

## **Leverhulme Centre for Climate Change Mitigation (LC<sup>3</sup>M)**

### **Full publication listing through to February 2025**

#### **2025**

- 76) Beerling, D.J., Kantzas, E.P., Lomas, M.R., Taylor, L.L., Zhang, S., Kanzaki, Y., Eufrazio, R.M., Renforth, P., Mecure, J-F., Pollitt, H., Holden, P.B., Edwards, N.R., Koh, L., Epihov, D.Z., Wolf, A., Hansen, J.E., Banwart, S.A., Pidgeon, N.F., Reinhard, C.T., Planavsky, N.J. & Val Martin, M. (2025) Transforming US agriculture for carbon removal with enhanced weathering. *Nature*.  
<https://doi.org/10.1038/s41586-024-08429-2>
- 75) Cox, E., Lim, R., Spence, E., Payne, M., Beerling, D. & Pidgeon, N.F. et al (2025) Question-led innovation: public priorities for enhanced weathering research in Malaysia. *Environmental Science and Policy*, 163, 103977. <https://doi.org/10.1016/j.envsci.2024.103977>

#### **2024**

- 74) Abd Aziz, A., Nor Ghani, A., Sugiyama, M., del Barrio Alvarez, D., Cox, E., Spence, E. & Kamaludin, M. (2024). Public perception of Carbon Dioxide Removal (CDR) and its influencing factors: Evidence from a survey in Malaysia. *Sustainability Science*. <http://dx.doi.org/10.1007/s11625-024-01587-2>
- 73) Holden, F.J., Davies, K., Bird, M.I., Hume, R., Green, H., Beerling D.J. & Nelson, P.N. (2024). In-field carbon dioxide removal via weathering of crushed basalt applied to acidic tropical agricultural soil. *Science of the Total Environment*. 955,176568. <https://doi.org/10.1016/j.scitotenv.2024.176568>
- 72) Cox, E., Bellamy, R. & Waller, L. (2024). Public attitudes and emotions toward novel carbon removal methods in alternative sociotechnical scenarios. *Environmental Research Letters* 19(8), article number: 84026. <http://dx.doi.org/10.1088/1748-9326/ad5dd0>
- 71) Epihov, D.Z., Banwart, S.A., McGrath, S.P., Martin, D., Kantola, I.B., Masters, M.D., DeLucia, E.H. & Beerling, D.J. (2024) Iron chelation in soil: a scalable biotechnology for accelerating carbon removal by enhanced weathering of basalt. *Environmental Science & Technology* **58** (27), 11970-11987  
<https://doi.org/10.1021/acs.est.3c10146>
- 70) Oppon, E., Lenny Koh, S.C. & Eufrazio, R. (2024) Sustainability performance of enhanced weathering across countries: A triple bottom line approach. *Energy Economics* **136**, 2024, 107722,  
<https://doi.org/10.1016/j.eneco.2024.107722>
- 69) Weber, J., Keeble, J., Abraham, N.L., Beerling, D.J. & Val Martin, M. (2024) Global agricultural N<sub>2</sub>O emission reduction strategies deliver climate benefits with minimal impact on stratospheric O<sub>3</sub> recovery. *npj Climate and Atmospheric Science*, **7**. <https://doi.org/10.1038/s41612-024-00678-2>
- 68) Lamb, W.F., Müller-Hansen, F., Cox, E., Repke, T., Bellamy, R. & Lueck, S. (2024) Chapter 6: Public Perceptions and Communication. *The State of Carbon Dioxide Removal*, 2nd edition.  
<https://www.stateofcdr.org/> <https://doi.org/10.17605/OSF.IO/QN6FV>
- 67) Cox, E., Shirani, F. & Rouse, P. (2024) Voices from the algorithm: Large language models in social research. *Energy Research and Social Science* 113. <https://doi.org/10.1016/j.erss.2024.103559>
- 66) Eufrazio Espinosa, R.M. & Lenny Koh, S.C. (2024) Forecasting the ecological footprint of G20 countries in the next 30 years. *Sci Rep* **14**, 8298. <https://doi.org/10.1038/s41598-024-57994-z>
- 65) Contzen, N., Perlaviciute, G., Steg, L., Reckels, S.C., Alves, S., Bidwell, B., Böhm, G., Bonaiuto, M., Chou, L-F., Corral-Verdugo, V., Dessi, F., Dietz, T., Doran, R., do Carmo Eulálio, M., Fielding, K., Gómez-Román, C., Granskaya, J.V., Gurikova, T., Hernández, B., Maira P., Kabakova, T., Lee, C-H., Li, F., Lima, M.L., Liu, L., Luís, S., Muinos, G., Ogunbode, C.A., Ortiz, M.V., Pidgeon, N., Argüello Pitt, M., Rahimi, L., Revokatova, A., Cecilia Reyna, C., Schuitema, G., Shwom, R., Yalcinkaya, N.S.,

- Spence, E. & Sütterlin, B. (2024) Public opinion about solar radiation management: A cross-cultural study in 20 countries around the world. *Climatic Change* **177**, 65. <https://doi.org/10.1007/s10584-024-03708-3>
- 64) Hilsner, H., Hiraldo, L., Moreau, C., Draiby, A., Cox, E., Andrews, M.G., Winks, L. & Walworth, N.G. (2024) Public engagement and collaboration for carbon dioxide removal: lessons from a project in the Dominican Republic. *Frontiers in Climate*, **6**. <https://doi.org/10.3389/fclim.2024.1290999>
- 63) Green, H., Larsen, P., Liu, Y. & Nelson, P.N. (2024) Carbon dioxide removal via weathering of sugarcane mill ash under different soil conditions. *Applied Geochemistry* **165**, 105940. <https://doi.org/10.1016/j.apgeochem.2024.105940>
- 62) Weber, J., King, J. A., Abraham, L., Grosvenor, D., Smith, C., Shin, Y., Lawrence, P., Roe, S., Beerling, D.J. & Val Martin, M. (2024) Chemistry-albedo feedbacks offset up to a third of forestation's CO<sub>2</sub> removal benefits. *Science* **383**, 860-864. <https://doi.org/10.1126/science.adg6196>
- [Perspective by Garry Hayman, Forestation is not an easy fix. *Science* **383**, 6685 (833-834) (2024). <https://www.science.org/doi/10.1126/science.adn7026>]
- 61) Beerling, D.J., Epihov, D.Z., Kantola, I.B., Masters, M.D., Reershemius, T., Planavsky, N.J., Reinhard, C.T., Jordan, J.S., Thorne, S.J., Weber, J., Martin, M.V., Freckleton, R.P., Hartley, S.E., James, R.H., Pearce, C.R., DeLucia, E.H. & Banwart, S.A. (2024) Enhanced weathering in the US Corn Belt delivers carbon removal with agronomic benefits. *Proceedings of the National Academy of Science of the United States of America* **121**(9), e2319436121. <https://doi.org/10.1073/pnas.2319436121>

## **2023**

- 60) Hilsner, H., Cox, E., Moreau, C., Hiraldo, L., Draiby, A., Winks, L., Andrews, M.G. & Walworth, N.G. (2024) Localized governance of carbon dioxide removal in small island developing states. *Environmental Development*, Volume 49, 2024, 100942, <https://doi.org/10.1016/j.envdev.2023.100942>
- 59) Reershemius, T., Kelland, M.E., Jordan, J.S., Davis, I.R., D'Ascanio, R., Kalderon-Asael, B.K., Aseal, D., Surhthoff, T.J., Epihov, D.Z., Beerling, D.J., Reinhard, R.T. & Planavsky, N.J. (2023) Initial validation of a soil-based mass-balance approach for empirical monitoring of enhanced rock weathering rates. *Environmental Science & Technology*, **57**, 19497-19507. <https://doi.org/10.1021/acs.est.3c03609>
- 58) Val Martin, M., Blanc-Betes, E., Fung, M.K., Kantzas, E.P., Kantola, I.B., Chiaravalloti, I., Taylor, L.L., Emmons, L.K., Wieder, W.R., Planavsky, N.J., Masters, M.D., DeLucia, M.D., Tai, A.P.K. & Beerling, D.J. (2023) Improved nitrogen cycle in a land surface model (CLM5) to quantify soil N<sub>2</sub>O, NO, and NH<sub>3</sub> emissions from enhanced weathering with croplands. *Geoscientific Model Development*, **16**, 5783-5801. <https://doi.org/10.5194/gmd-16-5783-2023>
- 57) Renforth, P., Bellamy, R., Beerling, D., Boettcher, M., Bonalumi, Brandao, M., Fridahl, M., Fuss, S., Hansson, A., Heyward, C. Kolosz, B., Lamers, P., McLaren, D., Pomi, R., Sanchez, D.L., Shayegh, Sick, V., Van der Spek, M., Vishal, V. & Wilcox, J. (2023) Speciality grand challenge: renaming our section to 'Carbon Dioxide Removal'. *Frontiers in Climate*, **5**, <https://doi.org/10.3389/fclim.2023.1279109>.
- 56) Kantola, I. B., Blanc-Betes, E., Masters, M. D., Chang, E., Marklein, A., Moore, C. E., von Haden, A., Bernacchi, C. J., Wolf, A., Epihov, D. Z., Beerling, D.J. & DeLucia, E.H. (2023) Improved net carbon budgets in the US Midwest through direct measured impacts of enhanced weathering. *Global Change Biology*, **00**, 1–17. <https://doi.org/10.1111/gcb.16903>
- 55) Oppon, E., Koh, S., Eufrazio, R. *et al.* (2023) Towards sustainable food production and climate change mitigation: an attributional life cycle assessment comparing industrial and basalt rock dust fertilisers. *Int J Life Cycle Assess* (2023). <https://doi.org/10.1007/s11367-023-02196-4>
- 54) Carr-Whitworth, R., Barrett, J., Colechin, M., Pidgeon, N., Style, R., Betts-Davies, S., Cox, E., Watson, A. & Wilson, O. (2023). Delivering net zero in the UK: Twelve conditions for success. *Environmental Research Letters* **18**, 07404. <http://dx.doi.org/10.1088/1748-9326/ace199>

- 53) Beerling, D., Kantzas, E., Val Martin, M., Espinosa, R., Pidgeon, N. & Banwart, S. (2023) UK Government Policy Brief: Potential of enhanced rock weathering deployed with UK agriculture to sequester atmospheric carbon dioxide. Available at *figshare*. *Online resource*.  
<https://doi.org/10.6084/m9.figshare.22888646.v3>
- 52) West, L.J., Banwart, S.A., Val Martin, M., Kantzas, E. & Beerling, D.J. (2023) Making mistakes in estimating the CO<sub>2</sub> sequestration potential of UK croplands with enhanced weathering. *Applied Geochemistry*, **151**, 105591, <https://doi.org/10.1016/j.apgeochem.2023.105591>

## **2022**

- 51) Larkin, C.S., Andrews, M.G., Pearce, C.R., Yeong, K.L., Beerling, D.J., Bellamy, J., Benedick, S., Freckleton, R.P., Goring-Harford, H., Sadekar, S. & James, R.H. (2022) Quantification of CO<sub>2</sub> removal in a large-scale enhanced weathering field trial on an oil palm plantation in Sabah Malaysia. *Frontiers Climate*, **4**, <https://doi.org/10.3389/fclim.2022.959229>.
- 50) Vakilifard, N., Williams, R.G., Holden, P.B., Turner, K., Edwards, N.R. & Beerling, D.J. (2022) Impact of negative and positive CO<sub>2</sub> emissions on global warming metrics using an ensemble of Earth system model simulations. *Biogeosciences*, **19**, 4249-4265. <https://doi.org/10.5194/bg-19-4249-2022>
- 49) Oppon, E., Richter, J.S., Koh, L.S.C. & Nabayiga, H. (2022) Macro-level economic and environmental sustainability of negative emission technologies; Case study of crushed silicate production for enhanced weathering. *Ecological Economics*, **Volume 204**, Part A, 2023, 107636.  
<https://doi.org/10.1016/j.ecolecon.2022.107636>
- 48) Vienne, A., Poblador, S., Portillo-Estrada, M., Hartmann, J., Ijehon, S., Wade, P. & Vicca, S. (2022) Enhanced Weathering Using Basalt Rock Powder: Carbon Sequestration, Co-benefits and Risks in a Mesocosm Study With *Solanum tuberosum*. *Front. Clim.* 4:869456.  
<https://doi.org/10.3389/fclim.2022.869456>
- 47) Kemp, S.J., Lewis, A.L. & Rushton, J.C. (2022) Detection and quantification of low levels of carbonate mineral species using thermogravimetric-mass spectrometry to validate CO<sub>2</sub> drawdown via enhanced rock weathering. *Applied Geochemistry*, **146**. <https://doi.org/10.1016/j.apgeochem.2022.105465>
- 46) Cox, E., Spence, E. & Pidgeon, N. (2022) Deliberating enhanced weathering: Public frames, iconic ecosystems and the governance of carbon removal at scale. *Public Understanding of Science*.  
doi:[10.1177/09636625221112190](https://doi.org/10.1177/09636625221112190)
- 45) Semieniuk, G., Holden, P.B., Mercure, J-F, Salas, P., Pollitt, H., Jobson, K., Vercoulen, P., Chewpreecha, U., Edwards, N.R. & Vinueles, J.E. (2022) Stranded fossil-fuel assets translate to major losses for investors in advanced economies. *Nature Climate Change*, **12**,  
<https://doi.org/10.1038/s41558-022-01356-y>.
- 44) Eufrasio, R.M., Kantzas, E.P., Edwards, N.R., Holden, P.B., Pollitt, H., Mercure, J.F., Koh, S.C.L. & Beerling, D.J. (2022) Environmental and health impacts of atmospheric CO<sub>2</sub> removal by enhanced rock weathering depend on nations' energy mix. *Communications Earth & Environment*, **3**, 106.  
<https://doi.org/10.1038/s43247-022-00436-3>
- 43) Kantzas, E.P., Val Martin, M., Lomas, M.R., Eufrasio, R.M., Renforth, P., Lewis, A.L., Taylor, L.L., Mercure, J.F., Pollitt, H., Vercoulen, P.V., Vakilifard, N., Holden, P.B., Edwards, N.R., Koh, L., Pidgeon, N.F., Banwart, S.A. & Beerling, D.J. (2022) Substantial carbon drawdown potential from enhanced rock weathering in the United Kingdom. *Nature Geoscience*, **15**, 382-389.  
<https://doi.org/10.1038/s41561-022-00925-2>

[Commentary on #43: *Nature Geoscience*, **15**, 341, 2022]

*This paper reports the first coupled dynamic enhanced rock weathering model findings in which a soil profile weathering model is coupled to a land surface model with nitrogen cycle representation. The modelling advance is akin to moving from equilibrium vegetation models developed in the 1980s to dynamic global vegetation models now embedded in Earth system models. It allows us to account mechanistically for N-fertilizer effects on basal mineral weathering rates. Simulations are uniquely (for ERW modelling analyses) constrained by resource production scenarios. We to show adding rock dust to*

UK agricultural soils could remove between 6 and 30 million tonnes of carbon dioxide (CO<sub>2</sub>) from the atmosphere annually by 2050 -- up to 45 per cent of the atmospheric carbon dioxide removal needed for the UK to reach net zero.

- 42) Redondo-Bermúdez, M., Jorgensen, A., Cameron, R., & Val Martin, M. (2022) Green infrastructure for air quality plus (GI4AQ+): Defining critical dimensions for implementation in schools and the meaning of 'plus' in a UK context, *Nature-Based Solutions*, **Volume 2**, <https://doi.org/10.1016/j.nbsj.2022.100017>
- 41) Fung, K. M., Val Martin, M., & Tai, A.P.K. (2022) Modeling the interinfluence of fertiliser-induced NH<sub>3</sub> emission, nitrogen deposition, and aerosol radiative effects using modified CESM2, *Biogeosciences*, **19**, 1635–1655, <https://doi.org/10.5194/bg-19-1635-2022>

## **2021**

- 40) Mercure, J.-F., Salas, P., Vercoulen, P., Semieniuk, G., Lam, A., Pollitt, H., Holden, P.B., Vakilifard, N., Chewpreecha, U., Edwards, N.R. & Vinuales, J.E. (2021) Reframing incentives for climate policy action. *Nature Energy*, **6**, 1133-1139. <https://doi.org/10.1038/s41560-021-00934-2>
- 39) James, R., Bullock, L., Larkin, C. & Matter, J. (2021) Geological solutions for carbon dioxide removal. *Geoscientist* (autumn), 16-22.
- 38) Vakilifard, N., Kantzas, E.P., Edwards, N.R., Holden, P.B. & Beerling, D.J. (2021) The role of enhanced weathering deployment with agriculture in limiting future warming and protecting coral reefs. *Environmental Research Letters*, **19**, 094005. <https://doi.org/10.1088/1748-9326/ac1818>
- 37) Gomez-Casanovas, N., Blanc-Betes, E., Moore, C.E., Bernachi, C.J., Kantola, I. & DeLucia, E.H. (2021) A review of transformative strategies for climate mitigation by grasslands. *Science of the Total Environment*, **799**, 149466. <https://doi.org/10.1016/j.scitotenv.2021.149466>
- 36) Lewis, A.L., Sarkar, B., Wade, P., Kemp, S.J., Hodson, M.E., Taylor, L.L., Yeong, K.L., Davies, K., Nelson, P.N., Bird, M.I., Kantola, I.B., Masters, M.D., DeLucia, E., Leake, J.R., Banwart, S.A. & Beerling, D.J. (2021) Effects of mineralogy, chemistry and physical properties of basalts on carbon capture potential and plant-nutrient element release via enhanced weathering. *Applied Geochemistry*, **132**, 105023. <https://doi.org/10.1016/j.apgeochem.2021.105023>
- 35) Spence, E., Cox, E. & Pidgeon, N. (2021) Exploring cross-national public support for the use of enhanced weathering as a land-based carbon dioxide removal strategy. *Climatic Change*, **165**, art. 23 <https://doi.org/10.1007/s10584-021-03050-y>
- 34) Horton, P., Long, S.P., Smith, P., Banwart, S.A. & Beerling, D.J. (2021) Technologies to deliver food and climate security through agriculture. *Nature Plants*, **7**, 250–255. <https://doi.org/10.1038/s41477-021-00877-2>
- 33) Epihov, D.Z., Saltonstall, K., Batterman, S.A., Hedin, L.O., Hall, J.S., van Breugel, M., Leake, J.R. & Beerling, D.J. (2021) Legume-microbiome interactions unlock mineral nutrients in regrowing tropical forests. *Proceedings of the National Academy of Sciences, USA*, **118**, e2022241118. <https://doi.org/10.1073/pnas.2022241118>.  
*Paper #33 reports enhanced weathering by N<sub>2</sub>-fixing legumes trees in tropical forests facilitated by the recruitment of a below-ground microbiome that also benefits neighbouring trees.*
- 32) Cox, E., Spence, E. & Pidgeon, N. (2021) But They told us it was safe! Carbon dioxide removal, fracking, and ripple effects in risk perceptions. *Risk Analysis*. <https://doi.org/10.1111/risa.13717>.
- 31) Cox E., Spence, E. & Pidgeon, N. (2021) What people think about Carbon Dioxide Removal. Leverhulme Centre for Climate Change Mitigation, University of Sheffield, U.K. [White Paper] Available at <http://lc3m.org/publications/>
- 30) Cox, E., Boettcher, M., Spence, E. & Bellamy, R. (2021) Casting a wider net on ocean NETs. *Frontiers in Climate*. <https://doi.org/10.3389/fclim.2021.576294>.

- 29) Taylor, L.L., Driscoll, C.T., Groffman, P.M., Rau, G.H., Blum, J.D. & Beerling, D.J. (2021) Increased carbon capture by a silicate-treated forested watershed affected by acid deposition. *Biogeosciences*, **18**, 169–188. <http://dx.doi.org/10.5194/bg-18-169-2021>

## **2020**

- 28) Blanc-Betes, E., Kantola, I.B., Gomez-Casanovas, N., Hartman, M.D., Parton, W.J., Lewis, A.L., Beerling, D.J. & DeLucia, E.H. (2020) In silico assessment of the potential of basalt amendments to reduce N<sub>2</sub>O emissions from bioenergy crops. *GCB Bioenergy*, **13**, 224-241. <http://dx.doi.org/10.1111/gcbb.12757>

*Paper #28 reports first evidence from LC<sup>3</sup>M field trials for consistent mitigation of N<sub>2</sub>O fluxes from US corn-belt soils over three growing seasons following basalt amendment.*

- 27) Beerling, D.J., Kantzas, E., Lomas, M.R., Wade, P., Eufrazio, R.M., Renforth, P., Quirk, J., Sarkar, B., Andrews, G., James, R.H., Pearce, C.R., Khanna, M., Koh, L., Quegan, S., Pidgeon, N.F., Janssens, I., Hansen, J. & Banwart, S.A. (2020) Potential for large-scale CO<sub>2</sub> removal via enhanced rock weathering with croplands. *Nature*, **583**, 242-248. <https://doi.org/10.1038/s41586-020-2448-9>

[Commentary on #26: News & Views, *Nature*, **583**, 204-205; Editorial, *Nature*, **583**, 167-168, 2020]

*Paper #24 develops the theory to simulate the weathering of particle size distributions, and an initial nation-by-nation assessment of CO<sub>2</sub> removal potential by enhanced weathering constrained by current and future energy policy scenarios using an advanced and robust computationally efficient modelling approach.*

- 26) Cox, E., Spence, E. & Pidgeon, N. (2020) Public perceptions of carbon dioxide removal in the United States and the United Kingdom. *Nature Climate Change*, **10**, 744-749. <https://doi.org/10.1038/s41558-020-0823-z>

- 25) MacDougall, A.H., Frölicher, T.L., Jones, C.D., Rogelj, J., Matthews, H.D., Zickfeld, K., Arora, V.K., Barrett, N.J., Brovkin, V., Burger, F.A., Eby, M., Eliseev, A.V., Hajima, T., Holden, P.B., Jeltsch-Thömmes, A., Koven, C., Mengis, N., Menviel, L., Michou, M., Mokhov, I.I., Oka, A., Schwinger, J., Séférian, R., Shaffer, G., Sokolov, A., Tachiiri, K., Tjiputra, J., Wiltshire, A. & Ziehn, T. (2020) Is there warming in the pipeline? A multi-model analysis of the Zero Emissions Commitment from CO<sub>2</sub>. *Biogeosciences*, **17**, 2987–3016. <https://doi.org/10.5194/bg-17-2987-2020>

- 24) Kelland, M.E., Wade, P.W., Lewis, A.L., Taylor, L.L., Sarkar, B., Andrews, M.G., Lomas, M.R., Cotton, T.E.A., Kemp, S.J., James, R.H., Pearce, C.R., Hartley, S.E., Hodson, M.E., Leake, J.R., Banwart, S.A. & Beerling, D.J. (2020) Increased yield and CO<sub>2</sub> sequestration potential with the C<sub>4</sub> cereal *Sorghum bicolor* cultivated in basaltic rock dust-amended agricultural soil. *Global Change Biology*, **26**, 3658–3676. <https://doi.org/10.1111/gcb>

*Paper #24 reports the first evidence from mesocosm experiments that amendment of a UK agricultural soil with crushed basalt increased yields of the C<sub>4</sub> crop Sorghum and introduced a detailed 1-D soil profile PhreeqC reactive transport model for simulating rock grain weathering and carbon capture.*

- 23) Pidgeon, N. (2021) Engaging publics about environmental and technology risks: frames, values and deliberation. *Journal of Risk Research*, **24**, 28-46. <https://doi.org/10.1080/13669877.2020.174911>

- 22) Cox, E., Spence, E. & Pidgeon, N. (2020) Incumbency, trust, and the Monsanto effect: stakeholder discourses on greenhouse gas removal. *Environmental Values*, **29**, 197-220. <https://doi.org/10.3197/096327119X15678473650947>

## **2019**

- 21) Lawrence, D. M. et al (including Val Martin, M). (2019) The Community Land Model version 5: Description of new features, benchmarking, and impact of forcing uncertainty. *Journal of Advances in Modeling Earth Systems*, **11**, 4245-4287. <https://doi.org/10.1029/2018MS001583>

- 20) Cox, E., Royston, S. & Selby, J. (2019) From exports to exercise: how non-energy policies affect energy systems. *Energy Research and Social Science*, **55**, 179-188. <https://doi.org/10.1016/j.erss.2019.05.016>

- 19) Beerling, D.J. (2019) Can plants help us avoid seeding a human-made climate catastrophe? *Plants, People, Planet*, **1**, 310-314. <https://doi.org/10.1002/ppp3.10066>
- 18) Andrews, M.G. & Taylor, L.L. (2019) Combating climate change through enhanced weathering of agricultural soils. *Elements*, **15**, 253-258. <https://doi.org/10.2138/gselements.15.4.253>
- 17) Cox, E. & Edwards, N.R. (2019) Beyond carbon pricing: policy levers for negative emissions technologies. *Climate Policy*, **19**, 1144-1156. <https://doi.org/10.1080/14693062.2019.1634509>
- 16) Smith, P., Adams, J., Beerling, D.J., Beringer, T., Calvin, K.V., Fuss, S., Griscom, B., Hagemann, N., Kammann, C., Kraxner, F., Minx, J.C., Popp, A., Renforth, P., Vicente-Vicente, J.L. & Keesstra, S. (2019) Land-management options for greenhouse gas removal and their impacts on ecosystem services and the sustainable development goals. *Annual Review of Environment and Resources*, **44**, 255-286. <https://doi.org/10.1146/annurev-environ-101718-033129>

## **2018**

- 15) Arnold, S.R., Lombardozzi, D., J-F Lamarque, T. Richardson, L.K. Emmons, S. Tilmes, S.A. Sitch, G. Folberth, M.J. Hollaway, M. Val Martin (2018) Simulated global climate response to tropospheric ozone-induced changes in plant transpiration, *Geophysical Research Letters*, **45**. <https://doi.org/10.1029/2018GL079938>
- 14) Eufrazio-Espinosa, R.M. & Koh, L.S.C. (2019) The UK Path and the Role of NETs to Achieve Decarbonisation. In: Shurpali N., Agarwal A., Srivastava V. (eds) Greenhouse Gas Emissions. Energy, Environment, and Sustainability. *Springer, Singapore*. pp. 87-109. [https://doi.org/10.1007/978-981-13-3272-2\\_7](https://doi.org/10.1007/978-981-13-3272-2_7)
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[Commentary on #9: Editorial *Nature* **554**, 404-405, 2018]

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