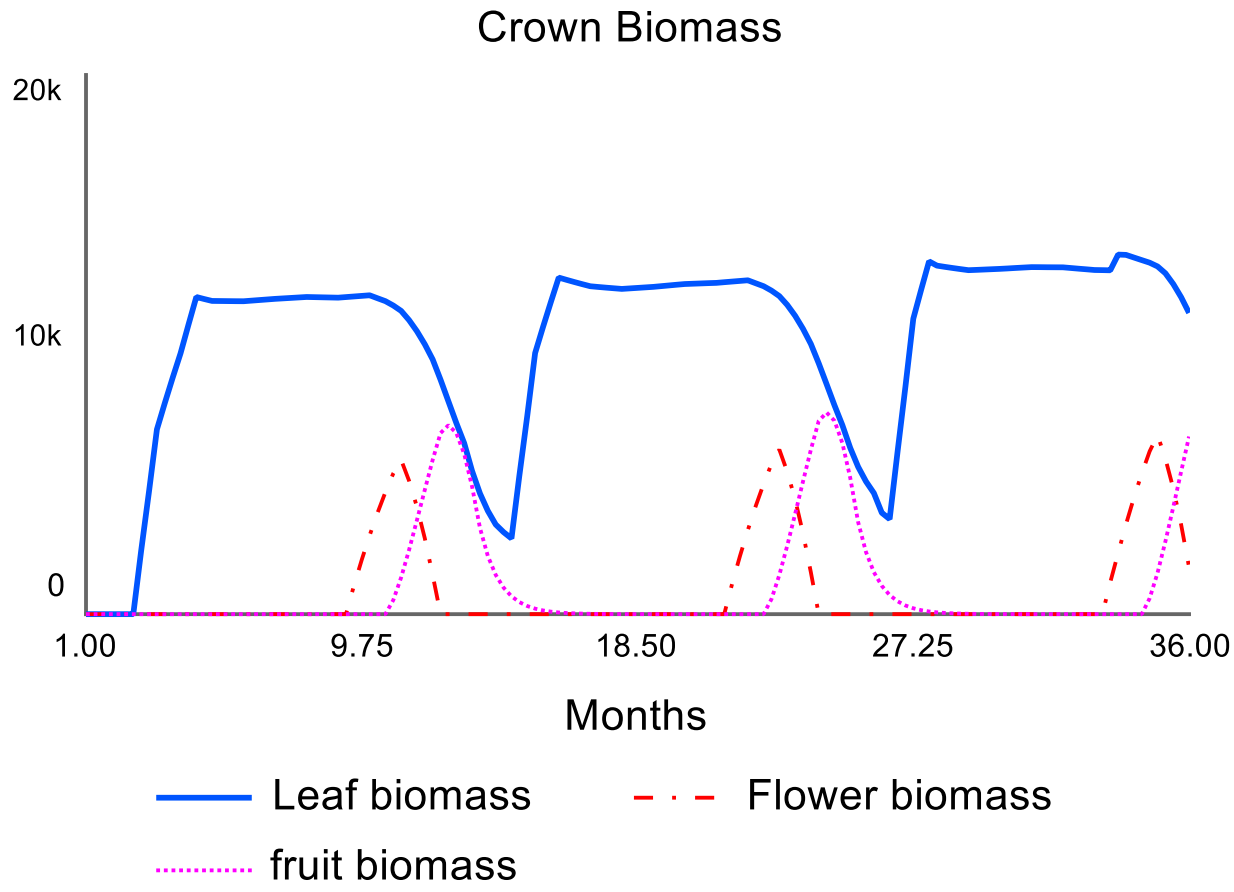


Land surface Temperature from Landsat 8



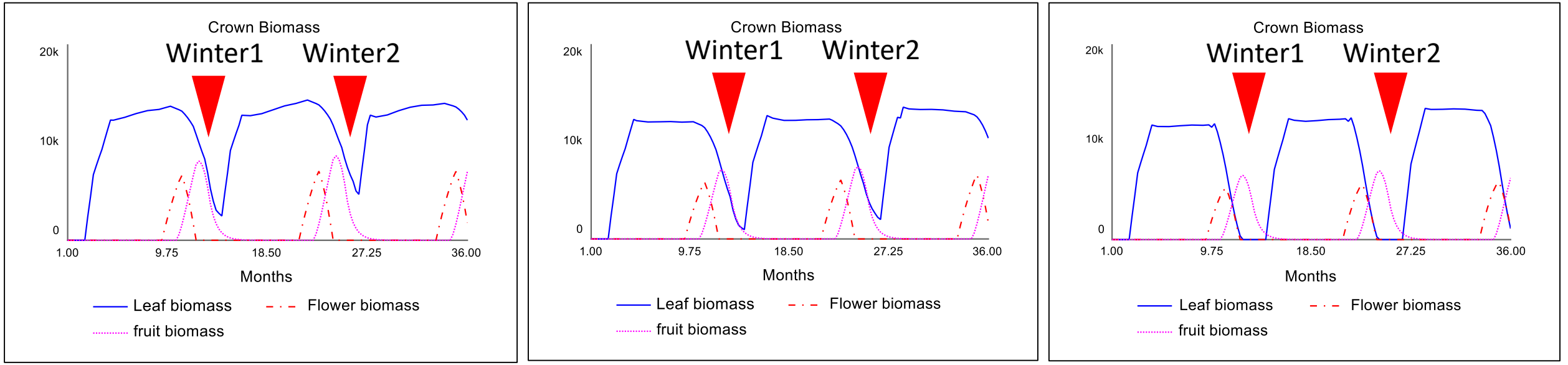
Simulation of Canopy Biomass

- A 3-Year canopy biomass simulation on *Koelreuteria henryi*.
- Canopy biomass activity is in line with seasonal temperature trends.
- Evaluate how changes in air temperature or leaf growth affect the magnitude of canopy biomass.



Effect of Temperature on Canopy Biomass

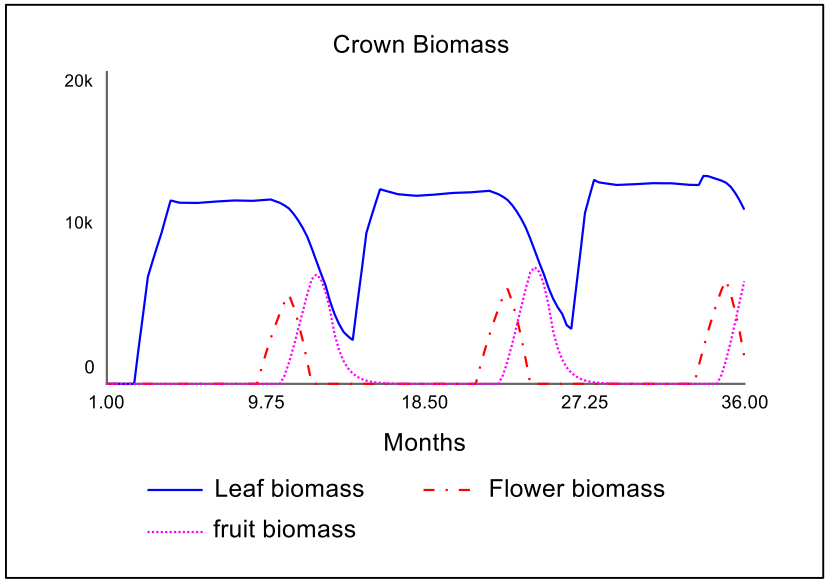
Higher Temperature → **Lower Temperature**

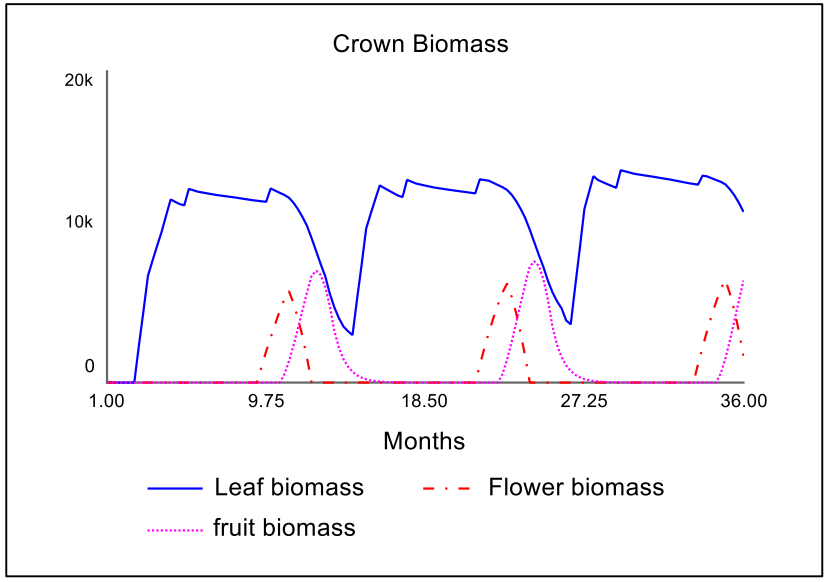


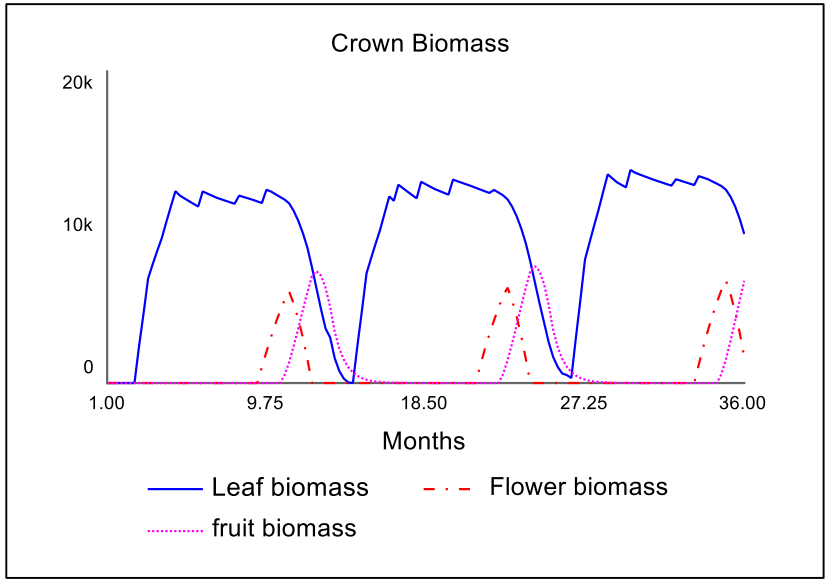
- Lower temperature → Early and faster defoliation
- Complete leaf fall from tree canopy

Effect of Leaf Growth Rate on Canopy Biomass

Higher Rate → **Lower Rate**







Different leaf growth rate or duration of leaf life cycle affects the magnitude and shape of the canopy biomass curve.

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Thanks for listening