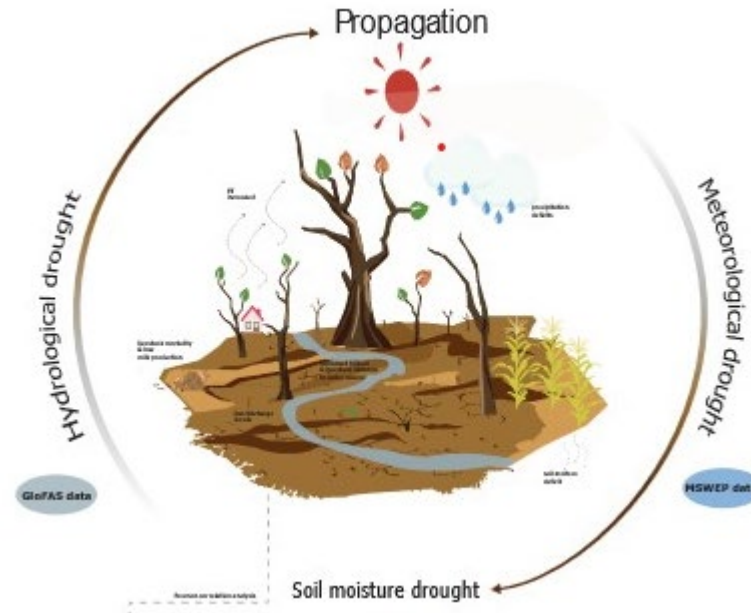


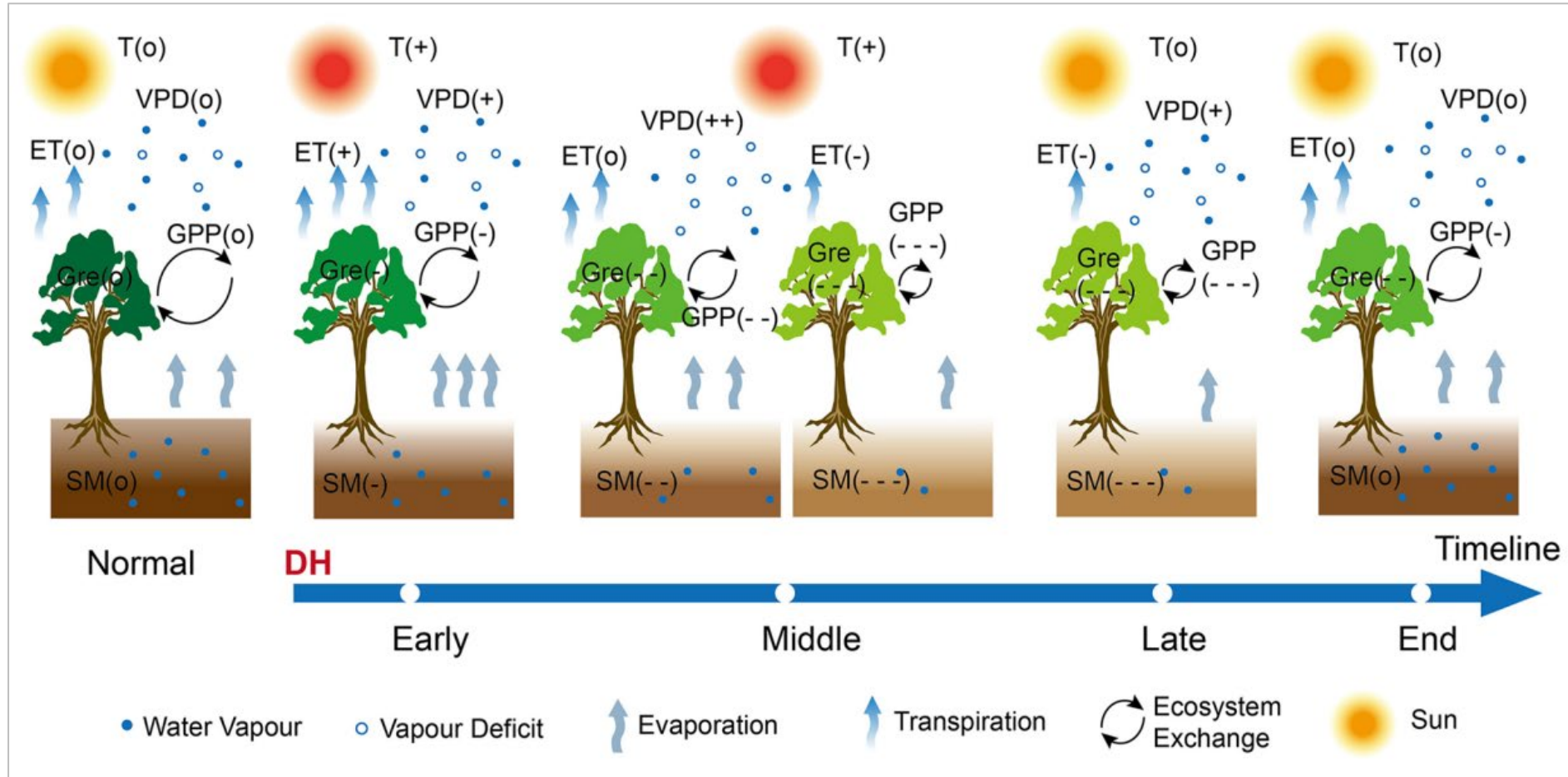
# Diurnal dynamics of carbon and water fluxes under contrasting drought regimes



**Mahum Naseer**  
PhD Student  
University of Antwerp, Belgium

**Promoters:** *Matteo Campioli, Marilyn Roland, Fran Lauriks, Ivan Janssens*

# Introduction – Drought Regimes



Symbols (0), (+), (-) denotes normal, increase and decrease

Magnitude (++) severely higher, (---) extremely lower

Source: (Dubey & Ghosh, 2023)

# Study Sites

## Site: Brasschaat

- Mixed patchy coniferous/deciduous forest
- Vegetation: Scots Pine (*Pinus sylvestris* L.)
- EC: 40 m tall tower
- Soil: Loamy sand

## Site: Maasmechelen

- Vegetation: Heather (*Calluna Vulgaris* L.)
- EC: 4 m tripod
- Soil: Dry sandy
- Only Heathland with continuous GHG measurements through EC in Europe

Forest (BE – Bra)



Heathland (BE – Maa)

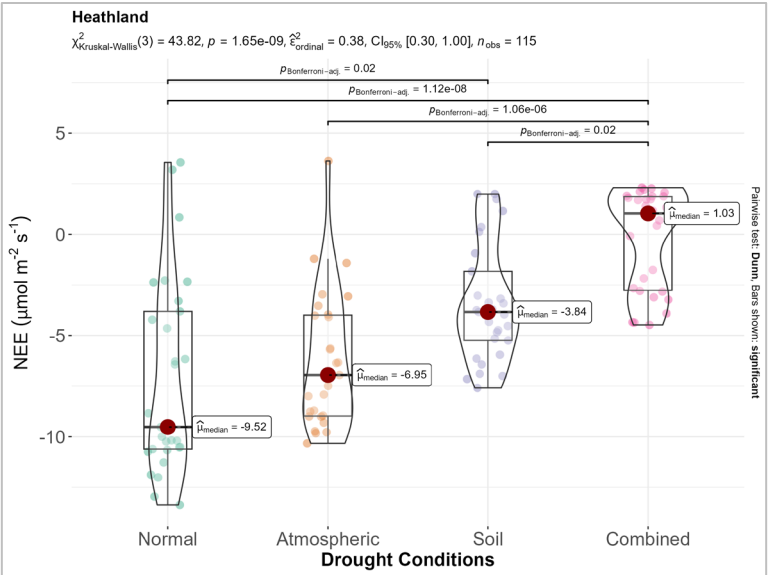
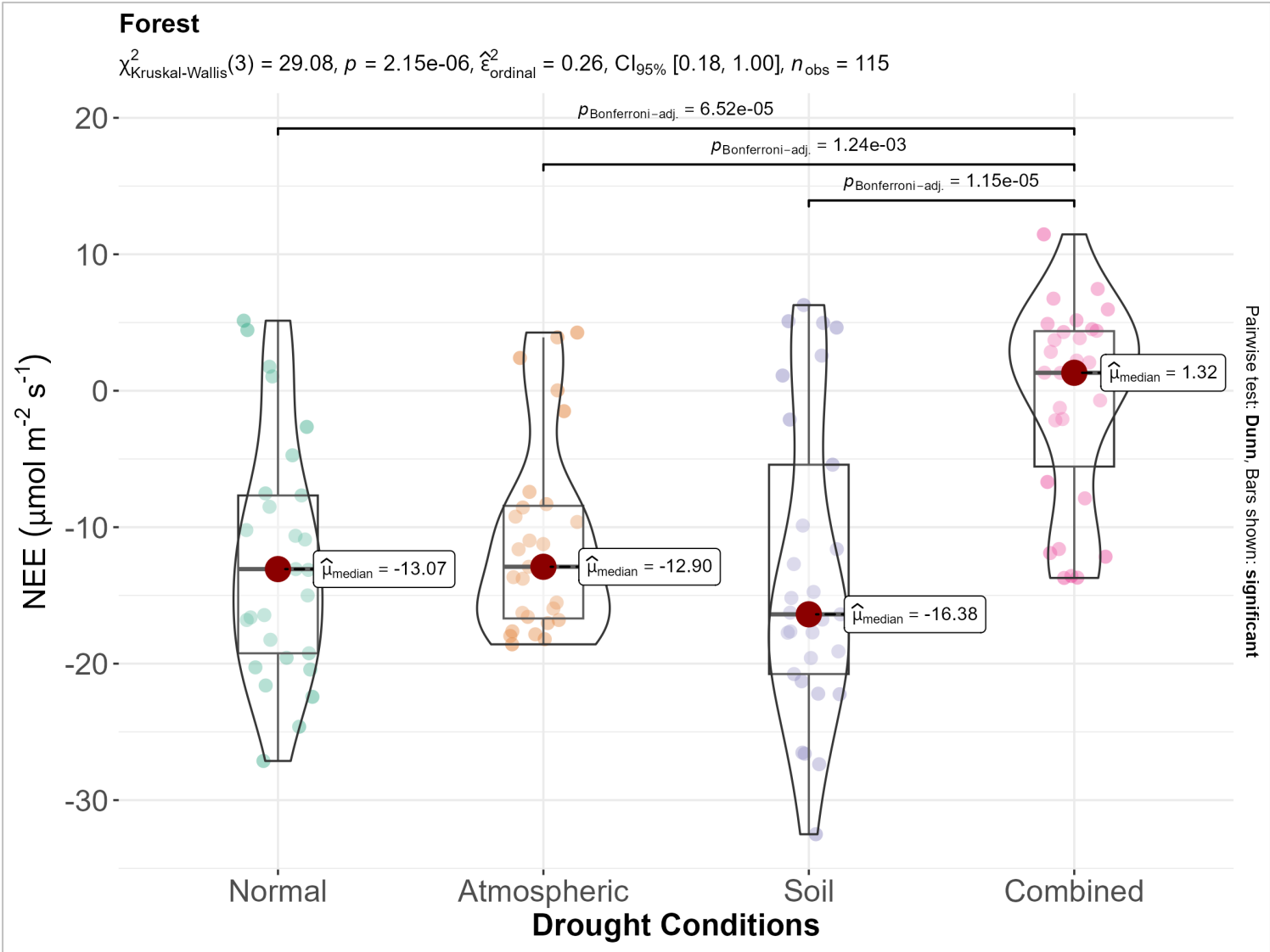


# Methodology

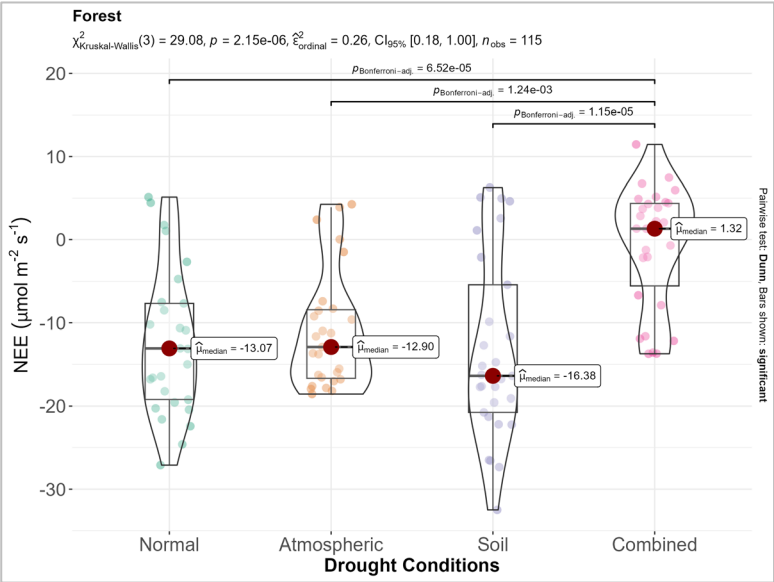
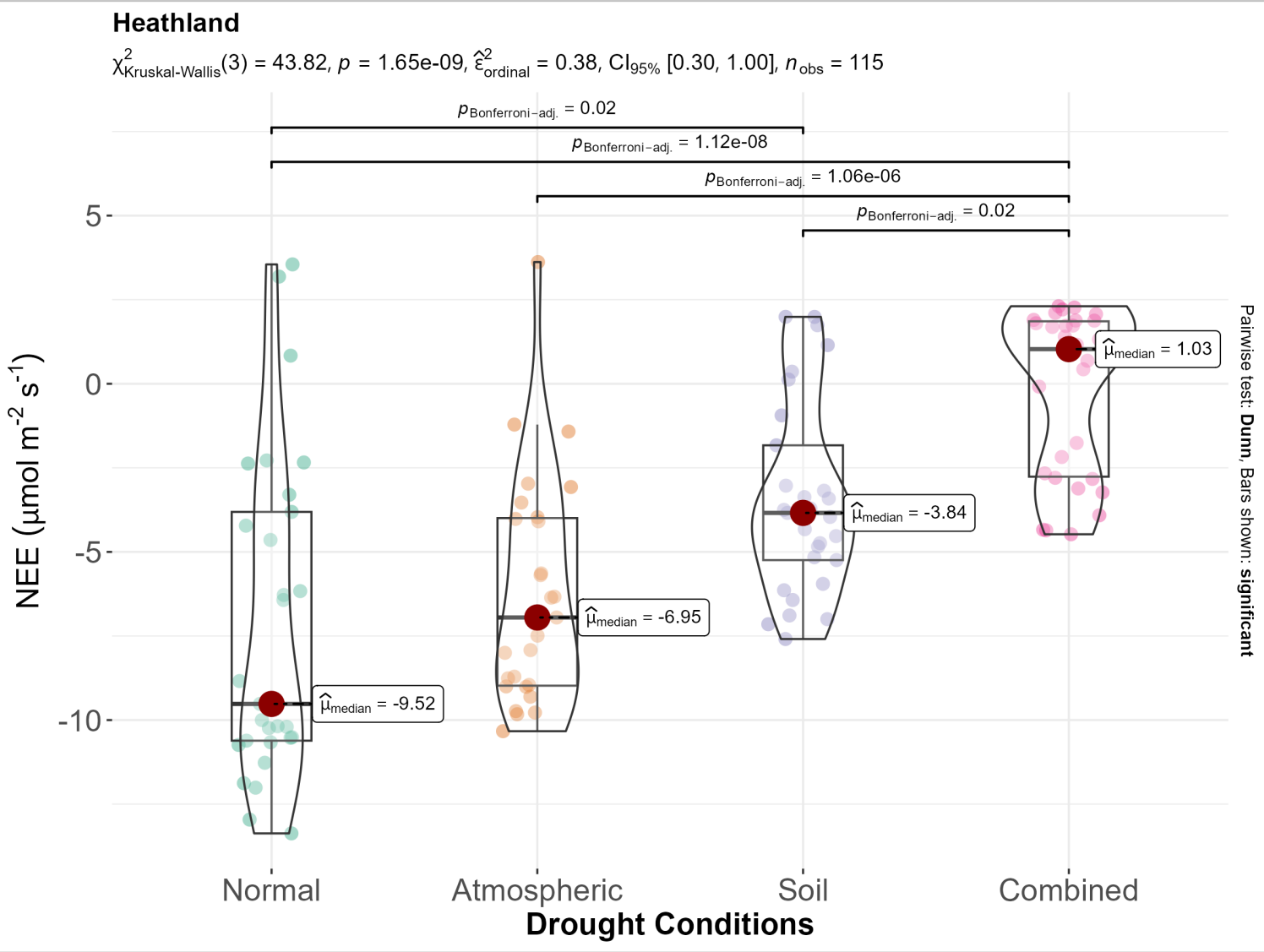
- Half-Hourly Eddy-covariance and meteorological Level 2 data (ICOS) for 4 years (2021-2024).
- Selection of days based on defined categories in each growth stage (early, mid and late
- Analyzed daily CO<sub>2</sub> and water fluxes

| Category           | Criteria                              | Description                           |
|--------------------|---------------------------------------|---------------------------------------|
| Moist and Low VPD  | $SWC > SWC_{75P}$ & $VPD < VPD_{25p}$ | No drought stress                     |
| Moist and High VPD | $VPD > VPD_{90p}$                     | Atmospheric drought                   |
| Dry and Low VPD    | $SWC < SWC_{10P}$                     | Soil drought                          |
| Dry and High VPD   | $SWC < SWC_{10P}$ & $VPD > VPD_{95p}$ | Combined atmospheric and soil drought |

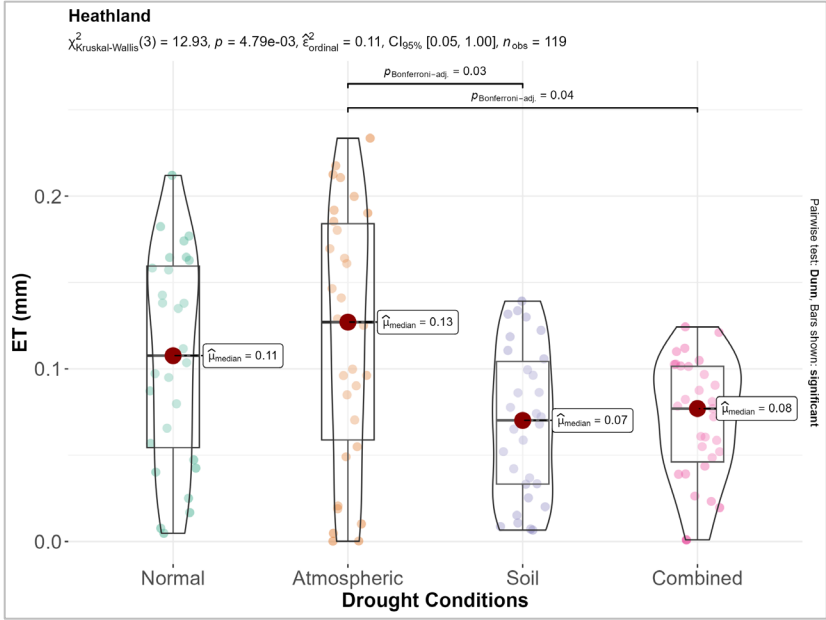
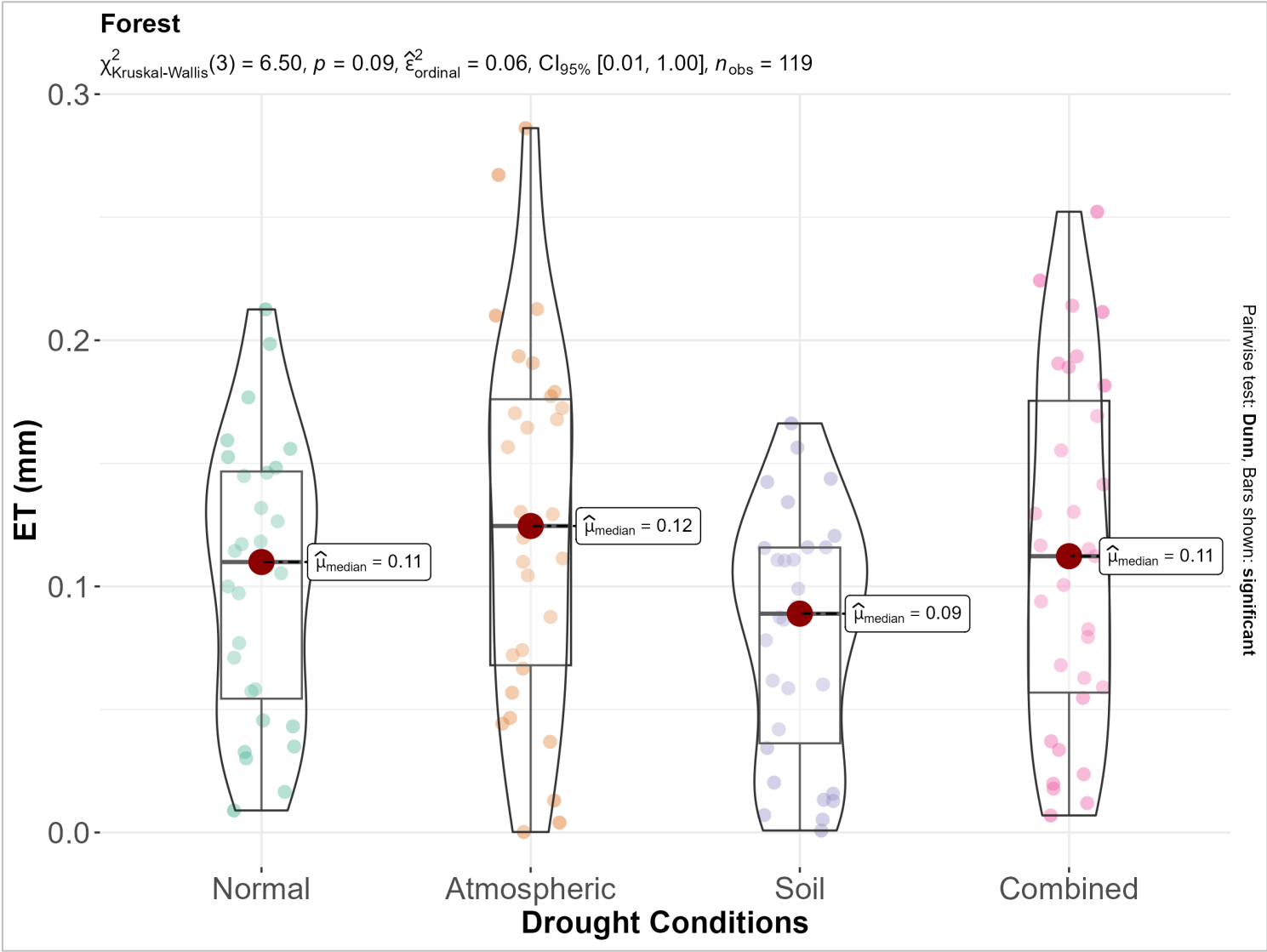
# Results – NEE (Mid-season)



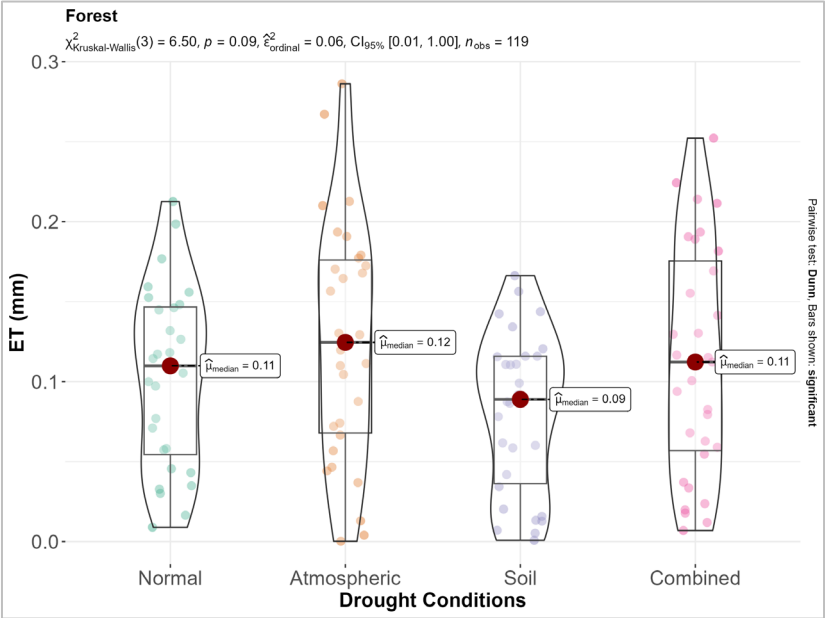
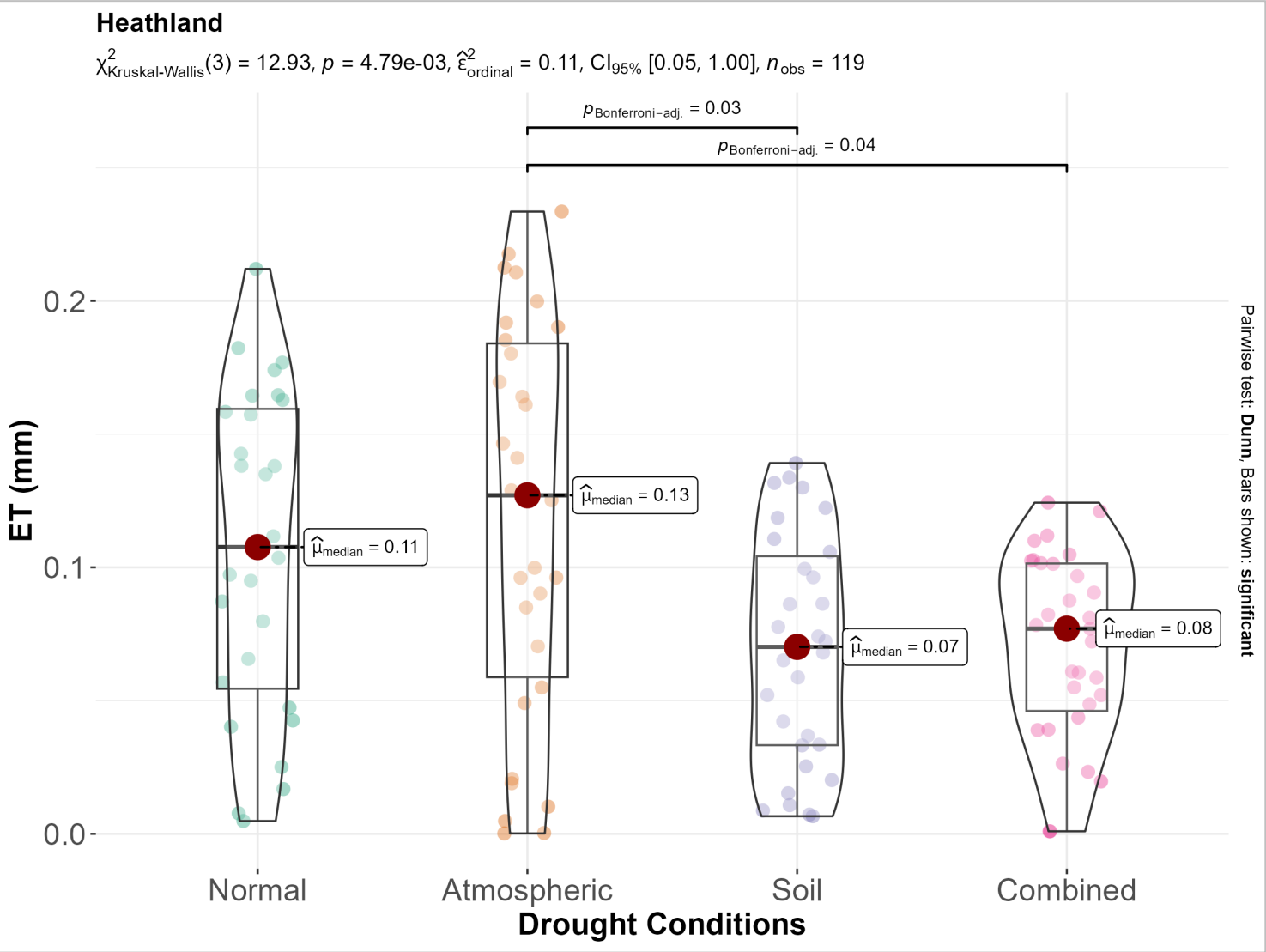
# Results – NEE (Mid-season)



# Results – ET (Mid-season)



# Results – ET (Mid-season)



# Takehome

- Forest are more significant ecosystem in climate mitigation through C sequestration
  - Drought affect CO<sub>2</sub> and water fluxes more in heathland than in forest.
  - Lower than expected difference in the daily ET between forest and heathland.
- 
- Such studies offers valuable input for crafting evidence-based policies and strategies under changing climatic conditions.

# ICOS

● ● ●  
INTEGRATED  
CARBON  
OBSERVATION  
SYSTEM

# THANK YOU

Contact: [mahum.naseer@uantwerpen.be](mailto:mahum.naseer@uantwerpen.be)