

EGU21-12541

<https://doi.org/10.5194/egusphere-egu21-12541>

EGU General Assembly 2021

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The Frontiers of Deep Learning for Earth System Modelling

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This talk gives an overview of cutting-edge artificial intelligence applications and techniques for the earth-system sciences. We survey the most important recent contributions in areas including extreme weather, physics emulation, nowcasting, medium-range forecasting, uncertainty quantification, bias-correction, generative adversarial networks, data in-painting, network-HPC coupling, physics-informed neural nets, and geoengineering, amongst others. Then, we describe recent AI breakthroughs that have the potential to be of greatest benefit to the geosciences. We also discuss major open challenges in AI for science and their potential solutions. This talk is a living document, in that it is updated frequently, in order to accurately reflect this rapidly changing field.