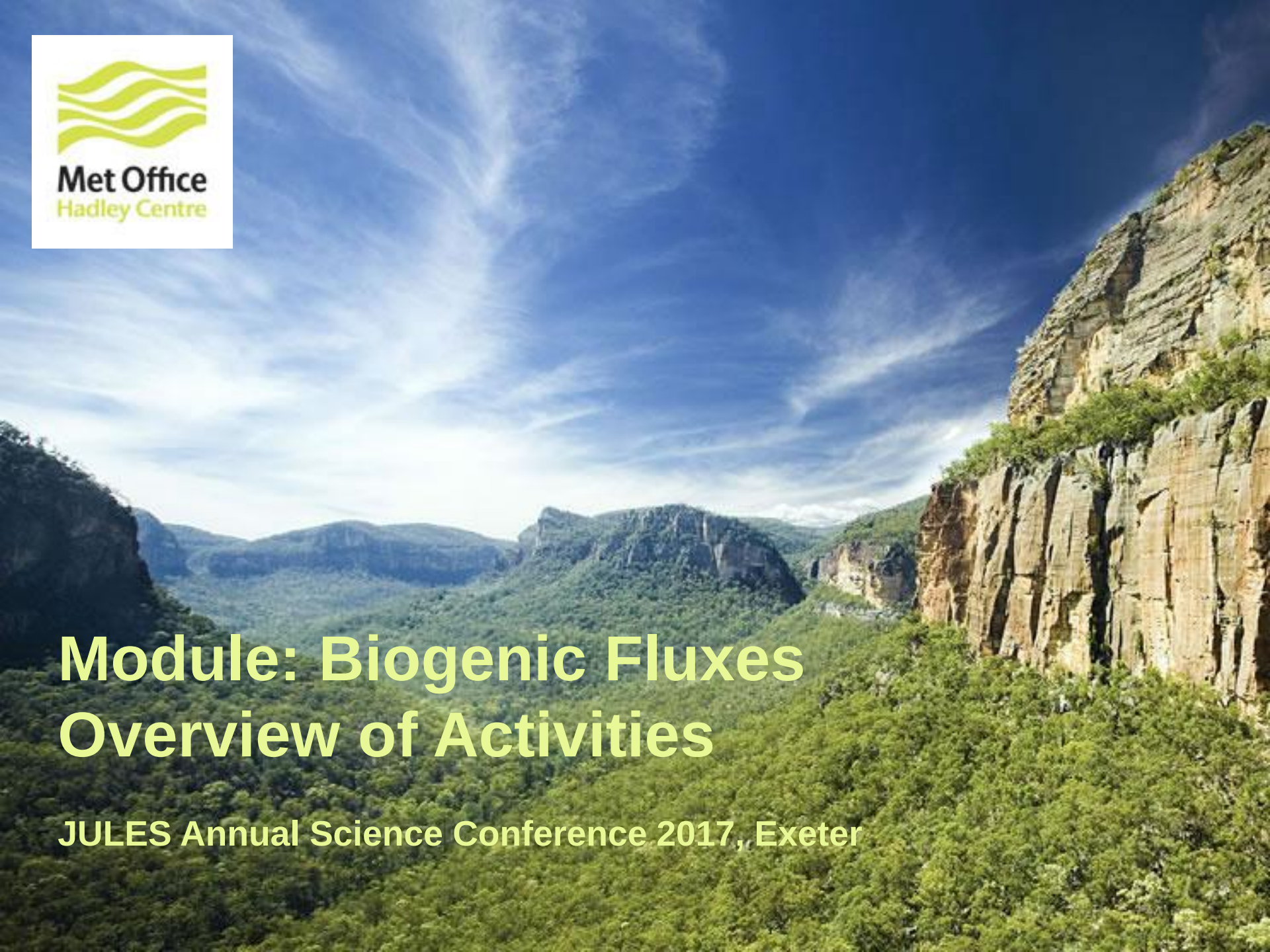

Module: Biogenic Fluxes Overview of Activities

JULES Annual Science Conference 2017, Exeter

Module Coordinated By

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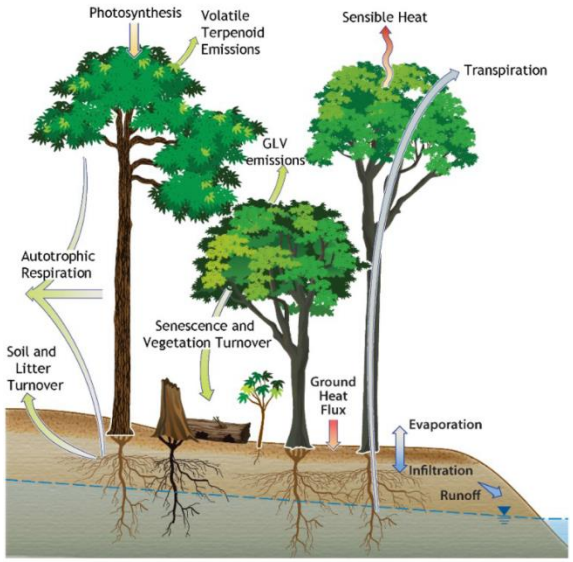
https://code.metoffice.gov.uk/trac/jules/wiki/Governance

Biogenic Fluxes in JULES



Considered in this module (so far):

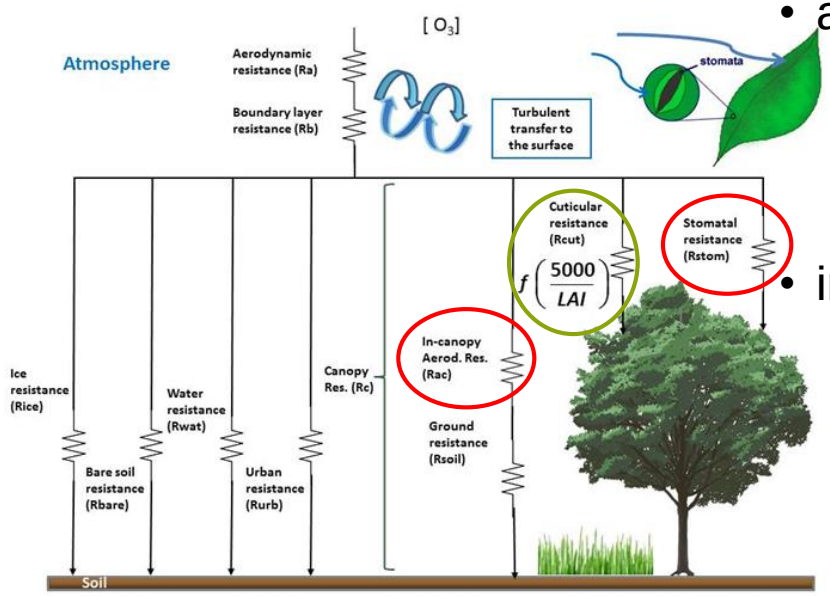
1. Emissions of chemical species from the vegetation
2. Deposition of chemical species to the vegetation
3. Indirect effects impacting on 1. and 2.
   - ozone impacts on ecosystem functioning
   - nitrogen fertilization via N-deposition from atmosphere

Not considered in this module (yet):

1. Biophysical fluxes
2. Carbon fluxes
3. Wetland emissions (**Hydrology Module**)
4. Permafrost emissions (**Biogeochemistry Module**)

Dry Deposition – Activities

Note: Dry Deposition currently **NOT** part of **JULES** but processed in **UKCA**

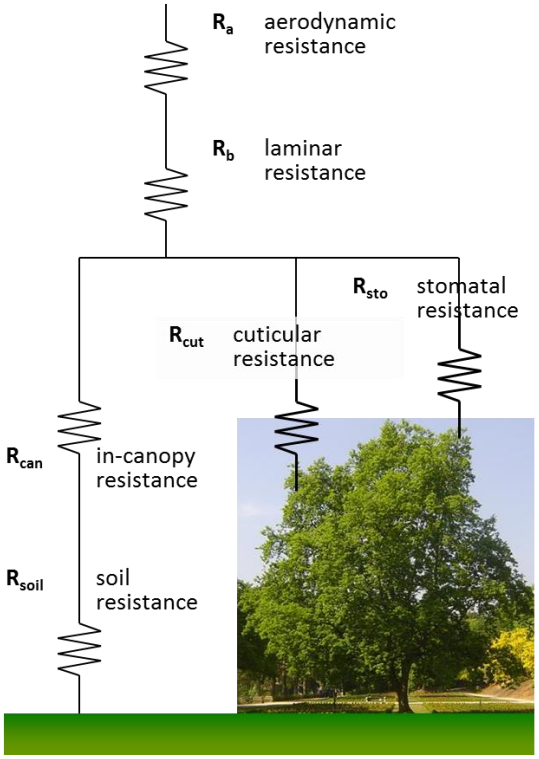


- much work being done by **Federico Centoni** (University of Edinburgh)
  - address existing inconsistencies
    - missing in-canopy aerodynamic resistance term (R_{ca})
    - disentangle stomatal from soil resistance term
  - include important missing terms
    - cuticular resistance (R_{cut}) as part of non-stomatal in-canopy deposition fluxes

- **Catherine Hardacre** (University of Lancaster)
  - Evaluation of O_3-dry deposition in global CTMs and GCMs

Hardacre et al., ACP, 15, 6419-6436, 2015.

Dry Deposition Working Group



- Community Consultation May-September 2016
  - overall good uptake from community using and developing around dry deposition
    - atmospheric composition, Earth system modelling
- Community Workshop, London, March 2017
  - reach-out to oceanic and cryosphere communities
  - position paper on future direction in preparation
- Subgroup to consider future ESM developments:
  - G. Hayman (Leader), E. Nemitz (CEH)
  - O. Wild (U. Lancaster)
  - J. Mulcahy, F. O'Connor, A. Hewitt, A Wilshire, G. Folberth (Met Office)
  - L. Emberson (SEI, York)
  - D. Stevenson (U. Edinburgh)
  - N. L. Abraham (U. Cambridge)

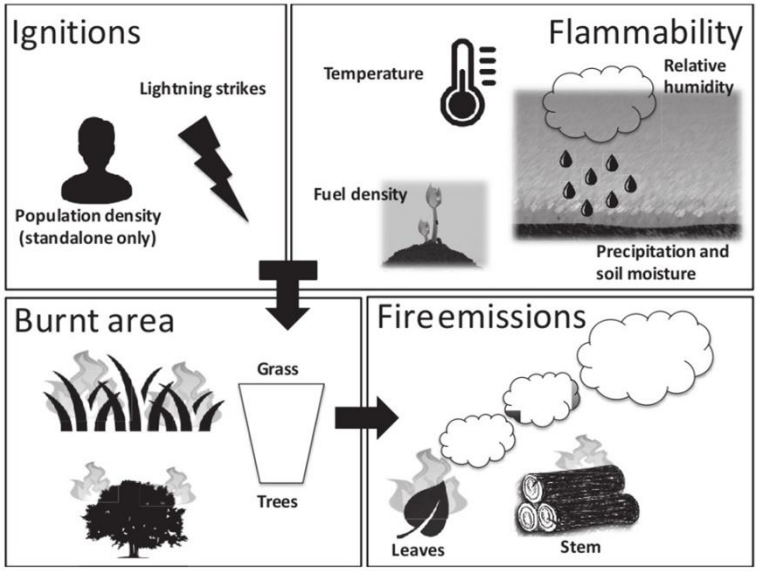
(*) ACITES = Atmospheric Chemistry in the Earth System

https://www.ncas.ac.uk/index.php/en/acites-news

Emissions from Natural Fires

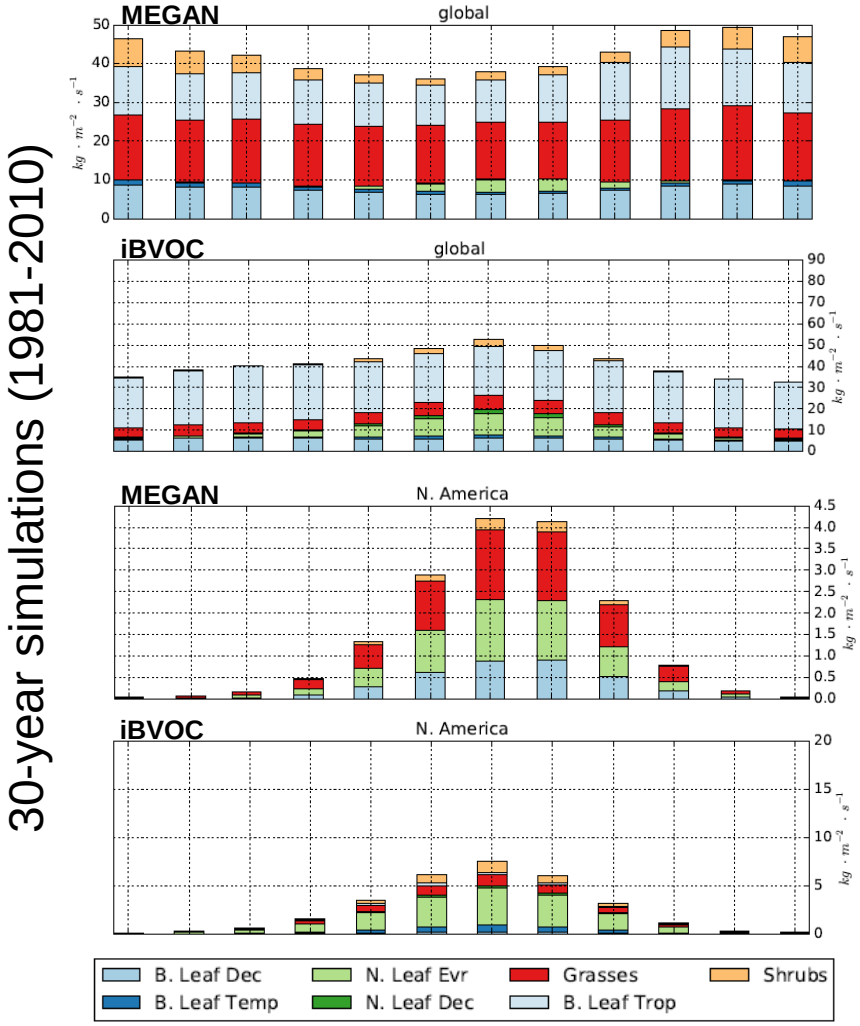
INteractive **F**ire and **E**missions algo**R**ithm for **N**atural envir**O**nments - INFERNO

- **Simple** - **Efficient** - **Effective**
- based on fire count parameterization (Pechony and Shindell, 2009)
- small number of state variables used
  - air temperature, relative humidity
  - precipitation, upper layer soil moisture
  - fuel density (leaf/stem carbon, DPM)
- diagnoses fire count, burnt area, emitted carbon & derived species emissions
  - NO_x, CO, CO_2, CH_4, SO_2, OC, BC
- coupling to vegetation (**Chantelle Burton**, see her talk tomorrow) and atmospheric composition (ongoing)



Mangeon et al., GMD, 9, m2685-2700, 2016

iBVOC Evaluation



Wider effort that is also feeding into CRESCENDO:

- new diagnostic tools
  - per-PFT analysis
  - regional analysis
- extensive statistical basis
- international multi-model comparisons
- comparison to observations
  - single site comparisons
  - satellite observations
- more on model performance in presentation by **Garry Hayman** tomorrow.