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Preliminary findings from RSF 06 372

N_2O form Irish agricultural grasslands: current emissions and future trends

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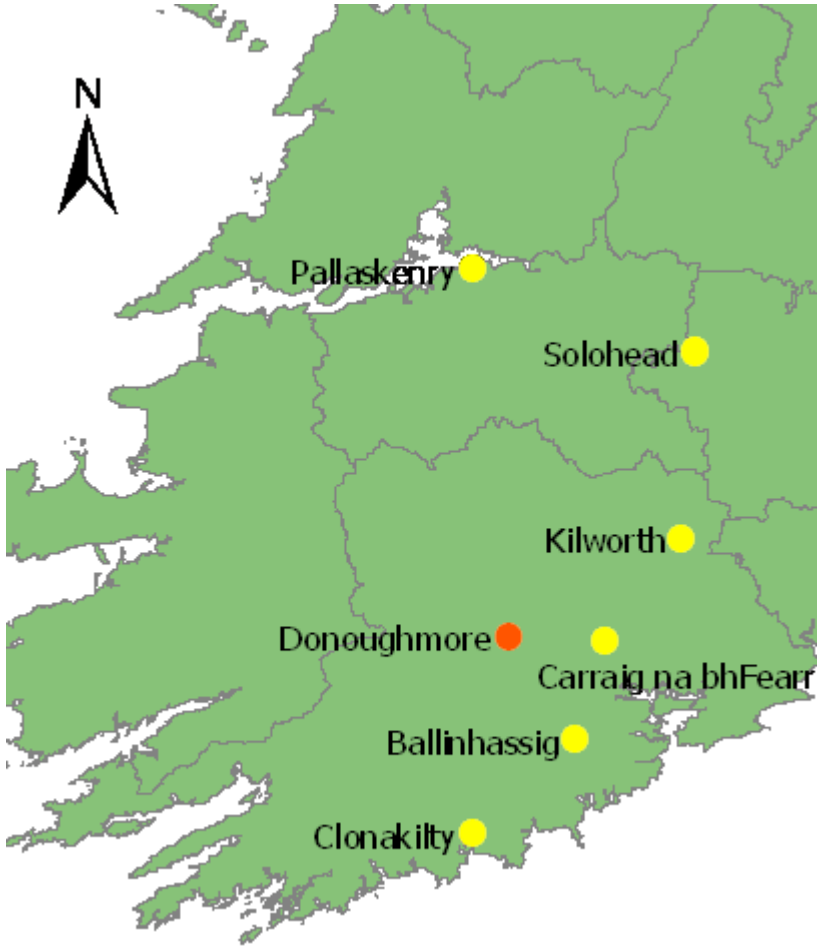
24th June 2009, Celbridge Co. Kildare

Tasks (work packages)

- Data collections
  - One main and 7 satellite sites across Munster
- Data analysis
- Method comparison
  - Closed chambers vs. eddy covariance (at 1 site)
- Emission modelling
- Emission upscalling
  - To the national level
- Scenario modelling
  - 2020-2060 projection

Field sites: Locations and soils



Site name	Soil type
Donoughmore	Gley
Ballinhassig	Grey brown podzolic
Carraig na bhFear	Brown podzolic
Clonakilty	Brown podzolic
Kilworth	Brown earth
Pallaskenry	Grey brown podzolic
Solohead	Gley

Methods: Eddy covariance

Donoughmore, Co. Cork

- Micrometeorological tower with a 3D sonic anemometer
- Trace gas analyser
- Various ground met equipment: soil temperature and moisture probes, rain gauges, etc.

17th April 2007 – 16th April 2009

Methods: Closed chambers

Satellite sites

- PVC custom-made chambers
- One hour incubation
- Gas chromatograph
- Weekly visits (monthly in winter)
- Simple met station

  August 2007 – present

Methods: Comparison

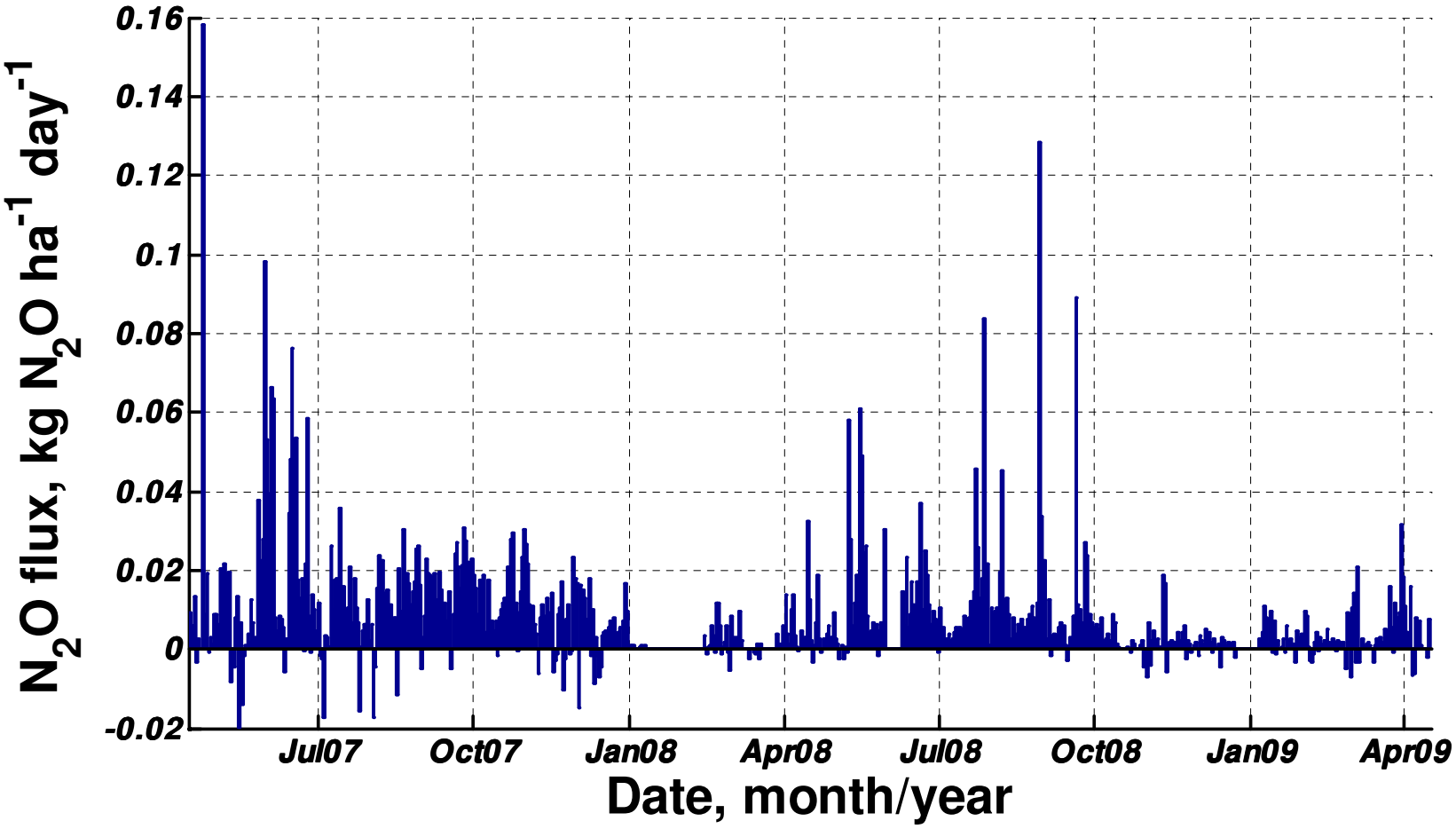
Eddy covariance

- Field/farm scale
- Continuous measurements (night and day)
- Single site
- High setup costs

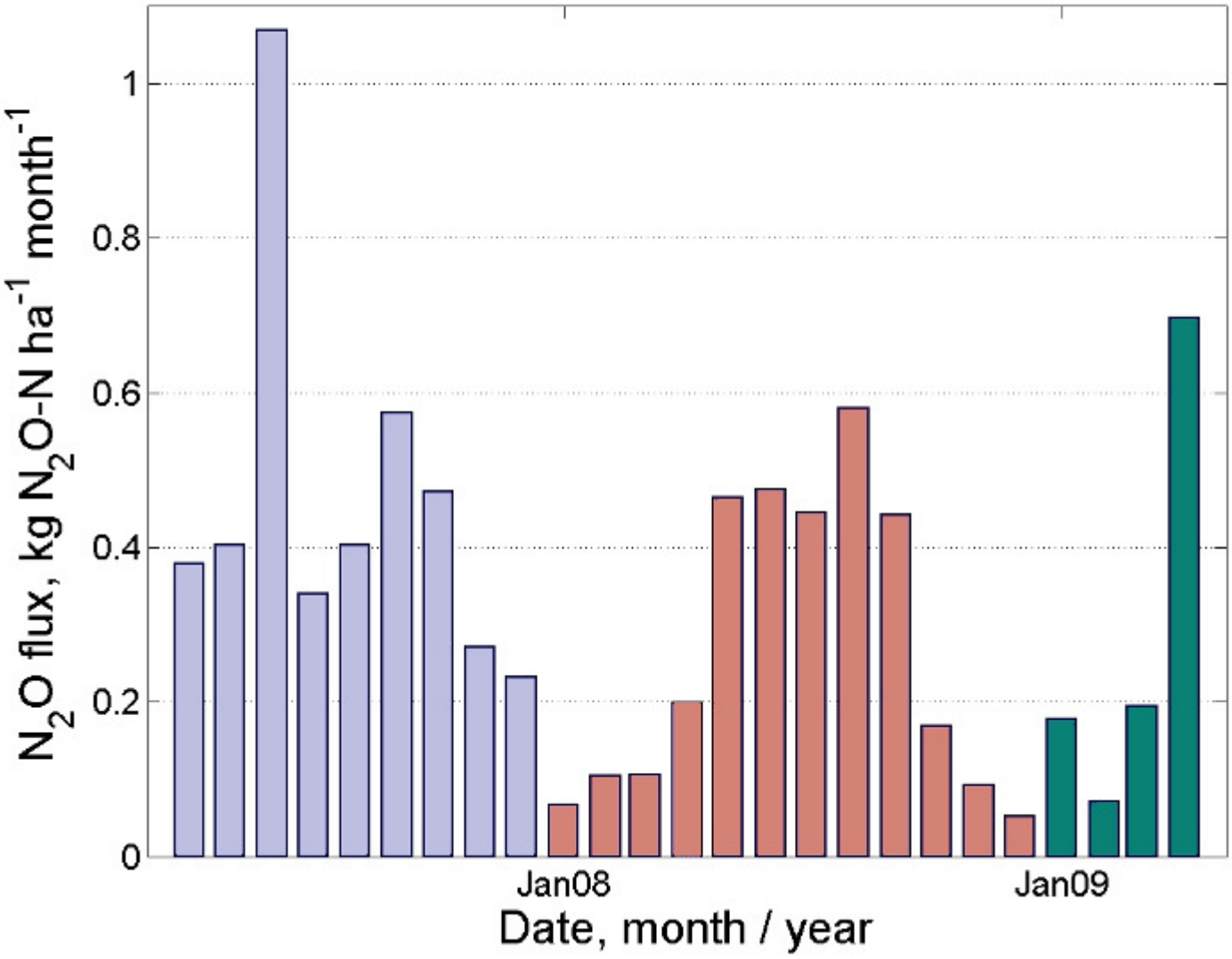
Closed chambers

- Soil profile scale (~ 1m)
- Low frequency of measurements (day-time)
- Multiple sites
- High cost of data collection

Results: Eddy covariance (daily)

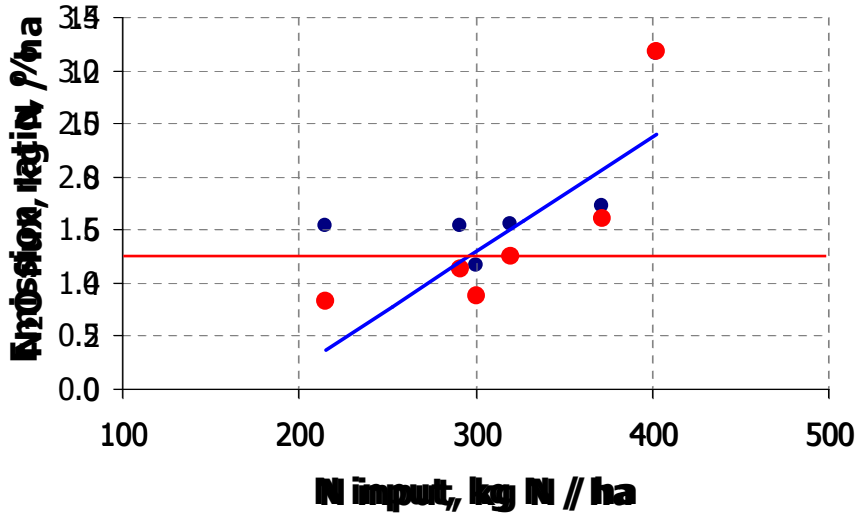


Results: Eddy covariance (monthly)

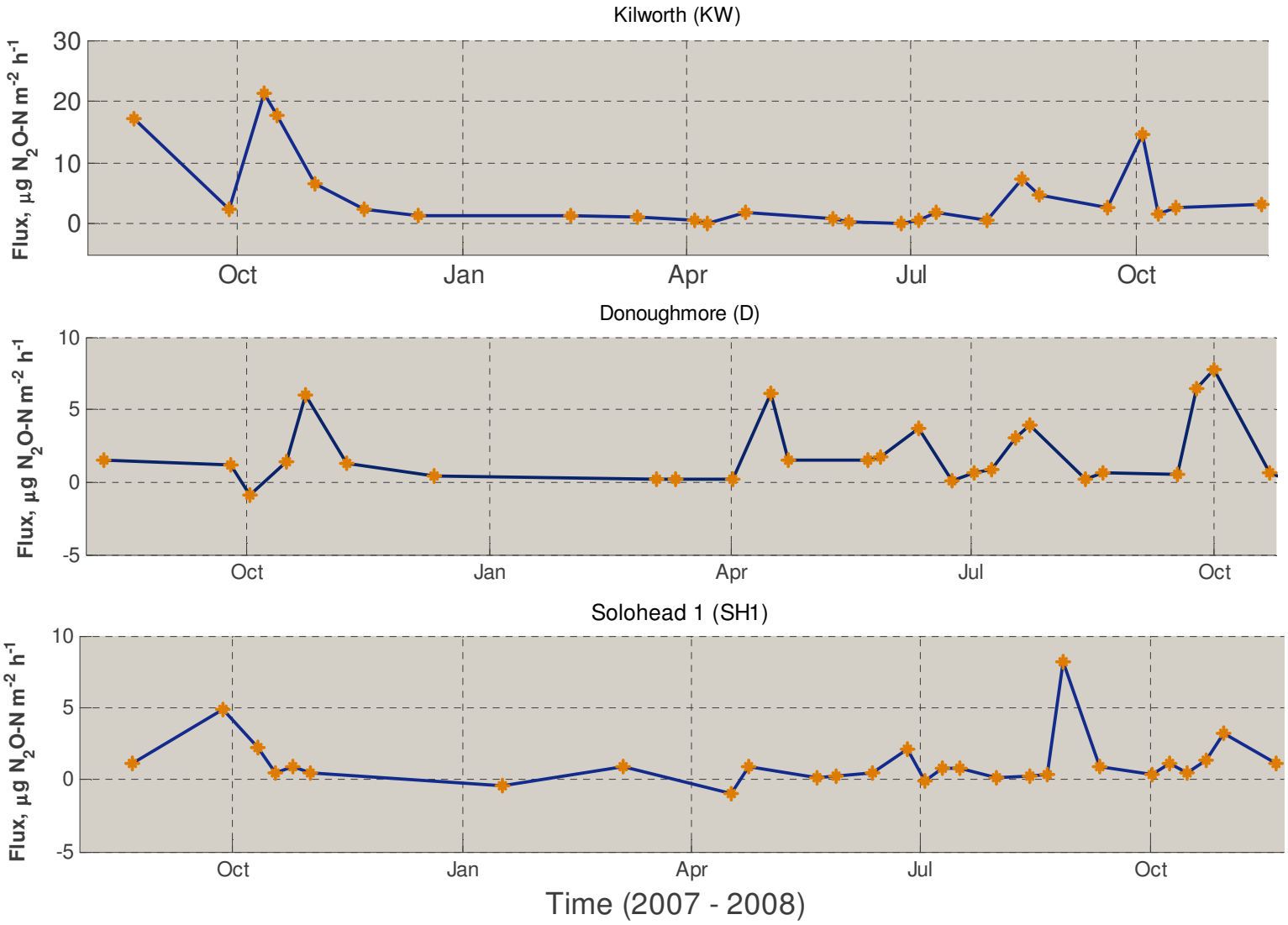


Results: Eddy covariance (annual)

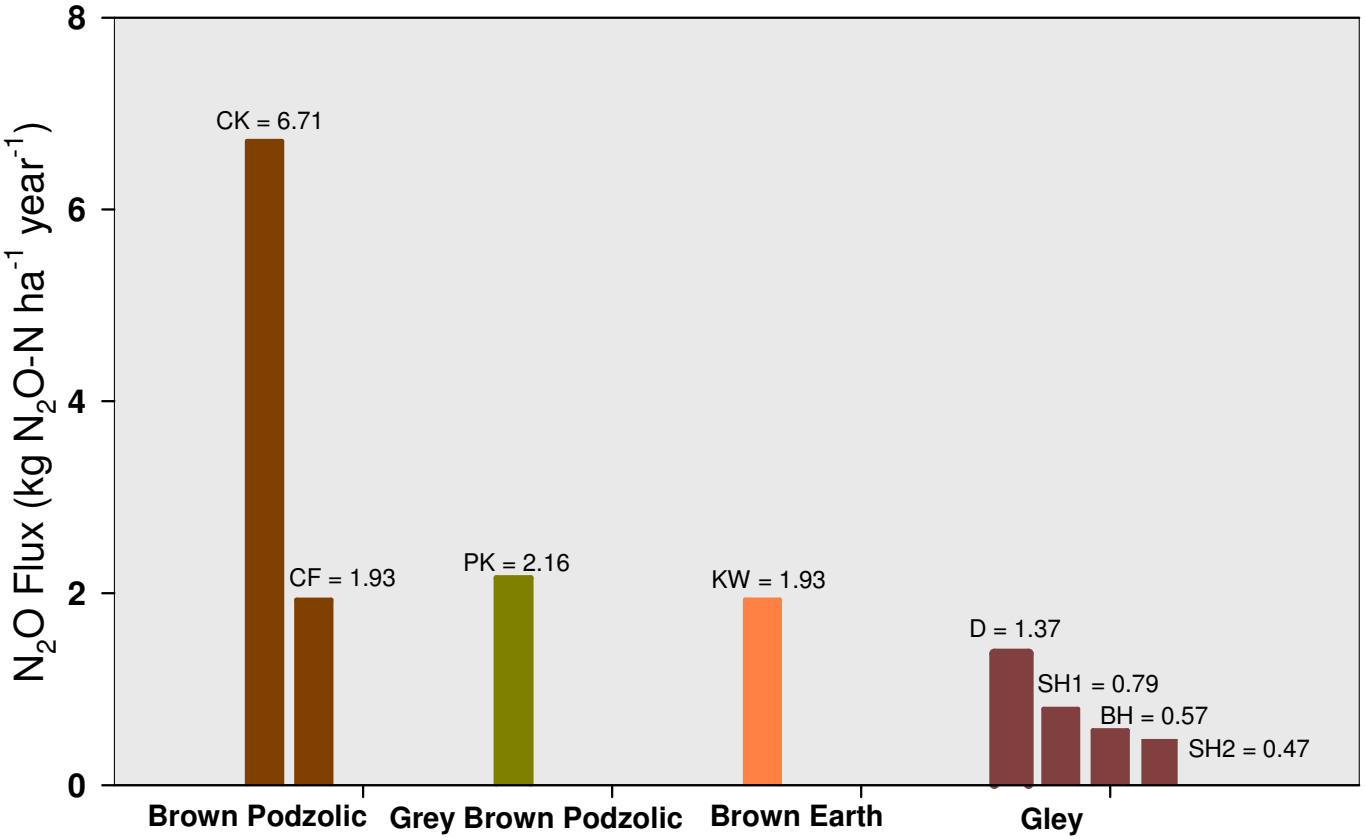
Year	Emission, kg N_2O-N ha^{-1} a^{-1}	Total input, kg N ha^{-1} a^{-1}
2007	1.7	300
2008	6.3	375
2005	4.5	291
2006	3.5*	300



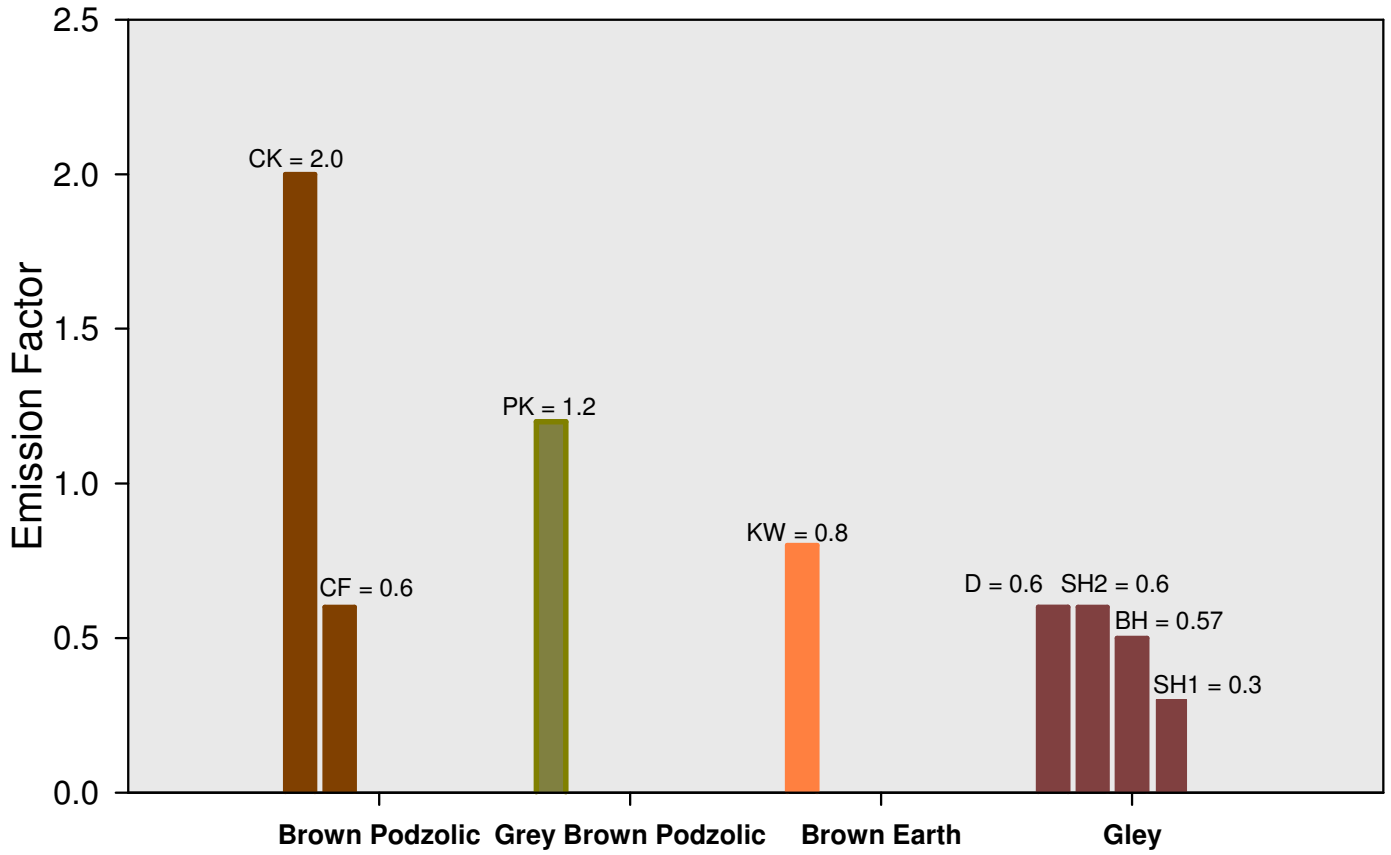
Results: Closed chambers



Results: Closed chambers (2008)



Results: Closed chambers (EF)



Summary

- Work packages progress:
  - Complete: data collection & analysis
  - Ongoing: method comparison, modelling, upscalling & scenario modelling
- DnDc modelling ongoing
- Emission factors ~ 1.5% across 6 years at the main site
- Emission factors correlate with soil type at the satellite sites
- Closed-chamber method seemingly underestimate annual emissions compared to eddy covariance approach