

AI emulator and data assimilation of auroral current system

*Ryuho Kataoka¹, Shin ya Nakano², Shigeru Fujita², Aoi Nakamizo³

1. National Institute of Polar Research, 2. The Institute of Statistical Mathematics, 3. National Institute of Information and Communications Technology

Physics-based auroral simulations, such as Japanese REProduce Plasma Universe (REPPU) code, are not practically fast enough for the purpose of real-time space weather forecast, even using the designated super computers. Here we developed a million-times-faster “emulator” to surrogate the outputs of the physics-based simulation, using the machine-learning technique called Echo State Network. The newly developed emulator, the surrogate model for REPPU auroral Ionosphere version 2 (SMRAI2), enables us to realize the real-time space weather forecast of the auroral current system as well as ensemble forecast and data assimilation forecast.

Keywords: Machine learning, Space Weather Forecast, Aurora