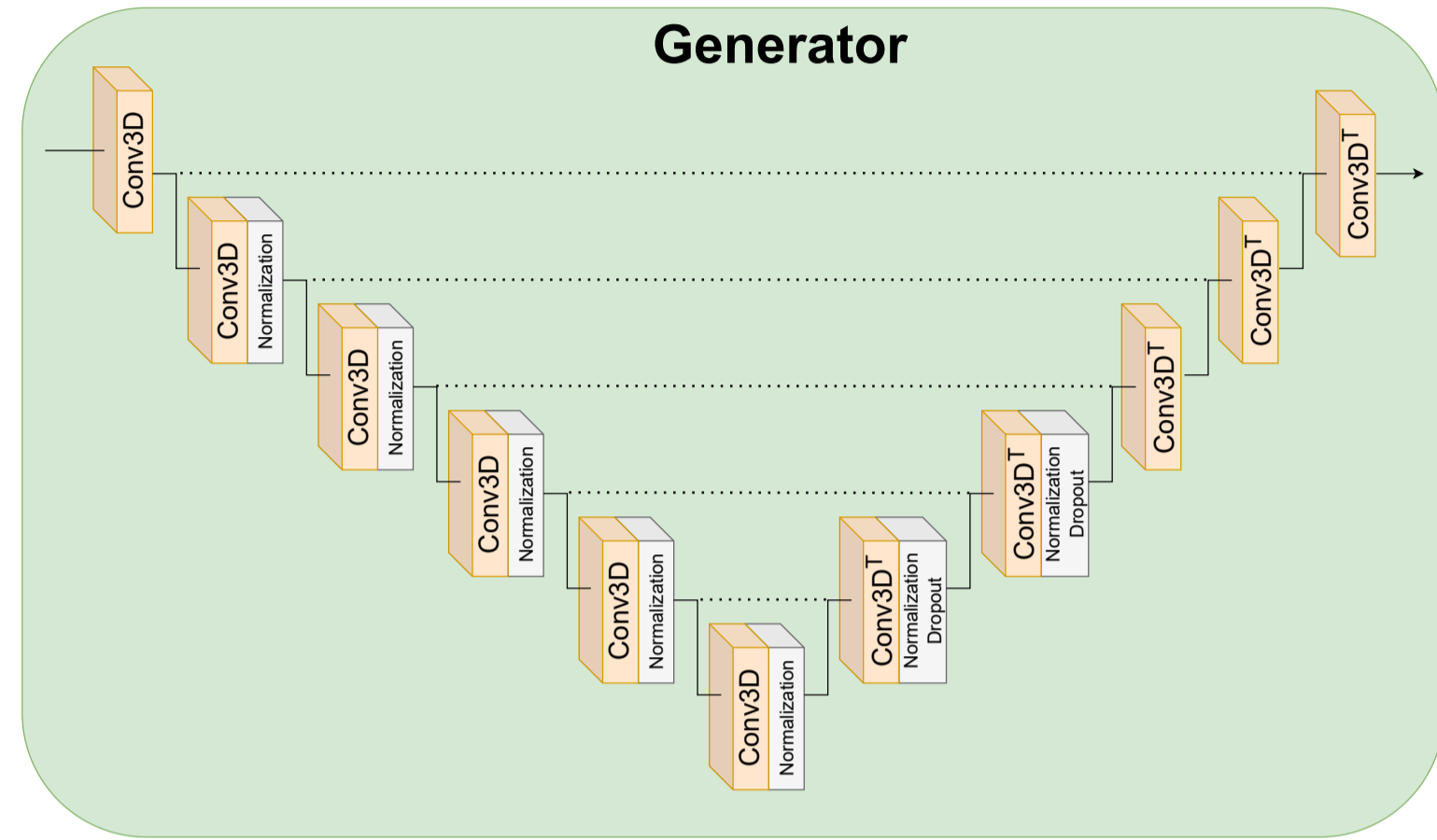
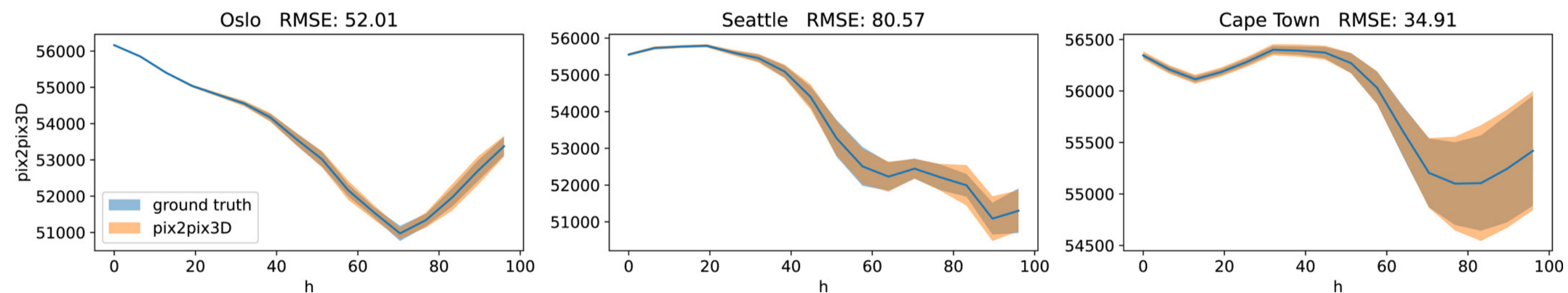
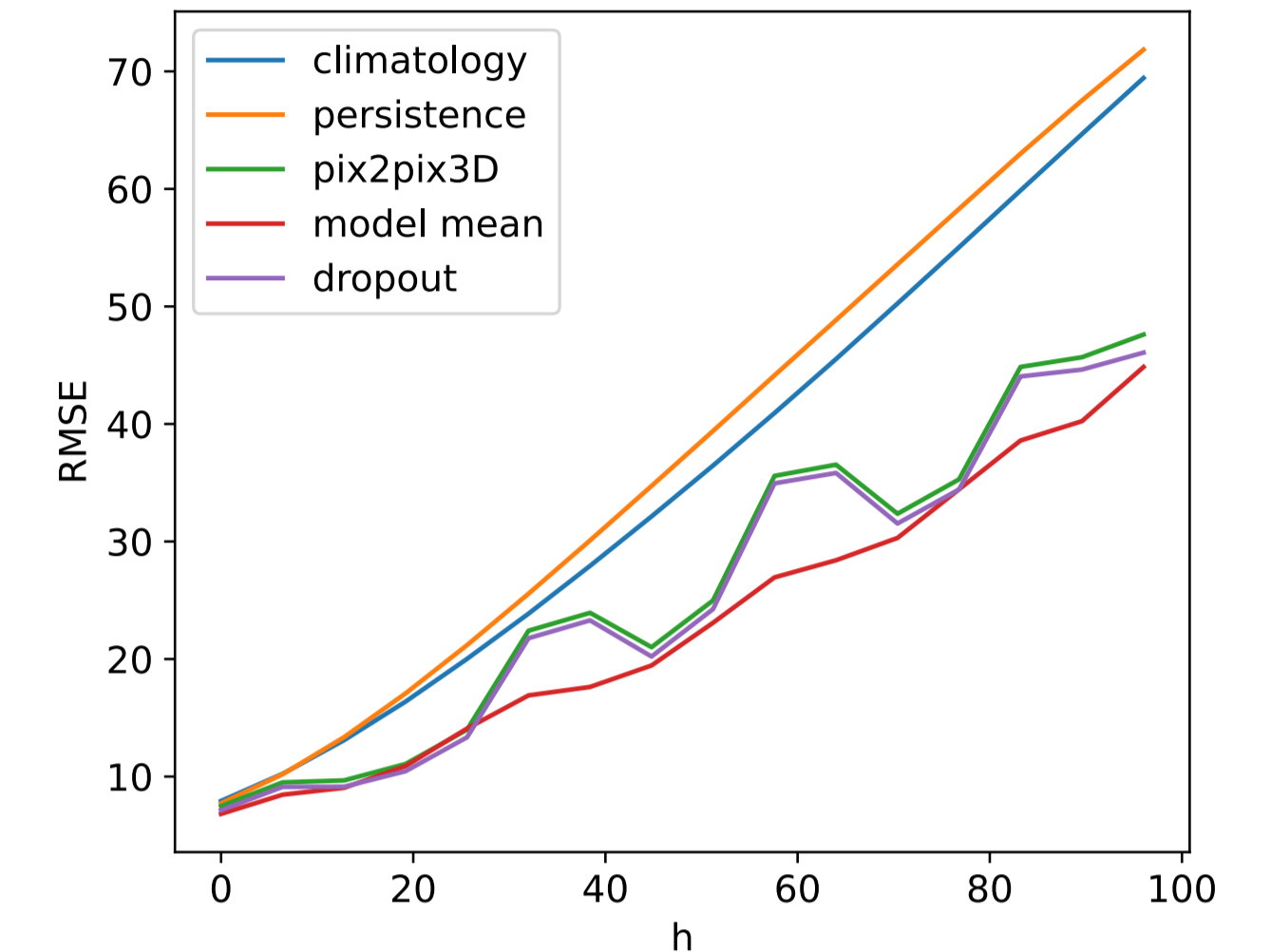
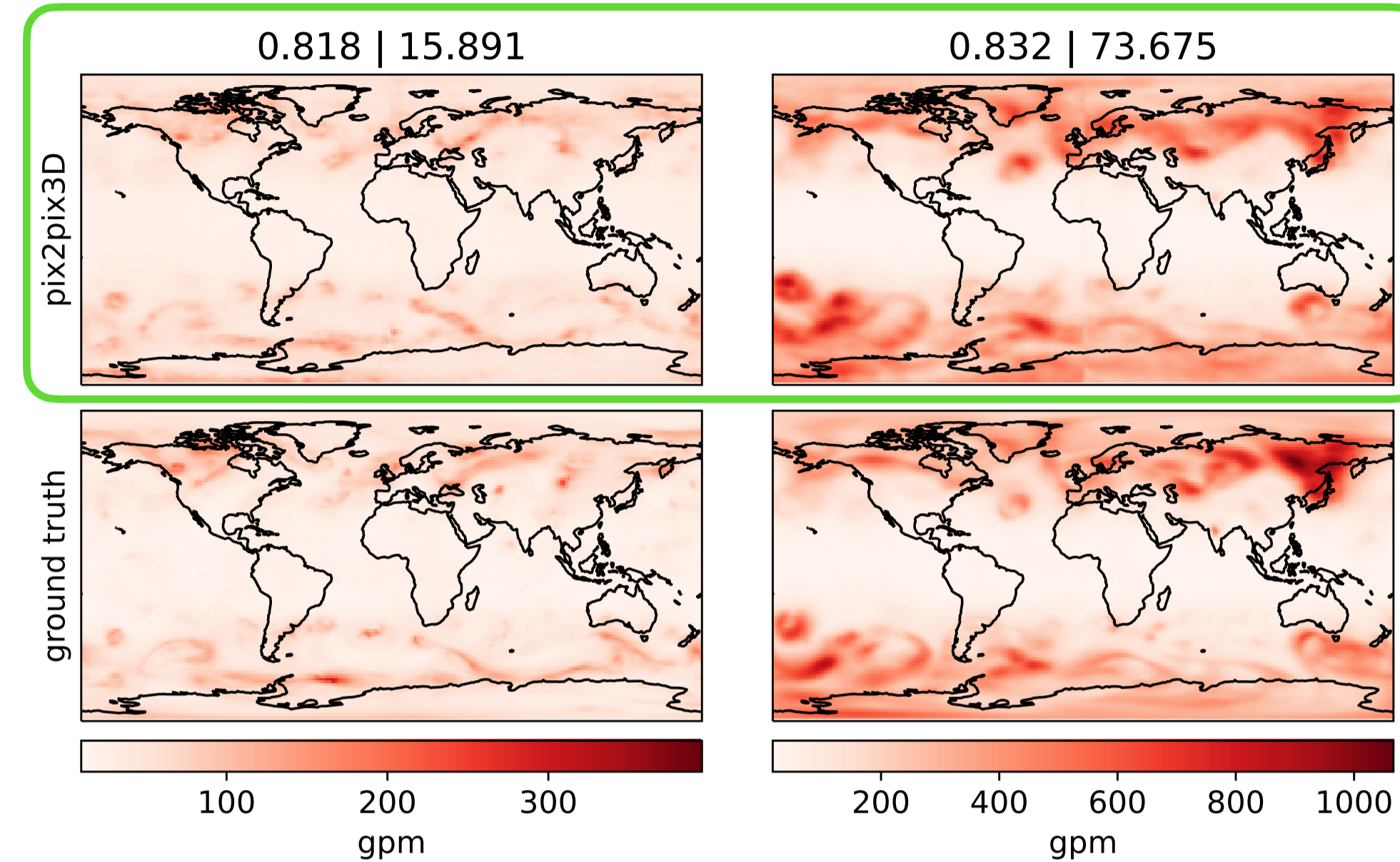


Using deep learning to generate the ensemble spread from deterministic weather predictions

Neural network



Results



Casimir-dissipation stabilized stochastic rotating shallow-water equations on the sphere

Stochastic RSW

$$\begin{aligned} d_t \mathbf{u} &= \underbrace{\left(-\mathbf{u} \cdot \nabla \mathbf{u} - \mathbf{f} \times \mathbf{u} - g \nabla h \right)}_{:=\text{det}} dt + \underbrace{\left(\frac{1}{2} \nabla \cdot \nabla \cdot (\mathbf{a} \mathbf{u}) dt - \sigma dB_t \cdot \nabla \mathbf{u} \right)}_{:=\text{sto}^V}, \\ d_t h &= -\nabla \cdot (\mathbf{u} h) dt + \underbrace{\left(\frac{1}{2} \nabla \cdot \nabla \cdot (\mathbf{a} h) dt - \sigma dB_t \cdot \nabla h \right)}_{:=\text{sto}^h}, \end{aligned}$$

Casimir dissipation

$$\left(\delta \int_0^T \ell(\mathbf{u}, h) dt \right) + \theta \int_0^T \gamma \left(\left[\frac{\delta C}{\delta \mathbf{m}}, \mathbf{u} \right], [\mathbf{u}, \mathbf{v}] \right) dt = 0$$

Results

