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## Evidence of ecological critical slowing-down in temperate soils

**fiona fraser**<sup>1,2</sup>, Ronald Corstanje<sup>1</sup>, Lindsay Todman<sup>3,4</sup>, Diana Bello-Curás<sup>5</sup>, Gary Bending<sup>6</sup>, Lynda Deeks<sup>1</sup>, Jim Harris<sup>1</sup>, Sally Hilton<sup>6,7</sup>, Mark Pawlett<sup>1</sup>, Joanna Zawadzka<sup>1</sup>, Andrew Whitmore<sup>3</sup>, and Karl Ritz<sup>8</sup>

<sup>1</sup>Cranfield University, College Road, Cranfield, MK43 0AL, UK

<sup>2</sup>SRUC, Crop and Soil Systems, United Kingdom of Great Britain – England, Scotland, Wales (fiona.fraser@sruc.ac.uk)

<sup>3</sup>Sustainable Agricultural Sciences, Rothamsted Research, Harpenden, AL5 2JQ, UK

<sup>4</sup>School of Agriculture, Policy, and Development, University of Reading, Reading, RG6 6AR, UK

<sup>5</sup>IIAG-CSIC, Avda. De Vigo s/n, 15705, Santiago de Compostela, Spain

<sup>6</sup>School of Life Sciences, The University of Warwick, Coventry, CV4 7AL, UK

<sup>7</sup>Micropathology Ltd, University of Warwick Science Park, Coventry, UK

<sup>8</sup>School of Biosciences, The University of Nottingham, Sutton Bonington, Leicestershire, LE12 5RD, UK

The resilience of ecological systems is crucially important, particularly in the context of climate change. We present experimental evidence of critical slowing-down arising from perturbation of a key function in a complex ecosystem, exemplified by soil. Different behavioural classes in soil respiratory patterns were detected in response to repeated drying:rewetting cycles. We characterised these as adaptive, resilient, fragile or non-resilient. The latter involved increasing erratic behaviour (i.e. increasing variance), and the propagation of such behaviour (i.e. autocorrelation), interpreted as a critical slowing-down of the observed function. Soil microbial phenotype and land-use were predominantly related to variance and autocorrelation respectively. No relationship was found between biodiversity and resilience, but the ability of a community to be compositionally flexible rather than biodiversity *per se* appeared to be key to retaining system function. These data were used to map the extent to which soils are close to crossing into alternative stable states at a national scale.