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Research interests

A Professor in Agriculture and Climate Change, with research interests in carbon sequestration, agricultural greenhouse gas mitigation and adaptation. A soil and environmental scientist, with a long established history of research in nitrogen and carbon cycling and soil management in a range of crop and soil systems. A significant involvement in EU funded research programmes, and recently co-ordinated Legume-Futures an EU Framework project on the role of legumes in farming systems. A participant in the recent projects on Marginal Abatement Cost Curves, and in an EU project on climate change adaptation. Currently expanding research activities on greenhouse gas mitigation in China and South Asia. His work has contributed to the publication of over 150 research papers, and he is recognised by Reuters as one of the world's leading climate researchers.

Qualifications

PhD, Nitrogen transformations in forest soils, University of Aberdeen
Award Date: 1 Jun 1985

Bachelor, Biology, University of Exeter
Award Date: 30 Jun 1981

Research outputs

Optimizing crop rotation increases soil carbon and reduces GHG emissions without sacrificing yields

Yang, Y., Ti, J., Zou, J., Wu, Y., Rees, RM., Harrison, M., Li, W., Huang, W., Hu, S., Liu, K., Wen, X., Chen, F. & Yin, X., 1 Feb 2023, In: *Agriculture, Ecosystems and Environment*. 342, 108220.

Soil pH and long-term fertilization affect gross N transformation and N₂O production pathways in Chinese and UK croplands

Zhang, C., Ju, X., Zhang, J., Rees, RM. & Müller, C., 7 Jan 2023, (First published) In: *Biology and Fertility of Soils*.

Optimizing nitrogen rates for synergistically achieving high yield and high nitrogen use efficiency with low environmental risks in wheat production – Evidences from a long-term experiment in the North China Plain

Hu, S., Qiao, B., Yang, Y., Rees, RM., Huang, W., Zou, J., Zhang, L., Zheng, H., Liu, S., Shen, S., Chen, F. & Yin, X., Jan 2023, In: *European Journal of Agronomy*. 142, 126681.

Field application of organic and inorganic fertilizers

Misselbrook, T. H., Bittman, S., Sylvester-Bradley, R., Cordovil, C., Olesen, J. E., Rees, RM. & Vallejo, A., 22 Nov 2022, *Nitrogen opportunities for agriculture, food and environment*. Sutton, M., Howard, C., Mason, K., Brownlie, W. & Cordovil, C. (eds.). Edinburgh: UK Centre for Ecology and Hydrology, p. 89-114 26 p.

Can nitrogen input mapping from aerial imagery improve nitrous oxide emissions estimates from grazed grassland?

Maire, JM., Gibson-Poole, S., Cowan, N. J., Krol, D., Somers, C., Reay, D. S., Skiba, U. M., Rees, RM., Lanigan, G. J. & Richards, K. G., Oct 2022, In: Precision Agriculture. 23, p. 1743-1774 32 p.

Pharmaceutical and Microplastic Pollution before and during the COVID-19 Pandemic in Surface Water, Wastewater, and Groundwater

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Progress on improving agricultural nitrogen use efficiency: UK-China virtual joint centers on nitrogen agronomy

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A review and meta-analysis of mitigation measures for nitrous oxide emissions from crop residues

Abalos, D., Recous, S., Butterbach-Bahl, K., De Notaris, C., Rittl, T. F., Topp, C. F. E., Petersen, S. O., Hansen, S., Bleken, M. A., Rees, R. M. & Olesen, J. E., 1 Jul 2022, In: The Science of the Total Environment. 828, 154388.

Farm-scale practical strategies to increase nitrogen use efficiency and reduce nitrogen footprint in crop production across the North China Plain

Yang, Y., Zou, J., Huang, W., Manevski, K., Olesen, J. E., Rees, RM., Hu, S., Kersebaum, K. C., Louarn, G., Ferchaud, F., Si, J., Xiong, S., Wen, X., Chen, F. & Yin, X., 1 Jul 2022, In: Field Crops Research. 283, 108526.

Using nitrification inhibitors and deep placement to tackle the trade-offs between NH₃ and N₂O emissions in global croplands

Chong, Z., Song, X., Zhang, Y., Rees, RM. & Ju, X., Jul 2022, In: Global Change Biology. 28, 14, p. 4409-4422 14 p.

Strategies to reach zero carbon beef and sheep production on Welsh farms

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Accelerating the development of biological nitrification inhibition as a viable nitrous oxide mitigation strategy in grazed livestock systems

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Soil oxygen depletion and corresponding nitrous oxide production at hot moments in an agricultural soil
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Fate of 15N-labelled urea when applied to long-term fertilized soils of varying fertility
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Bacterial communities in paddy soils changed by milk vetch as green manure: A study conducted across six provinces in South China
Gao, S., Cao, W., Zhou, G. & Rees, R. M., Aug 2021, In: Pedosphere. 31, 4, p. 521-530 10 p.

A Multifunctional Solution for Wicked Problems: Value-Chain Wide Facilitation of Legumes Cultivated at Bioregional Scales Is Necessary to Address the Climate-Biodiversity-Nutrition Nexus
Iannetta, P. PM., Hawes, C., Begg, G. S., Maass, H., Ntatsi, G., Savvas, D., Vasconcelos, M., Hamann, K., Williams, M., Styles, D., Toma, L., Shrestha, S., Balazs, B., Kelemen, E., Debeljak, M., Trajanov, A., Vickers, R. & Rees, RM., 23 Jul 2021, (First published) In: Frontiers in Sustainable Food Systems. 5, 692137.

Cropping system design can improve nitrogen use efficiency in intensively managed agriculture
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Legume-modified rotations deliver nutrition with lower environmental impact
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Combining process modelling and LAI observations to diagnose winter wheat nitrogen status and forecast yield
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Green manuring inhibits nitrification in a typical paddy soil by changing the contributions of ammonia-oxidizing archaea and bacteria

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Carbon substrates exert a stronger role than mineral nitrogen application in structuring soil diazotroph communities during Chinese milk vetch growth

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Representing crop rotations in life cycle assessment: a review of legume LCA studies

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Co-incorporation of rice straw and leguminous green manure can increase soil available nitrogen (N) and reduce carbon and N losses: An incubation study

ZHOU, G., CAO, W., BAI, J., XU, C., ZENG, N., GAO, S., REES, R. M. & DOU, F., Oct 2020, In: Pedosphere. 30, 5, p. 661-670 10 p.

A model-data fusion approach to analyse carbon dynamics in managed grasslands

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Regional land use efficiency and nutritional quality of protein production

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Management of rice straw with relay cropping of Chinese milk vetch improved double-rice cropping system production in southern China

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Understanding and quantifying carbon cycling in managed grasslands through model-data fusion

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Isolating the effect of soil properties on agricultural soil greenhouse gas emissions under controlled conditions

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Mitigating nitrous oxide emissions from agricultural soils by precision management

Rees, RM., Maire, JM., Florence, A., Cowan, N., Skiba, U. M., van der Weerden, T. & Ju, X., 2 Mar 2020, In: Frontiers of Agricultural Science and Engineering. 7, 1, p. 75-80 6 p.

Nitrogen fertiliser interactions with urine deposit affect nitrous oxide emissions from grazed grasslands

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Characterising the biophysical, economic and social impacts of soil carbon sequestration as a greenhouse gas removal technology

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Co-incorporation of Chinese milk vetch (*Astragalus sinicus* L.) and rice (*Oryza sativa* L.) straw minimizes CH₄ emissions by changing the methanogenic and methanotrophic communities in a paddy soil

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The sensitivity of soil organic carbon pools to land management varies depending on former tillage practices

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Just the tonic! Legume biorefining for alcohol has the potential to reduce Europe's protein deficit and mitigate climate change

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Identifying urine patches on intensively managed grassland using aerial imagery captured from remotely piloted aircraft systems

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