


Ecosystem functioning and CO_2 exchange in a remnant peatland, within an agricultural landscape, compared to that of a large peatland in a near-natural state

THE UNIVERSITY OF WAIKATO
Te Whare Wānanga o Waikato

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Peat is partially decayed organic matter

Mauquoy, Dmitri, and B. Van Geel. "Plant macrofossil methods and studies: mire and peat macros." *Encyclopedia of quaternary science*. Elsevier Science, 2007.


‘Beast of Brora’ Discovered June 2018

Faddan More Psalter – 800 AD

Why are we studying peatlands?

The Guardian

Ultimate bogs: how saving peatlands could help save the planet

They are one of the harshest environments on the planet and also one of the most important in terms of carbon storage. New research hopes to reveal the role these threatened bogs could play in the climate change story

Jeremy Hance *for* ***Ensia***

Fri 28 Jul 2017 14.00 BST

The New York Times

SCIENCE

Rising Temperatures May Dry Up Peat Bogs, Causing Carbon Release

Observatory

By HENRY FOUNTAIN OCT. 13, 2008

Home | News

NewScientist

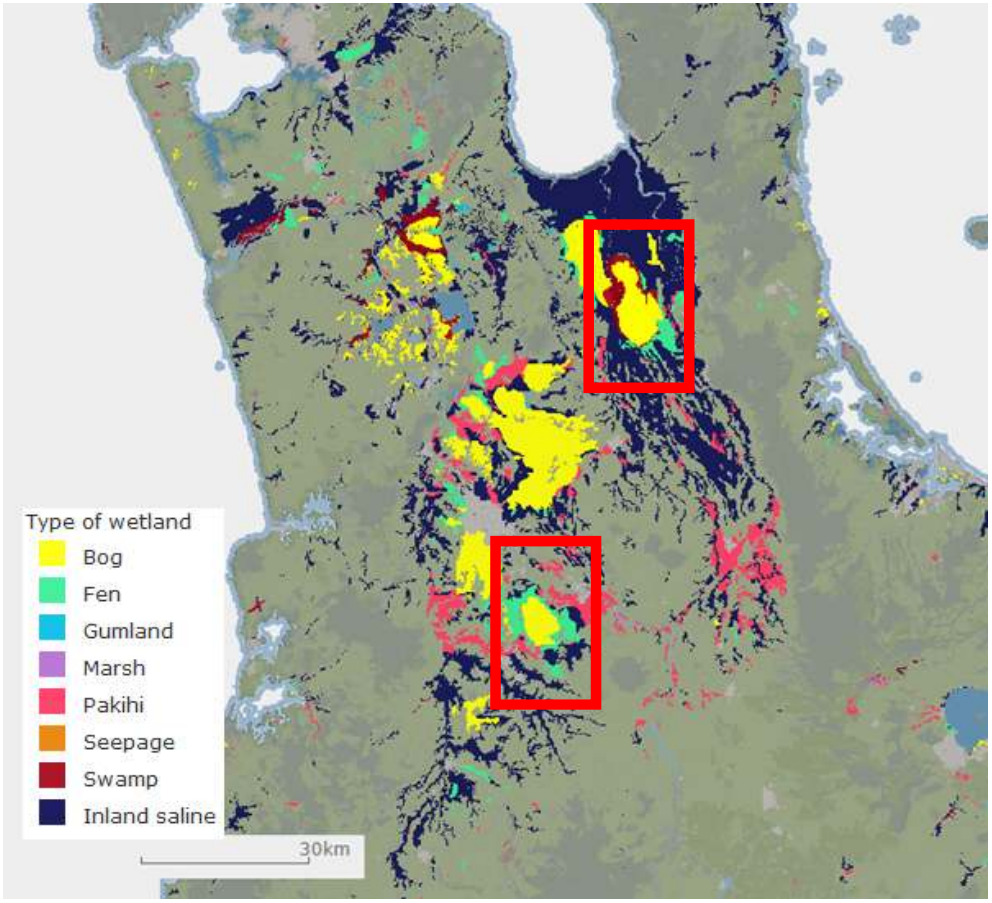
DAILY NEWS 7 July 2004

Peat bogs harbour carbon time bomb

By Fred Pearce

Why are we studying peatlands?

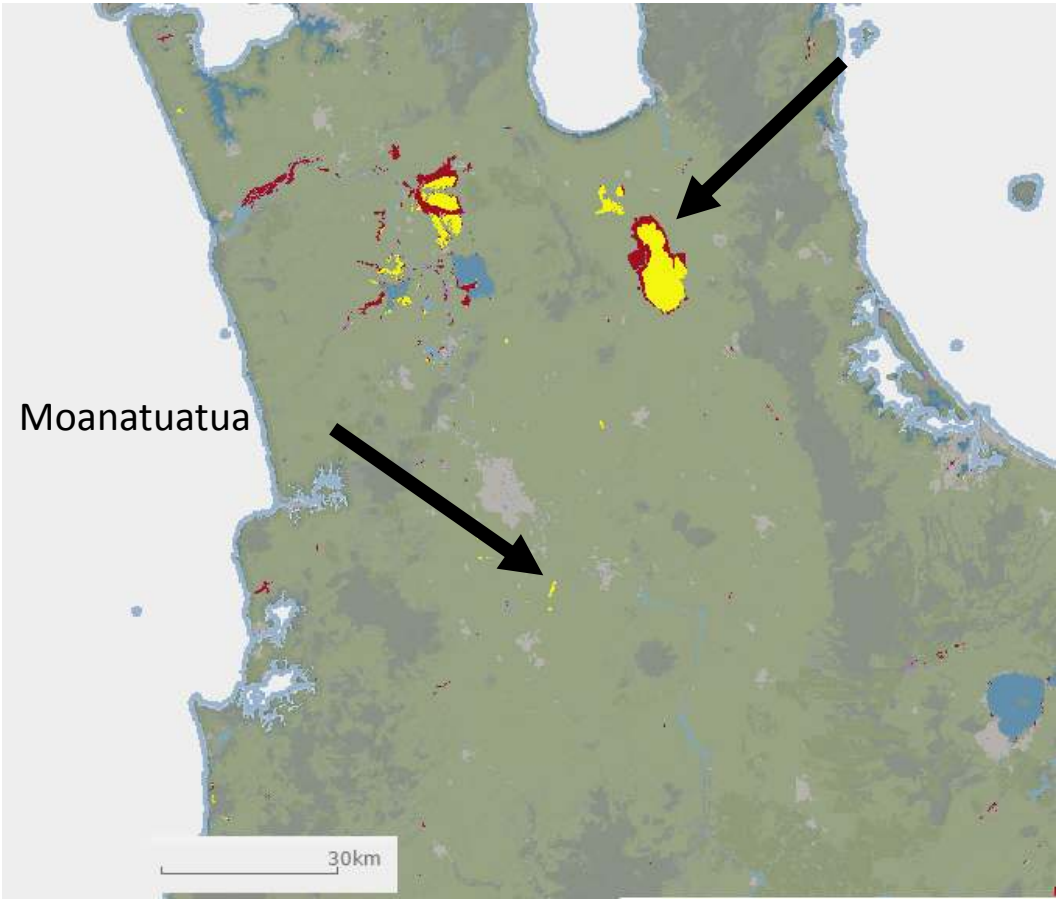
1250



2008

Kopuatai

Moanatuatua

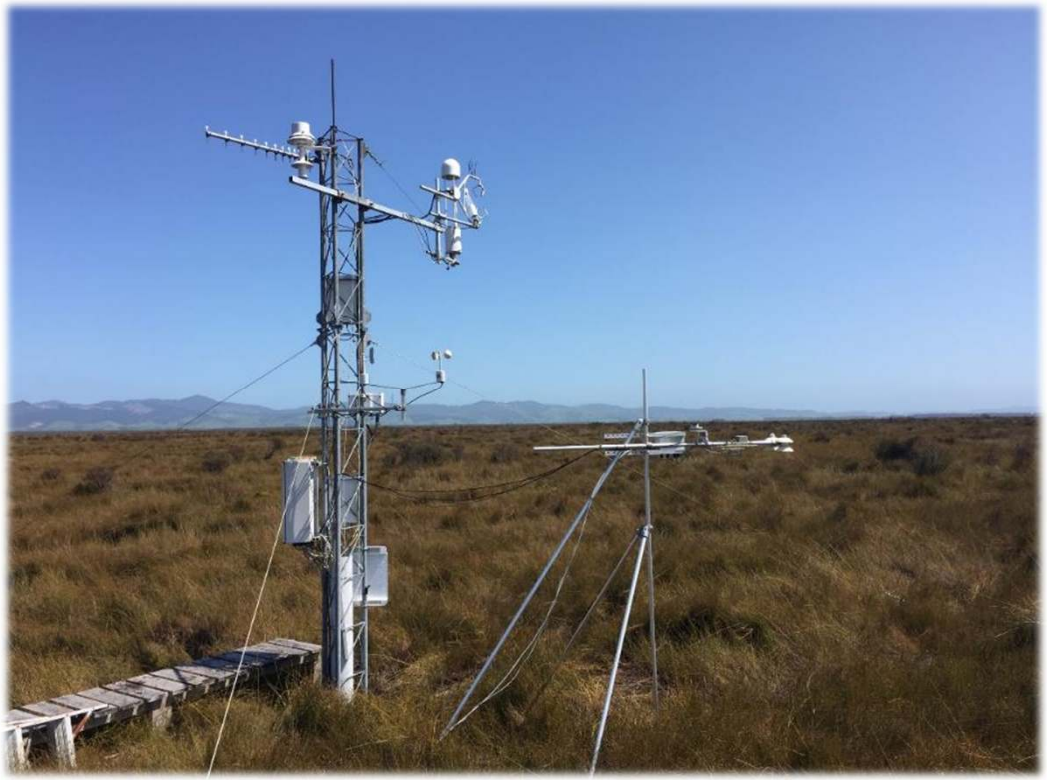


Moanatuatua

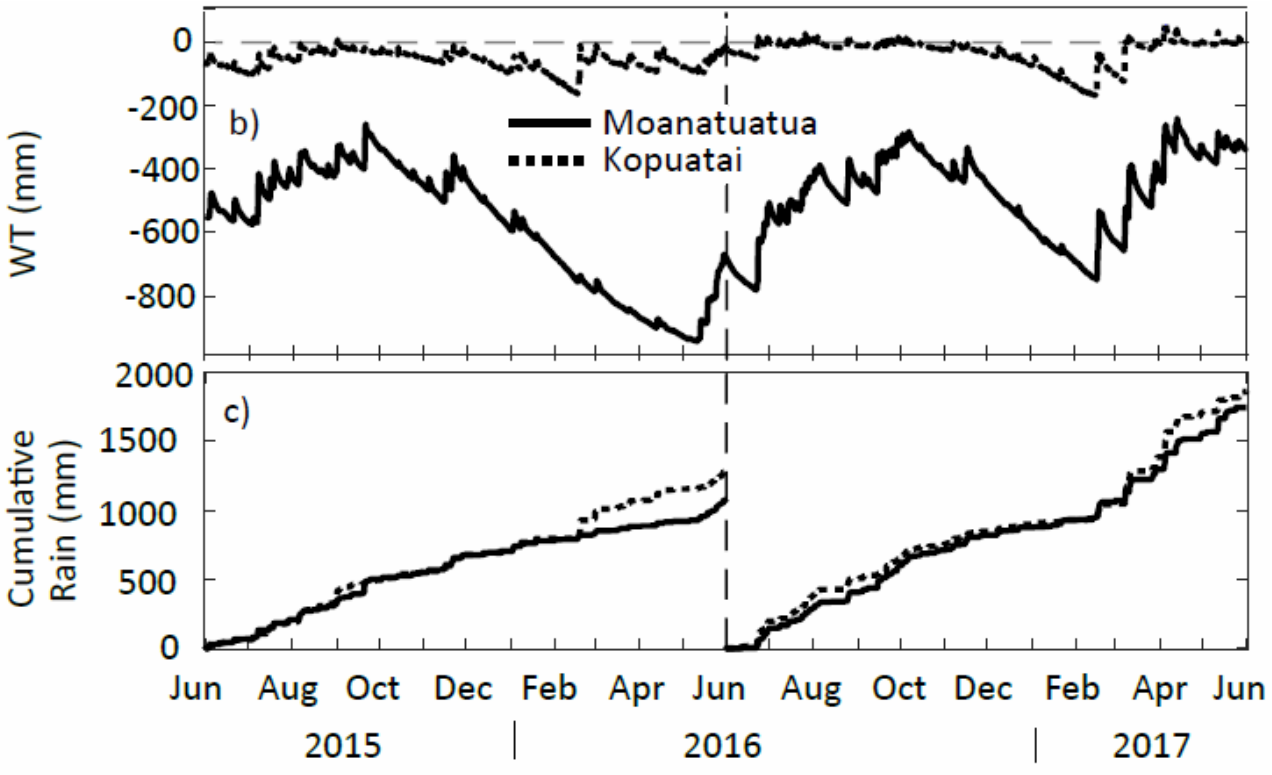
Kopuatai

What are we measuring?

- Eddy Covariance is used to measure CO_2 exchange at both bogs
- Paired with measurements of environmental variables
- 10 site years of data

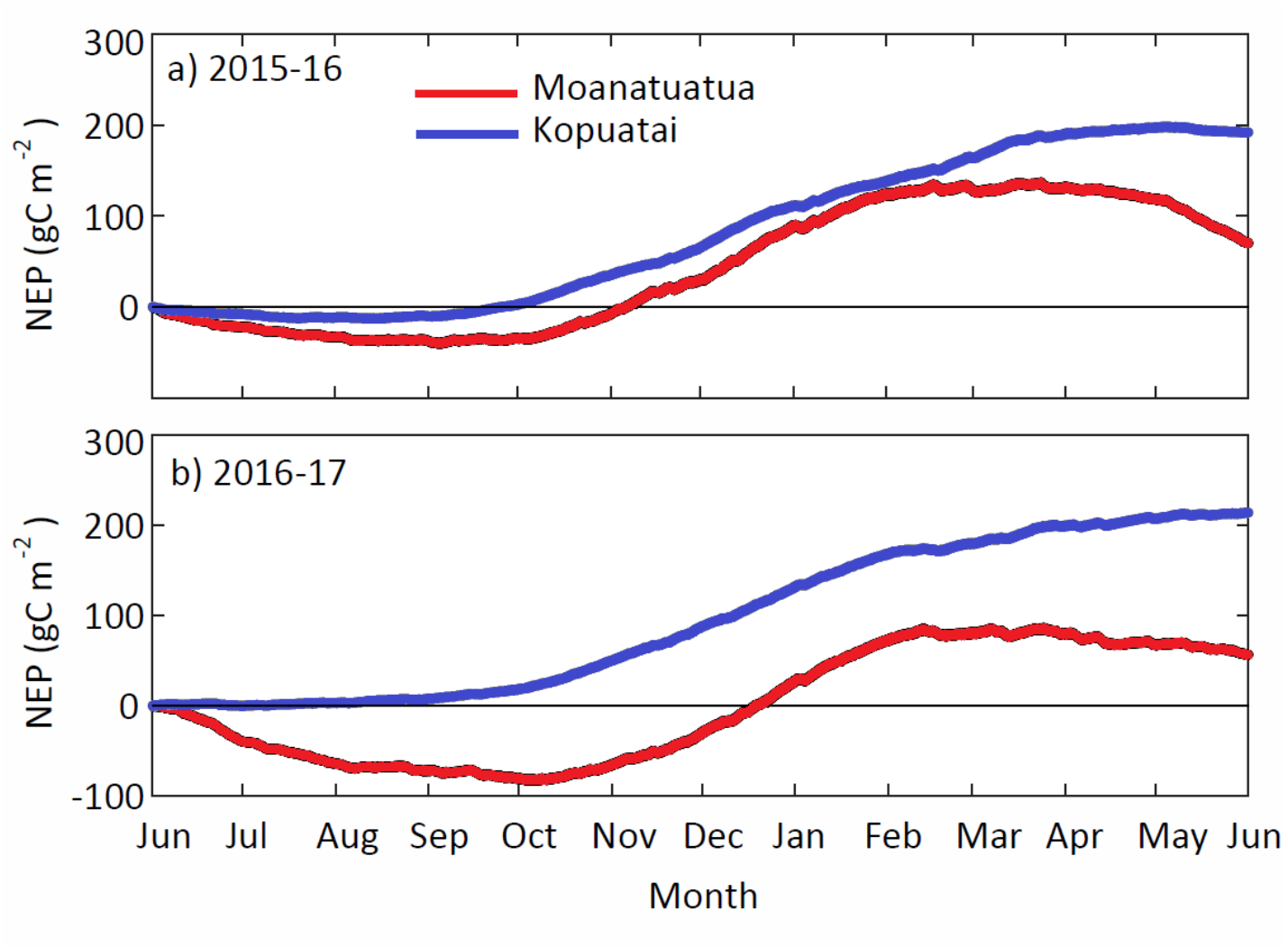


Background



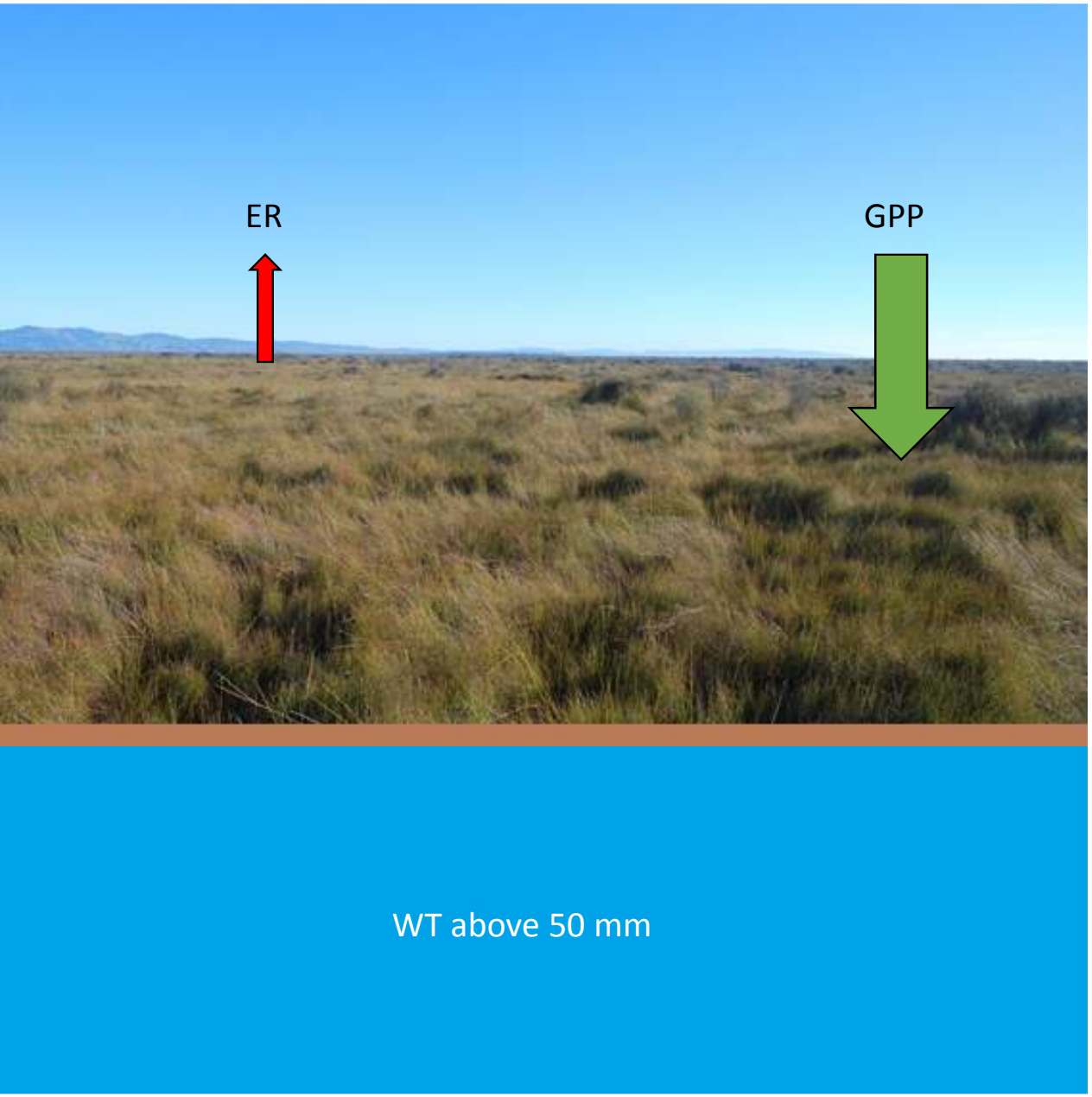
- The water table at Moanatuatua is deep and highly fluctuating
- What effect has this had on CO_2 exchange?

What have we found?

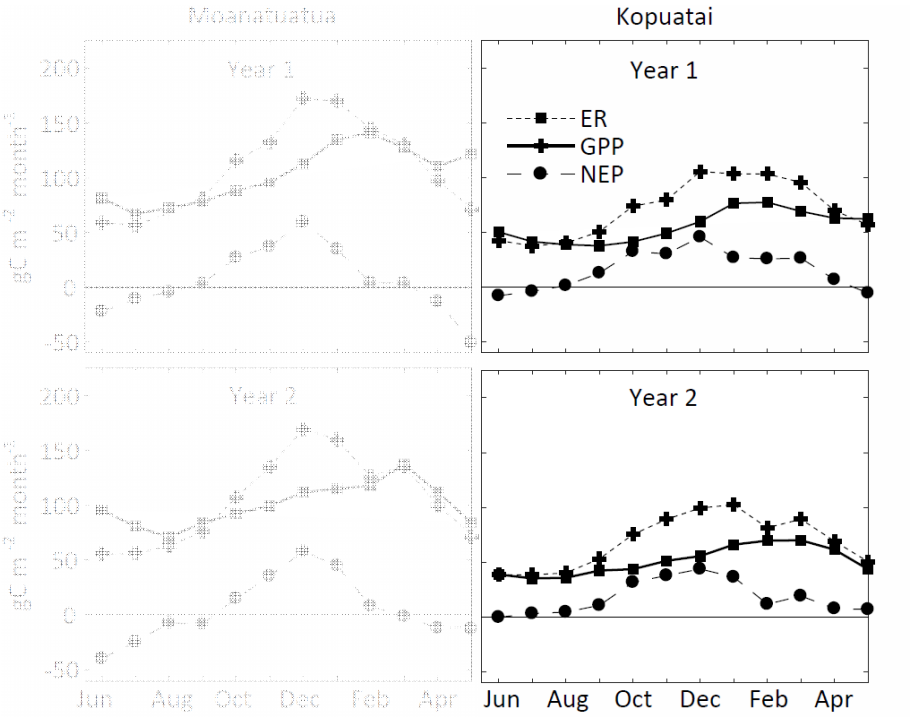


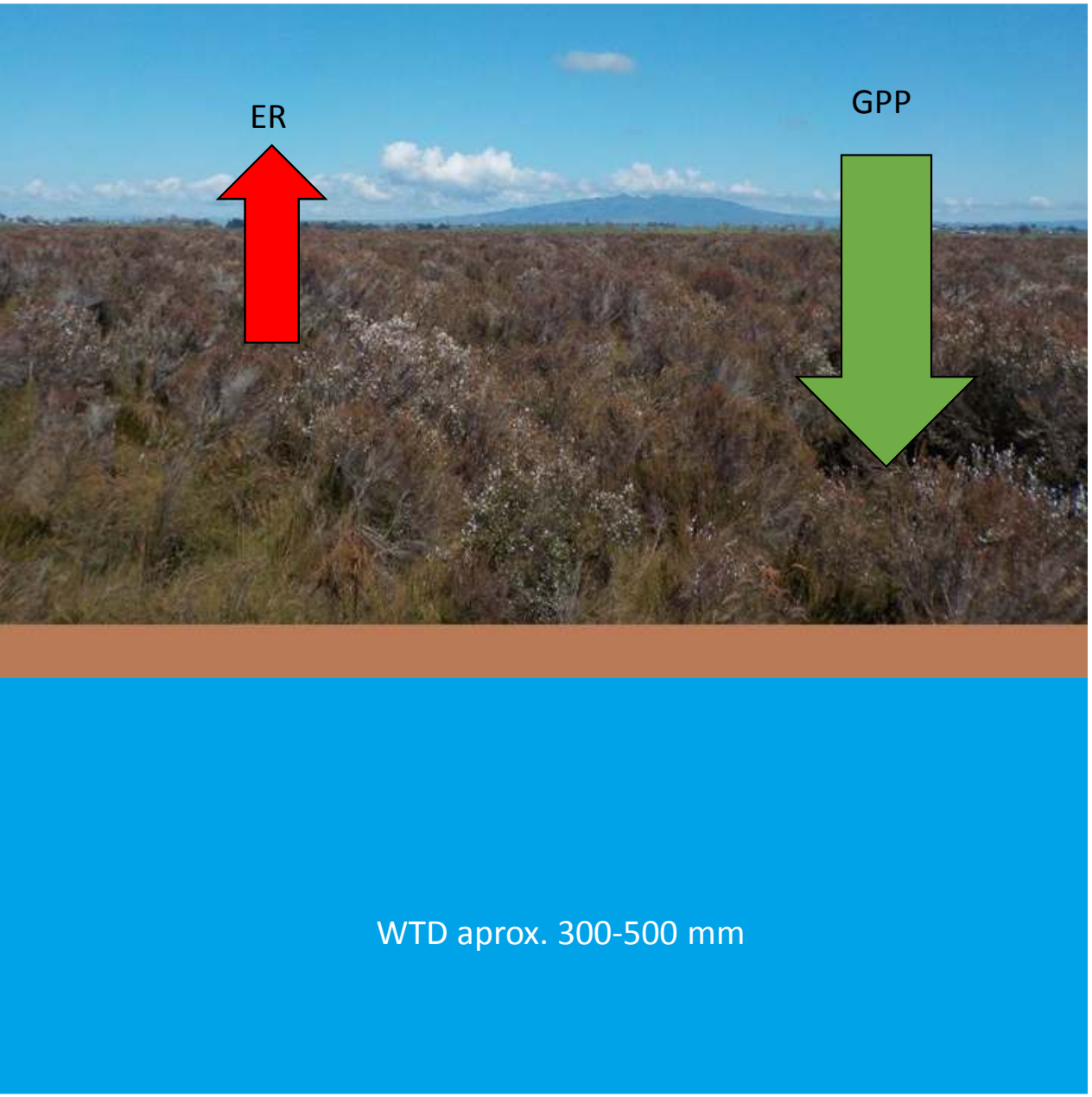
Indicates cumulative CO_2 removed from the atmosphere

- Moanatuatua is a weaker sink for CO_2 than Kopuatai
- Moanatuatua becomes a source for CO_2 during winter and late season dry conditions

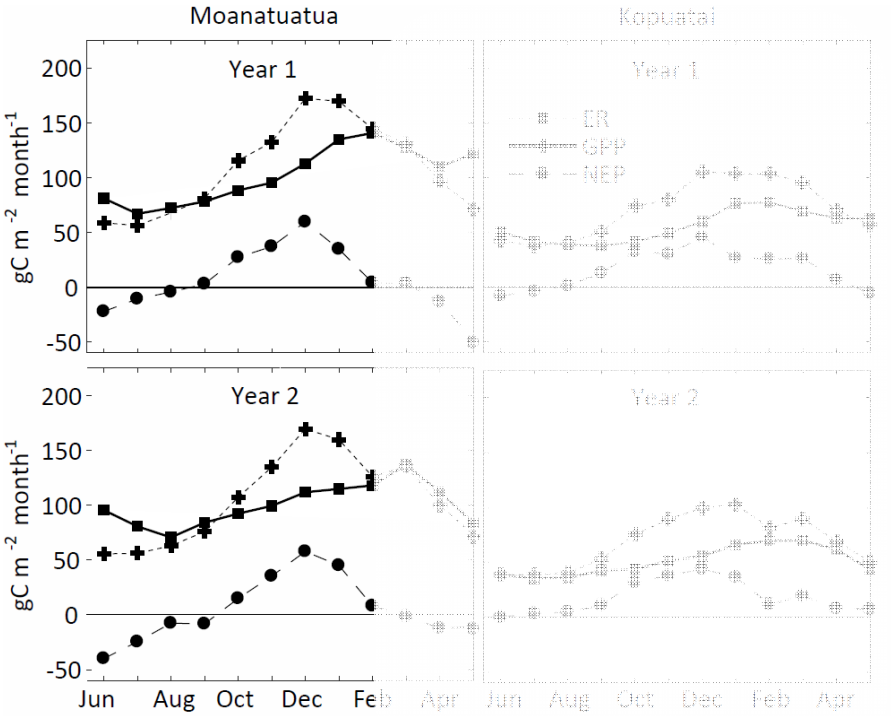


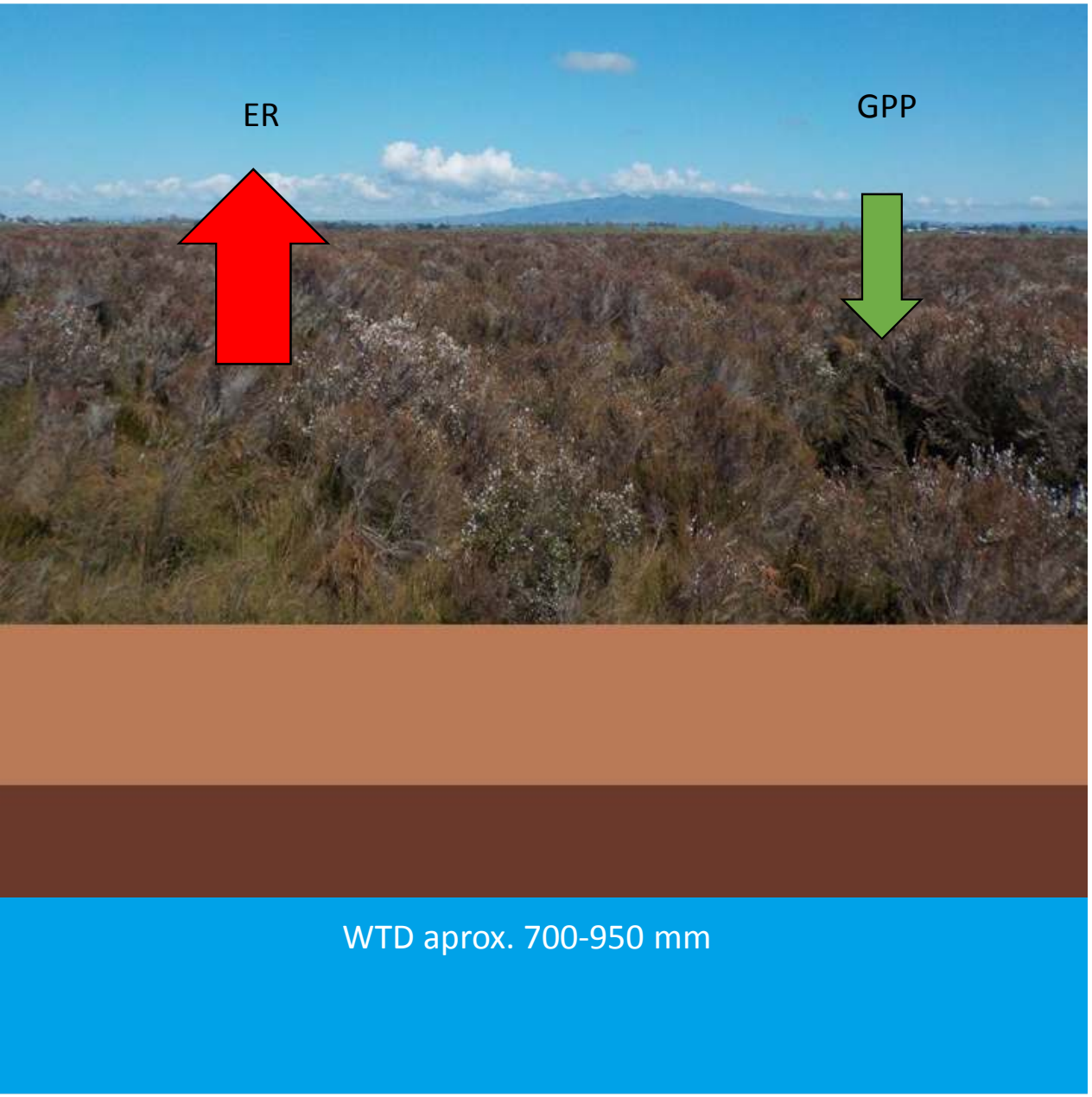
- Kopuatai has both low uptake and release of CO_2



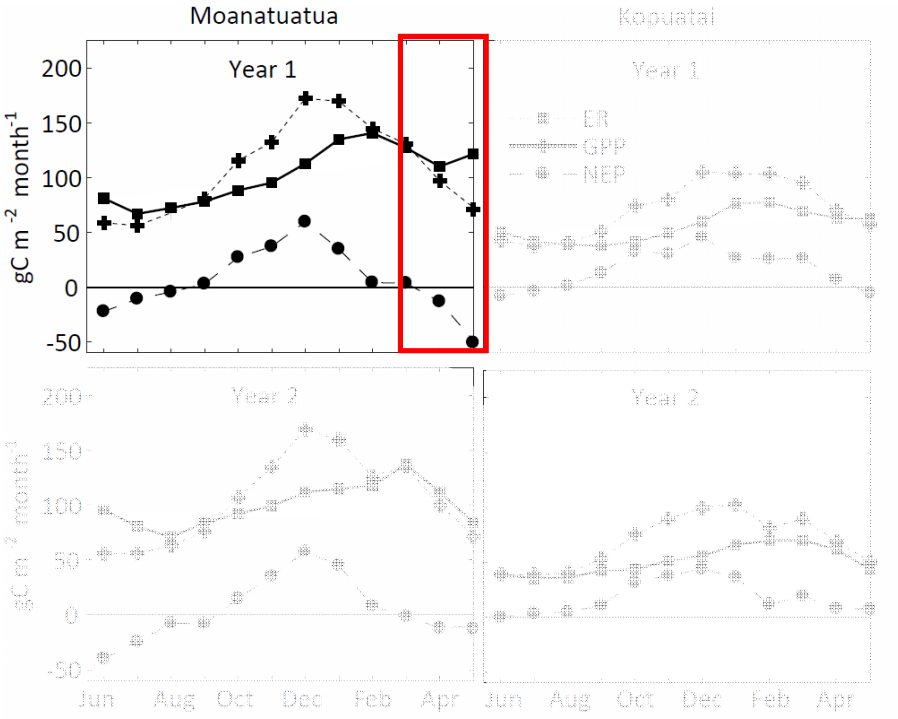


- Moanatuatua emits a large amount of CO_2 from ecosystem respiration
- High uptake by plants can compensate for this





- Uptake of CO_2 by plants is restricted when the water table is very low, and the site becomes a net source of CO_2



Take home messages

- New Zealand's endemic platformers are weird and wonderful, adapted to a wide range of conditions
- Resilient to drying to up to a point
- CO_2 fluxes are more sensitive to drought in the drainage-affected bog
- Questions remain about the long-term stability of the ecosystem is at Moanatuatua

Empodisma robustum

Further research

"Ignoring the strong feedbacks inherent in peatlands may lead to substantial under- or overestimates of their response to global change"
- *Nancy Dise, Science (2009)*

- Has there been a change in the way the bog responds to environmental factors since 1999 when the first Eddy Covariance system was installed?

- Comparison with peat cores. Is the peatland carbon sink stable over longer time periods? (50-100 years)