EMAC

- Atmospheric circulation
- **Biogenic volatile organic compound emissions** (ONEMIS & MEGAN) Empirically based *Guenther et al. (1993, 1995)*
- Atmospheric chemistry
- Ocean circulation
- Ocean biogeochemistry
- Dynamic sea ice

Soil properties
(initialisation only)

Climate state
temperature, precipitation, net shortwave radiation

Chemical concentration and fluxes
atmospheric CO2 concentration, N deposition

Vegetation states and fluxes
NPP, LAI, height, cover fractions (Forrest et al., 2020)
Foliar density, LAD distribution (This work)

Additional climate variables (for fire modelling)
e.g. humidity, wind speed, max/min temperature

Hydrological state and fluxes
e.g. soil water content, evapotranspiration

Land use
land cover class fractions, transitions

Trace gases
e.g. Ozone, dust

Trace gases
e.g. biogenic volatile, fire or methane emissions

LPJ-GUESS

- Photosynthesis (with N limitation) and respiration
- Allocation and growth
- Vegetation dynamics
- Soil hydrology
- Litter soil C and N dynamics
- **Biogenic volatile compound emissions** Process based *Niinemets et al. (1999, 2002)*
- Human land use and cover change
- *Alternative fire models*
- *Methane emission and permafrost*

Legend

Model exchange

Exchange implemented in Forrest et al. (2020)

Exchange implemented and evaluated in this study

Not yet implemented (future work)

Model processes

Process present in models and used in this study

Process present in models but not used in this study

Process to be added (planned future work)

Process evaluated in this study