

JULES Vegetation Module Update 2024

Becky Oliver (UKCEH), Lina Mercado (Exeter University / UKCEH), Karina Williams (Met. Office)

- **Code Development: SOX in the JULES trunk**

SOX is an analytical stomatal optimization model based on xylem hydraulics. Based on the formulation of Eller et al., (2020) to link stomatal function to xylem hydraulics.

Further developments in progress.....

- **University of Exeter (Simon Jones, Lina Mercado)**

Evaluating the SUGAR non-structural carbohydrate model in JULES using tree-ring and dendroband data from the BIFOR FACE site.

- **University of Exeter (Simon Jones, Peter Cox, Freek Engel)**

Work developing a new drought mortality model in JULES based on xylem hydraulics. They have been using data from the Caxiuana drought experiment to do this – presentation later today.

- **University of Exeter (Sebastian Gonzales-Caro, Lina Mercado)**

Developing plant trait parameters for tropical montane and lowland forests in the Andes.



JULES Vegetation Module Update 2024

- **University of Exeter (Goncalves De Souza, Lina Mercado)**

Working on a regional application of the JULES CNP model for the Amazon. JULES-CNP introduces phosphorous dynamics into JULES and its interaction with the nitrogen and carbon cycles.

- **UKCEH, University of Exeter, Met. Office (Phil Harris, Becky Oliver, Lina Mercado, Doug Clark, Eddy Robertson)**

Working on temperature acclimation of photosynthetic capacity using a newer scheme from Kumarathunge et al., (2019). Offline JULES application assessing impact of temperature acclimation on carbon fluxes under a future climate scenario. Phil assessing impact of temperature acclimation on carbon stores and vegetation dynamics AND implementing into UKESM.

- **James Cook University, University of Exeter, UKCEH, Met. Office (Alex Cheesman, Flossie Brown, Stephen Sitch, Becky Oliver, Lina Mercado, Gerd Folberth,.....)**

This study measured the ozone susceptibility of different tropical tree species to understand how tropical tree productivity is affected by ozone damage. Data used to develop new ozone damage parameters in JULES specifically for tropical trees, then JULES was used to assess the impact of ozone damage on NPP across tropical forests – paper out soon in Nature Geoscience.

JULES Vegetation Module Update 2024

- **Met. Office, UKCEH (Garry Hayman, Becky Oliver, Fiona O'Connor, Gerd Folberth, Paul Griffiths.....)**

Methane Pledge study led by Met. Office to investigate the impact of different CH₄ emission reduction scenarios on climate (radiative forcing), atmospheric composition, human health and vegetation productivity. Runs undertaken with UKESM1.0 with interactive CH₄ emissions. Evaluated the impact of ozone changes on vegetation productivity using JULES-ES configuration driven with meteorological parameters and surface O₃ fields from the corresponding UKESM runs. To do this we developed a new set of vegetation ozone damage parameters for JULES. See presentation by Garry on Thursday.

- **China University of Geosciences, UKCEH (Xuan Gui, Chris Huntingford)**

Working on the impact of light acclimation of photosynthesis on the global carbon cycle using the JULES-ES-ISIMP suite on JASMIN.

- **UKCEH (Becky Oliver)**

Developing PFT parameterisations for natural and plantation Kenyan tree species to look at the impact of different tree planting scenarios on the trade-off between carbon sequestration and water availability. Planned.

