Evapotranspiration: the missing piece in the puzzle of Alpine *Sphagnum* Peatland hydrology

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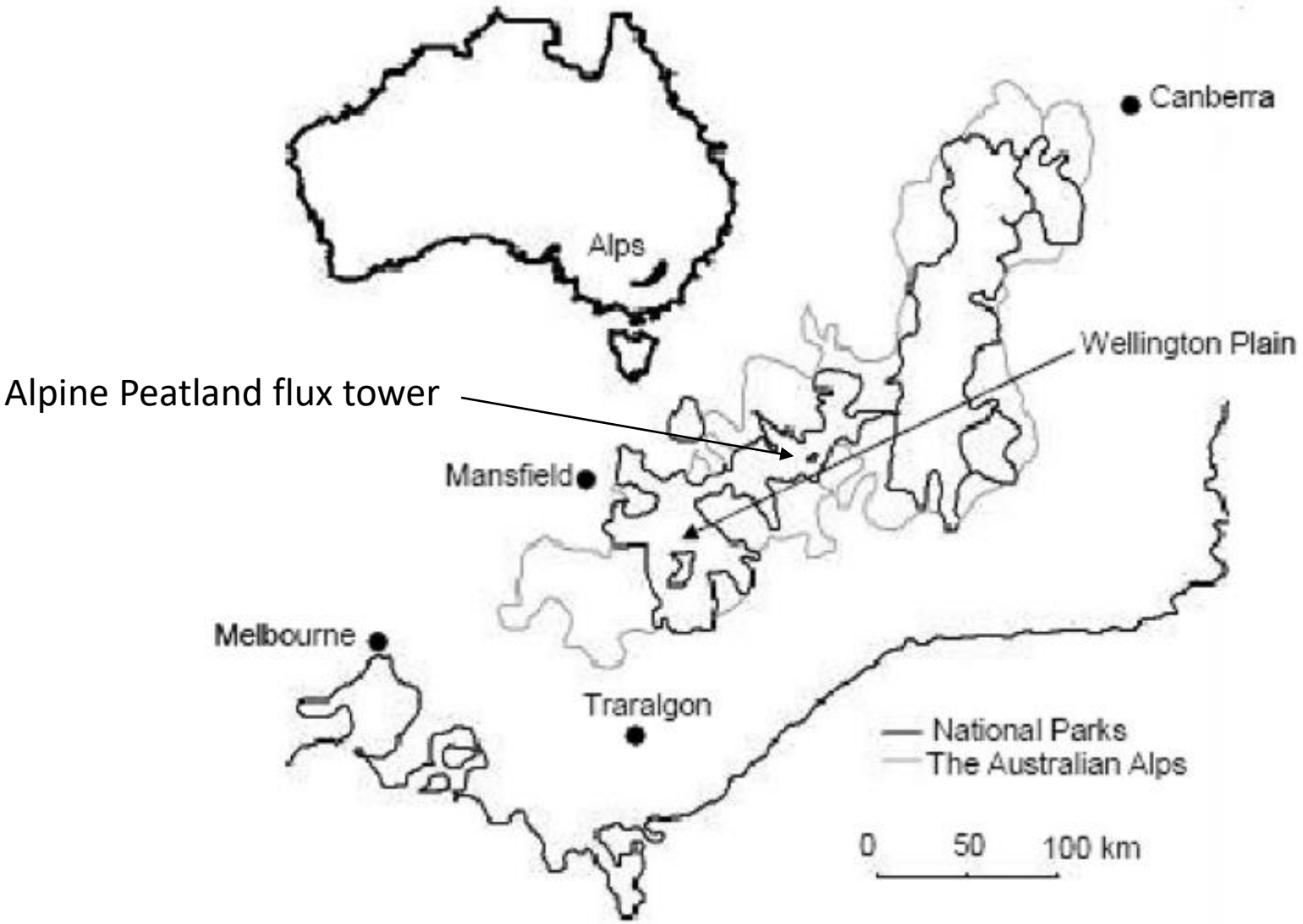
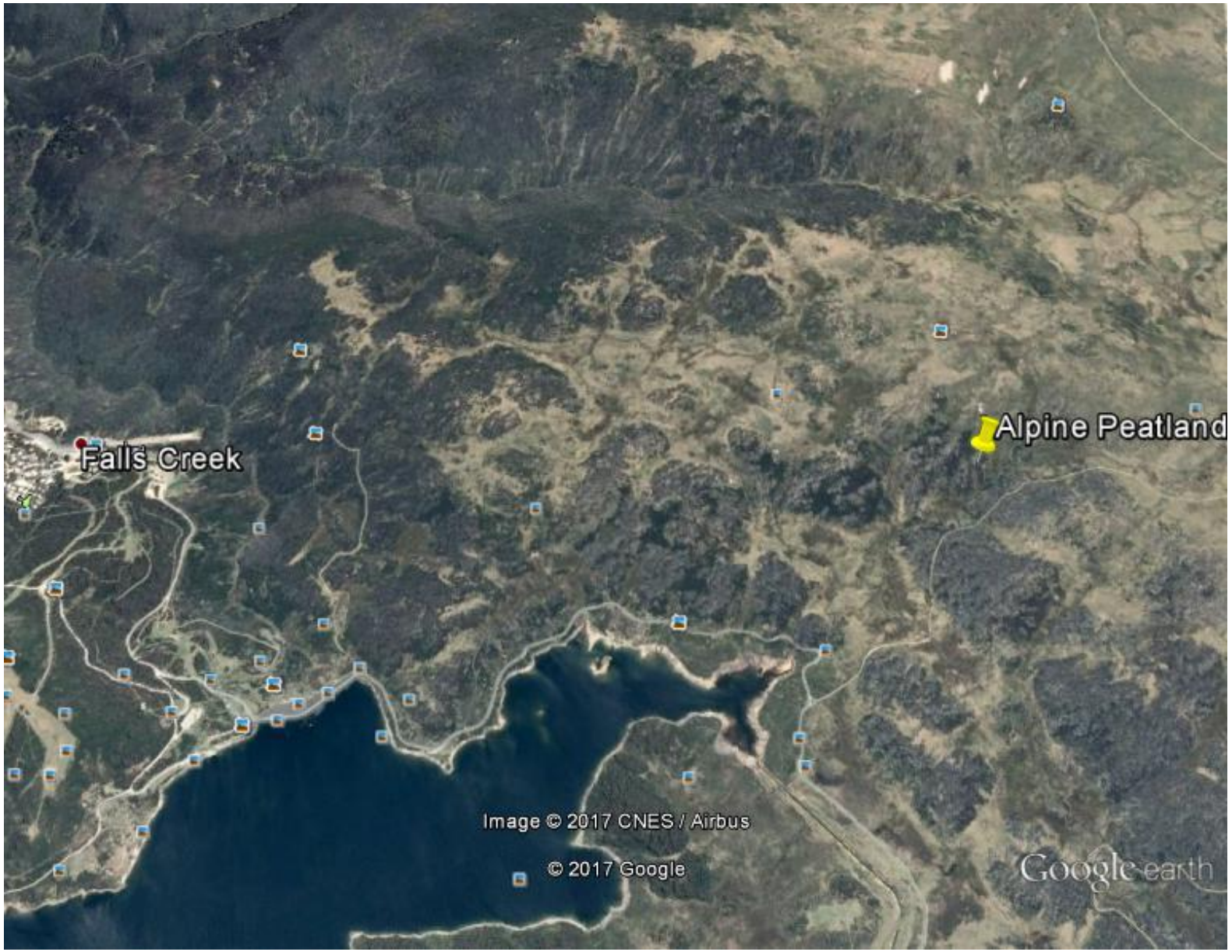
Talk outline

- Introduction to Alpine *Sphagnum* peatlands
  - Carbon cycling
  - Hydrology
- Eddy covariance for evapotranspiration
- Possible carbon fluxes

Carbon and water dynamics of peat soils of the Australian Alps

Where are Alpine peatlands?




Falls Creek
Alpine Peatland
Image © 2017 CNES / Airbus
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Google earth

Why are peatlands important?

Peatlands cover 3% of the earth's land area but contain about 30% of the planet's soil carbon (C) and about 20% of the earth's terrestrial fixed C

Ecosystem C pools of tropical peat forests are among the largest terrestrial C pools on earth; some sites exceed 2000 tC/ha

Disturbances from land-use change and climate change in these unique ecosystems results in exceptionally high GHG emissions

These unique ecosystems provide services, such as:

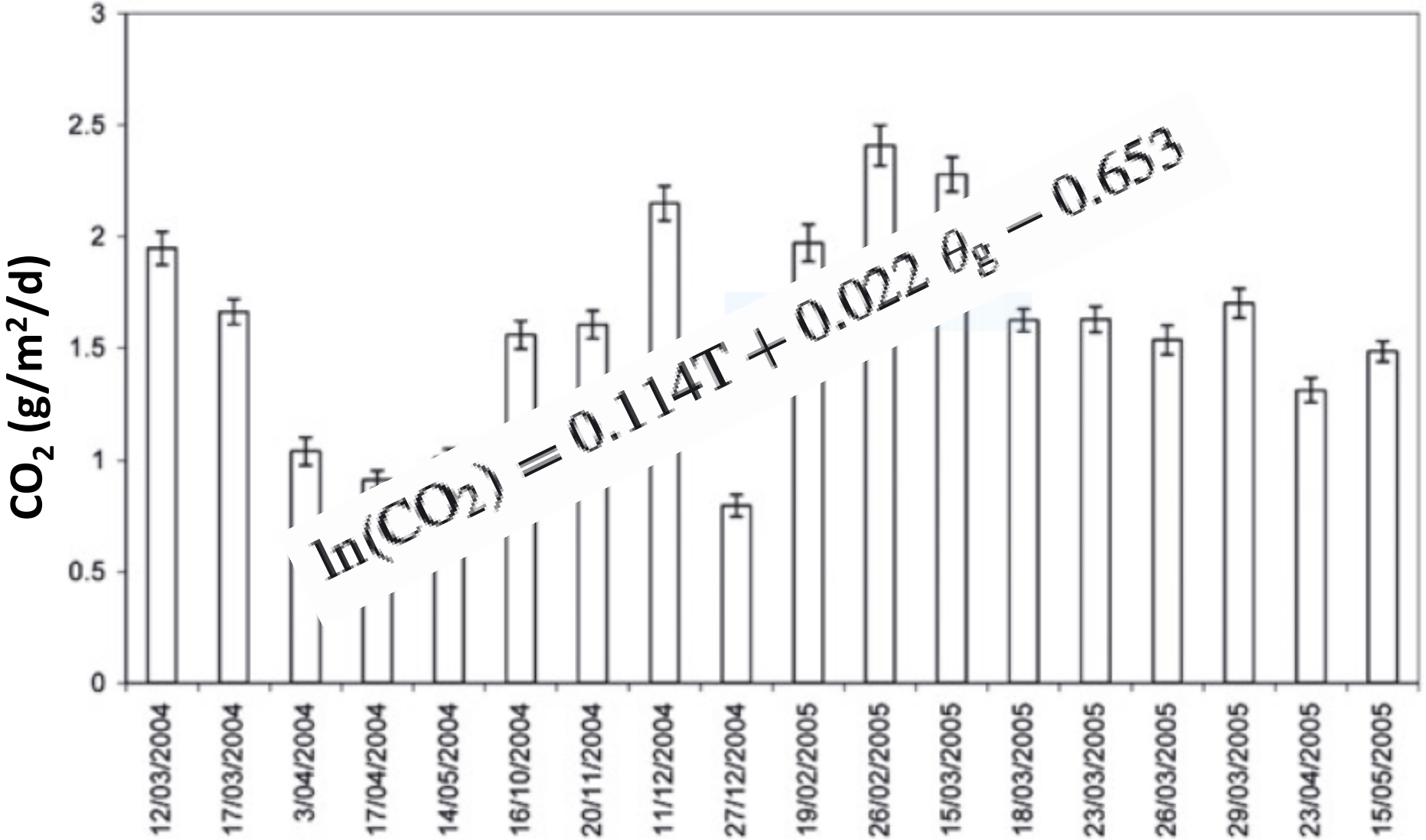
- biological diversity
- maintenance of water quality and timing
- forest and non-timber forest products
- aesthetic and ecotourism values
- carbon sinks (important for climate mitigation strategies)

Bog peat

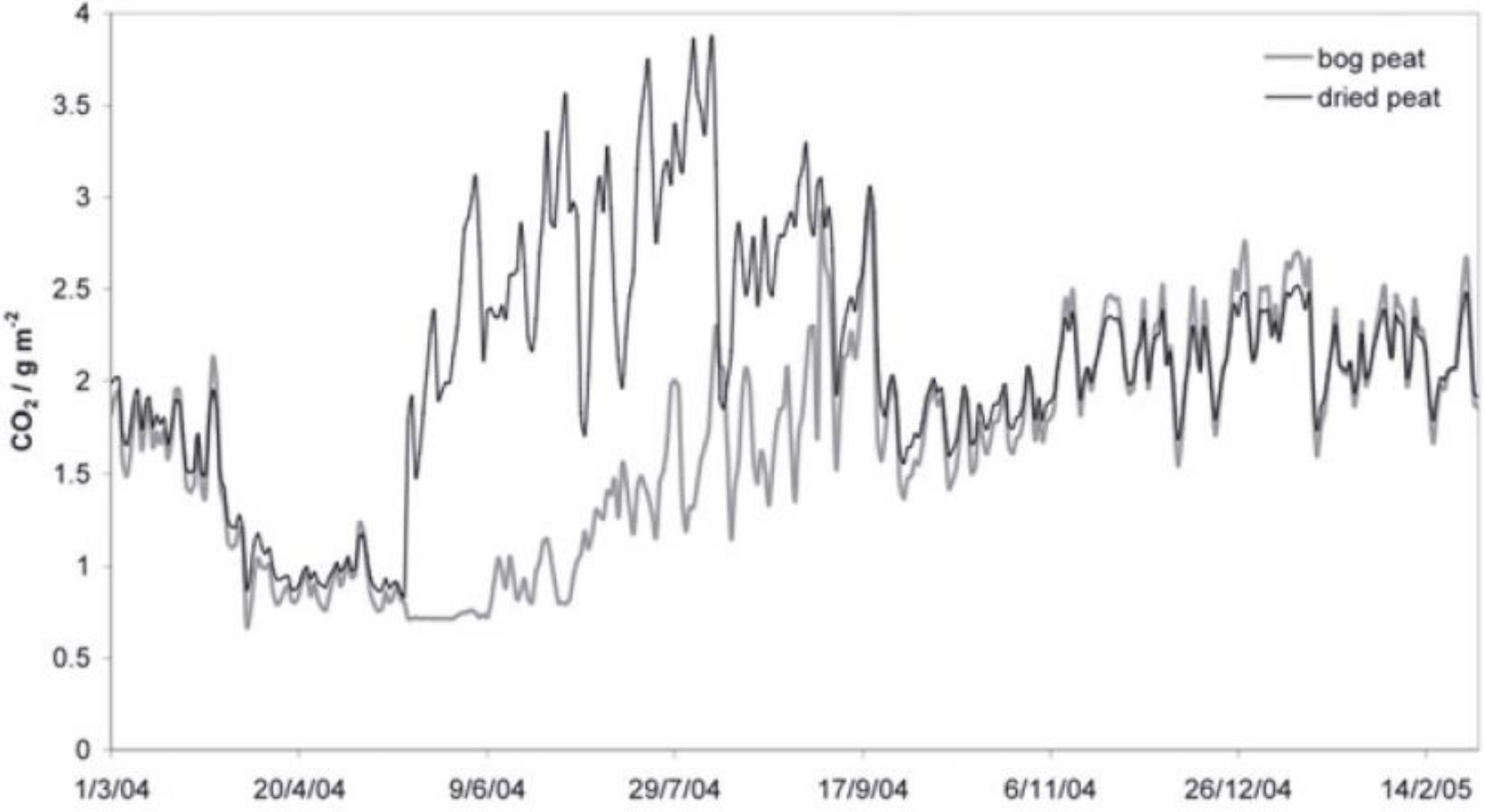
Dried peat

S.P.P., McKenzie, B.M., Baldock, J.A. and Papst, W.A., 2005. Chemical characterisation of bog peat and dried peat of the Australian Alps. Aust. J. Soil Res., 43: 963-971.

Chamber measurements of soil respiration



Annual soil respiration modelled from continuous measurement of soil temperature and water content



Peatland restoration in the Australian Alps

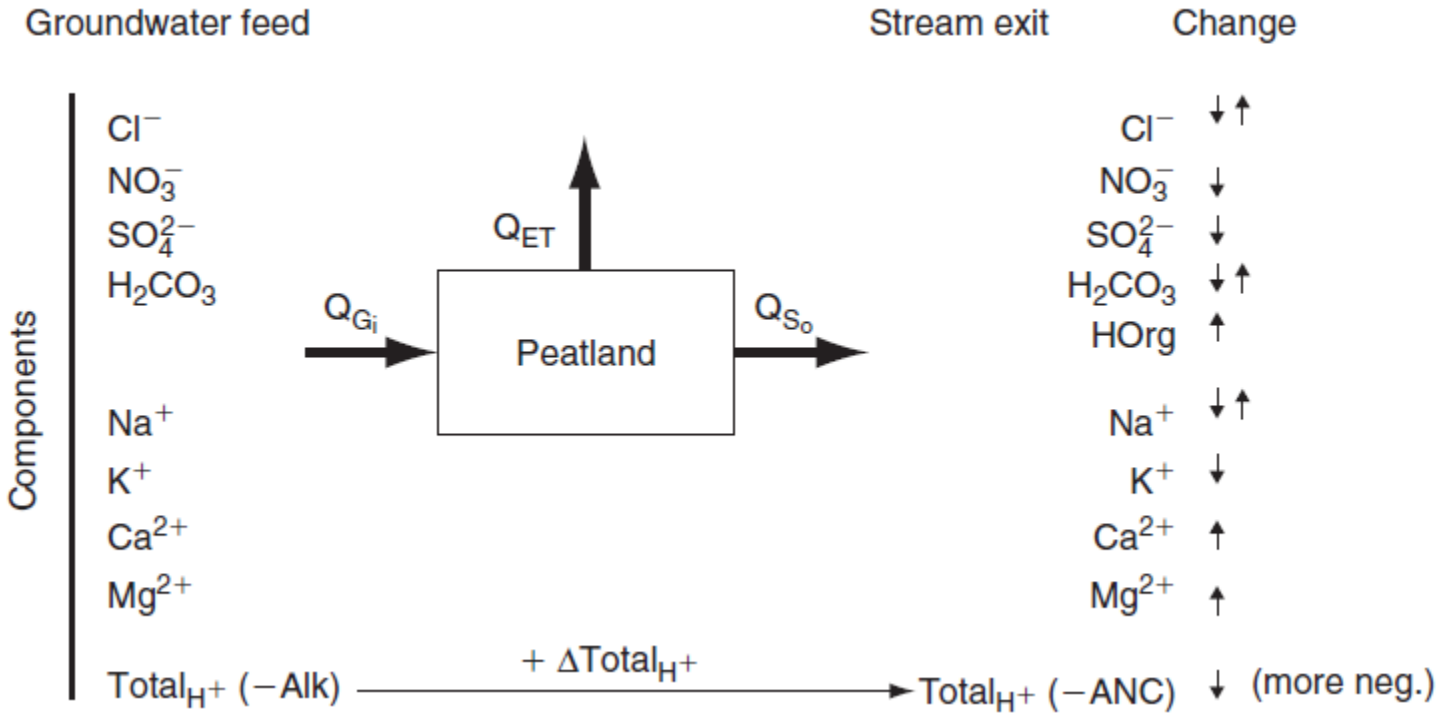
Australian Government
Department of the Environment

- Cattle grazing
- Feral animals
- Channels
- Drainage
- Drying
- Fire
- Climate change

National Recovery Plan
for the Alpine *Sphagnum*
Bogs and Associated Fens

- a threatened ecological community listed under the
Environment Protection and Biodiversity Conservation Act 1999

Peatlands alter stream water chemistry



Buffering capacity increased

Nitrate and sulfate removed

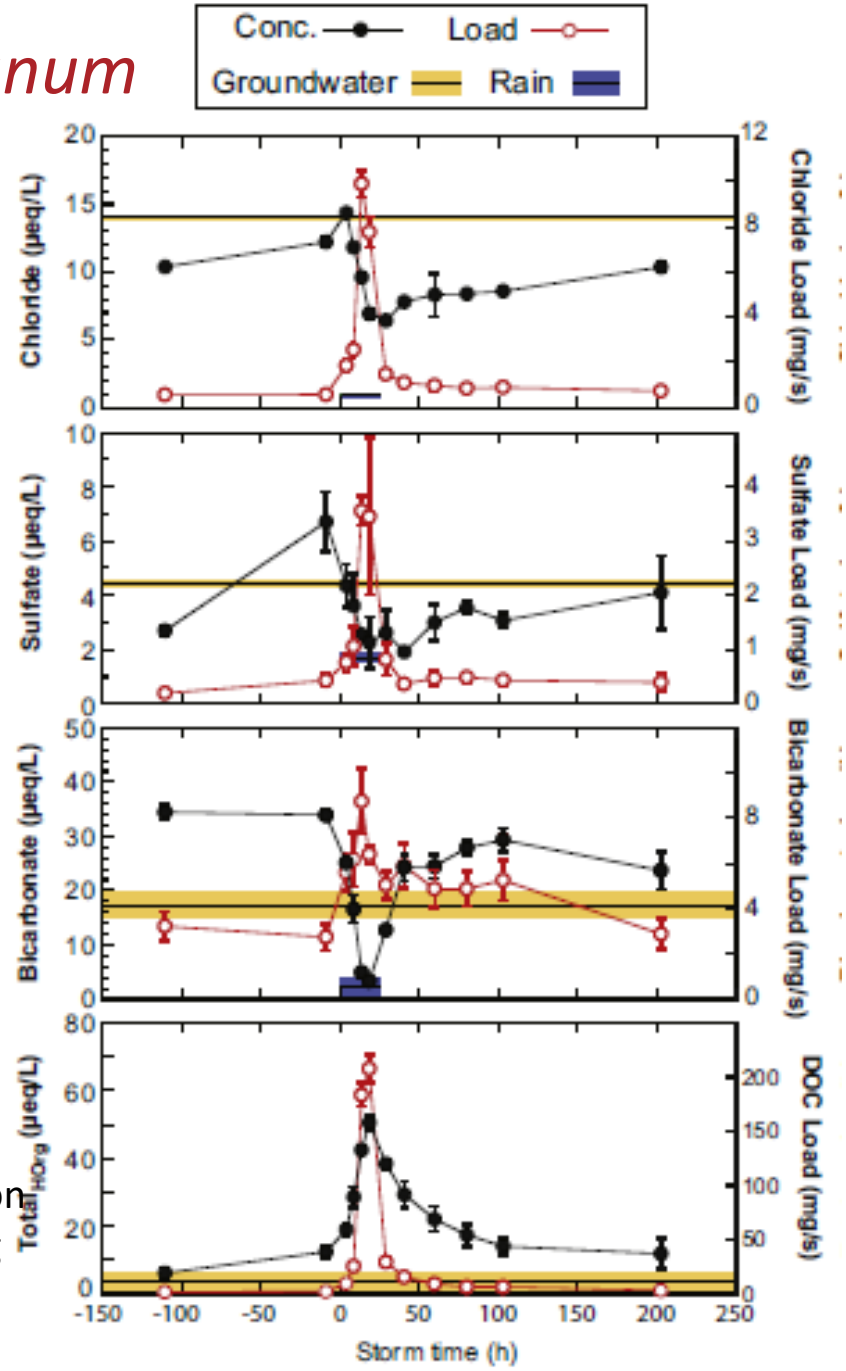
Dissolved organic carbon added to stream water

Silvester, E., 2009. Ionic regulation in an alpine peatland in the Bogong High Plains, Victoria, Australia. Environmental Chemistry, 6(5): 424-431.

Hydrochemistry of Alpine *Sphagnum* peatlands during storms

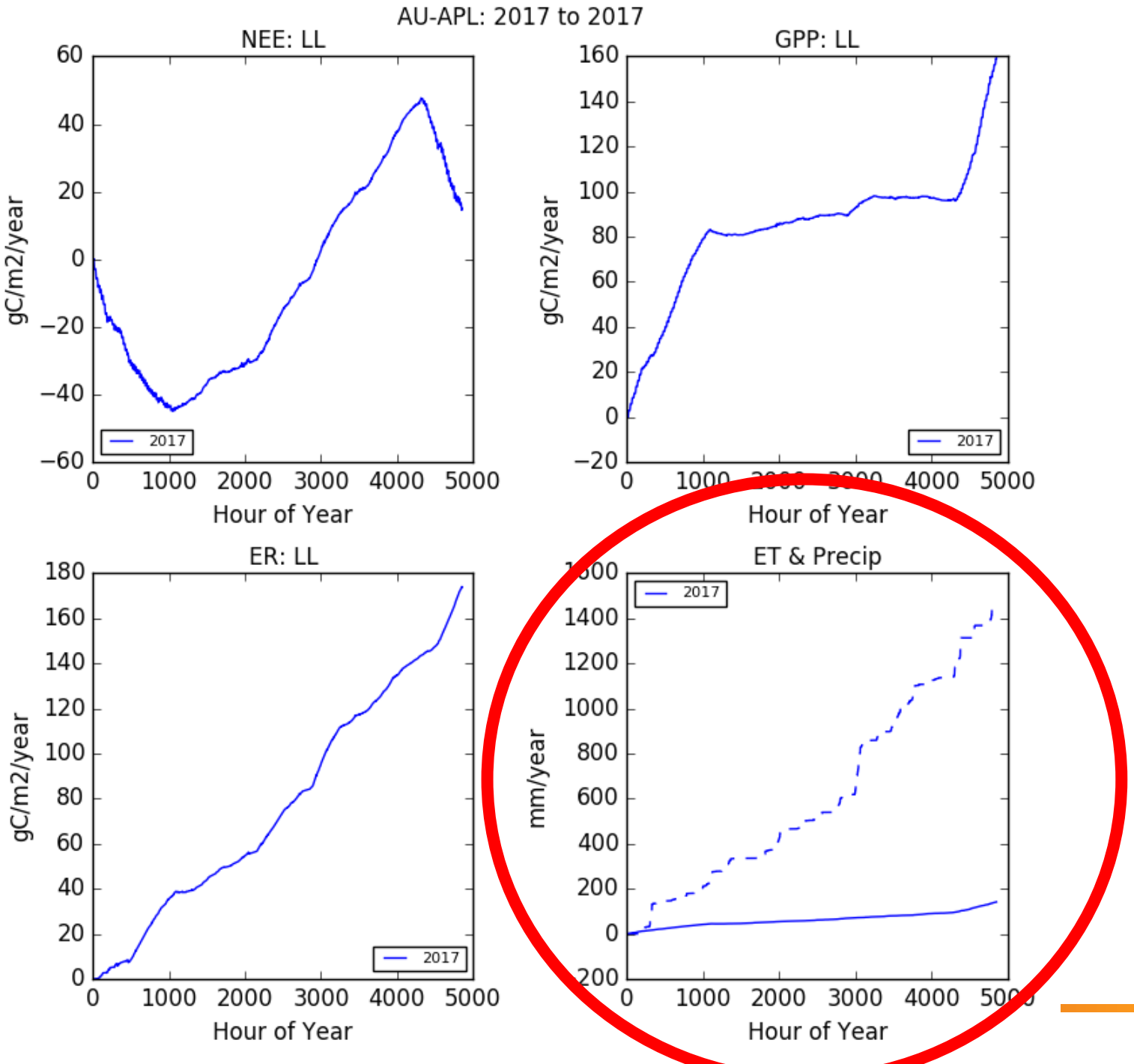
Chemostasis: little change in water chemistry despite large increase in volume

Chemical regulation of water chemistry occurs via rapid equilibration



Karis, T., Silvester, E. and Rees, G., 2016. Chemical regulation of alpine headwater streams during a storm event (Bogong High Plains, Victoria, Australia). Journal of Hydrology.

Snow covered for 137 days


AU-APL: 2017 to 2017
NEE: LL
gC/m2/year
Hour of Year
2017
GPP: LL
gC/m2/year
Hour of Year
2017
ER: LL
gC/m2/year
Hour of Year
2017
ET & Precip
mm/year
Hour of Year
2017

Australian Government

Australian Centre for International Agricultural Research

Community Fire Management and Peatland Restoration
Central Kalimantan, South Sumatera, Indonesia

Bridging traditional and scientific knowledge to support peatland restoration on the Tibetan Plateau

Thank you

La Trobe University Securing Food Water and Environment Research Focus Area ABC Researchers Grant

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