SuperIce - Super-resolution of sea ice thickness by combining machine learning and physical-based approach

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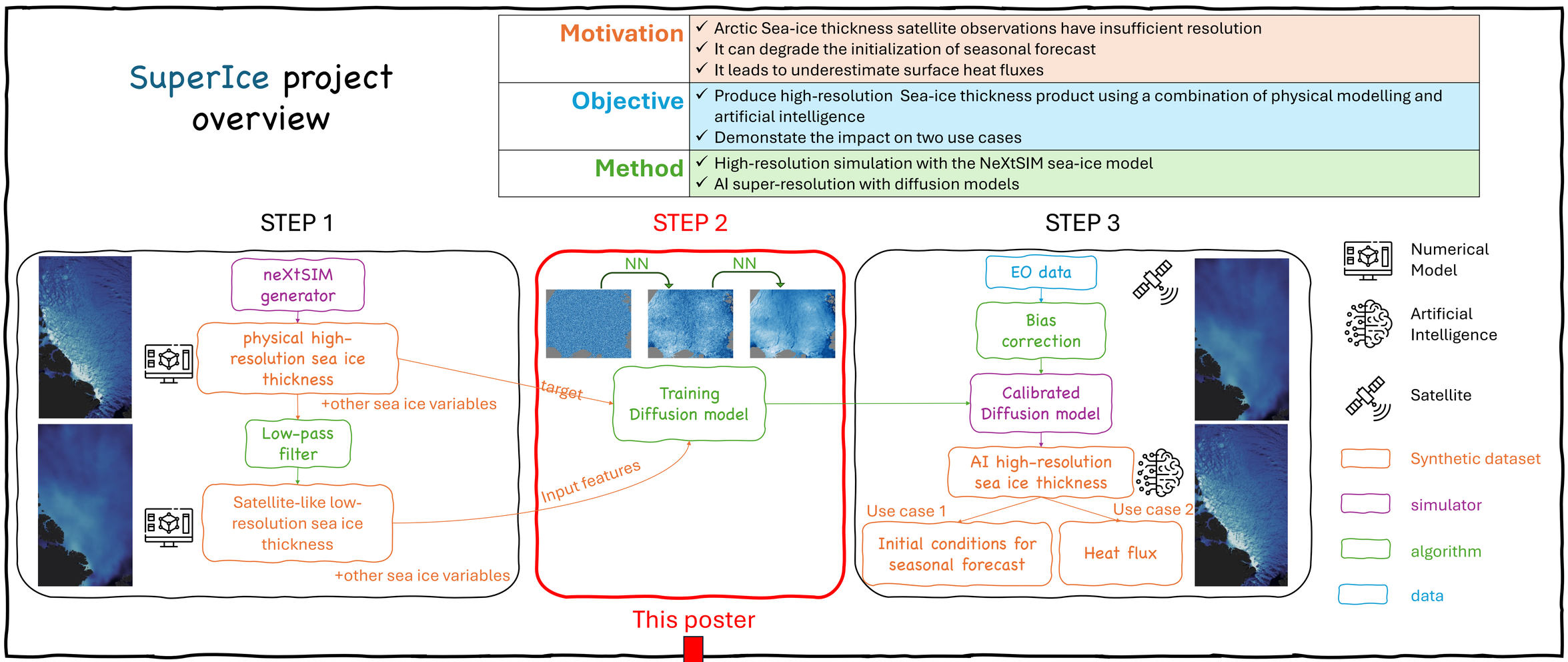
SuperIce project overview

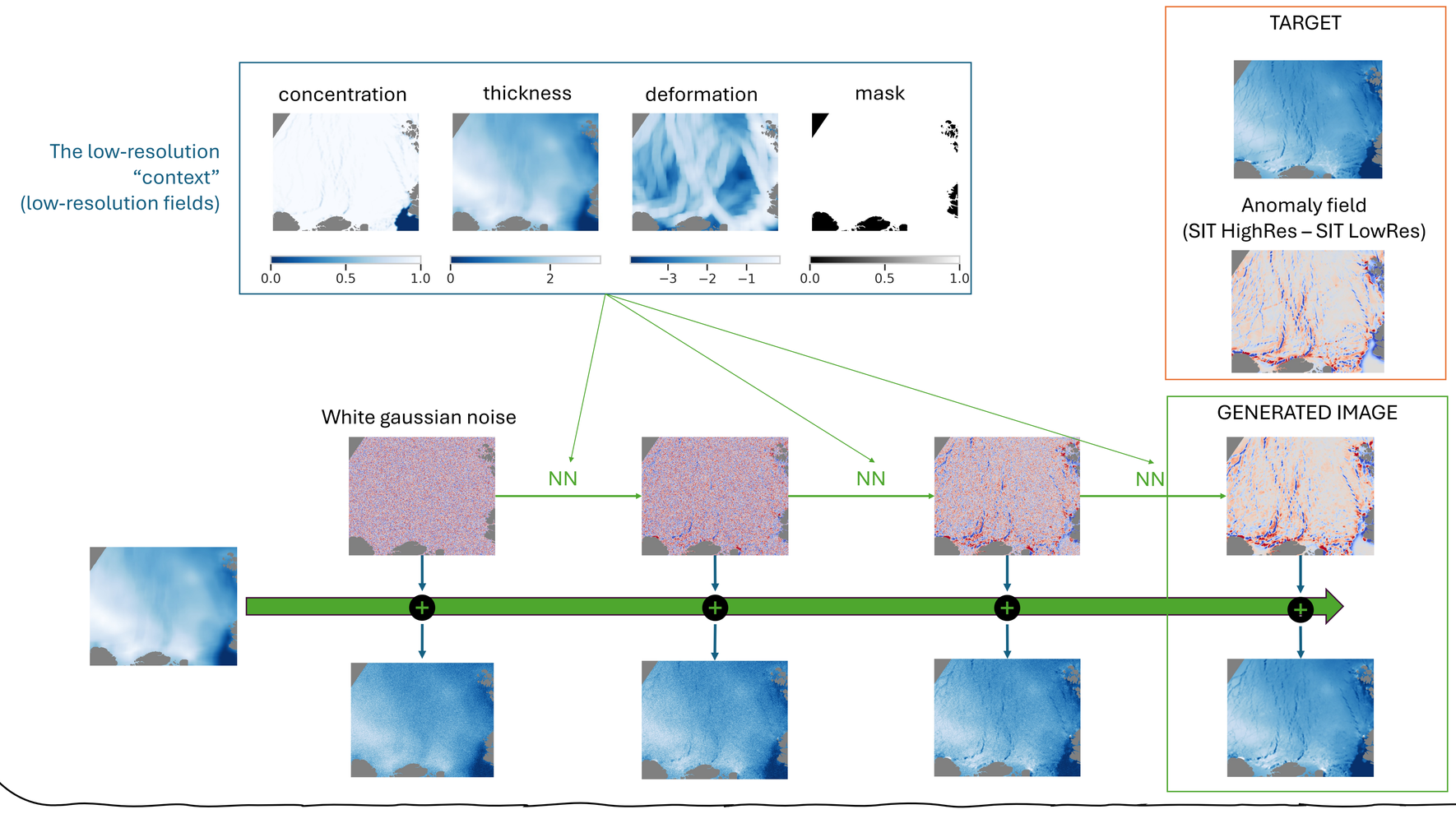
Motivation	✓ Arctic Sea-ice thickness satellite observations have insufficient resolution ✓ It can degrade the initialization of seasonal forecast ✓ It leads to underestimate surface heat fluxes
Objective	✓ Produce high-resolution Sea-ice thickness product using a combination of physical modelling and artificial intelligence ✓ Demonstate the impact on two use cases
Method	✓ High-resolution simulation with the NeXtSIM sea-ice model ✓ AI super-resolution with diffusion models



This poster

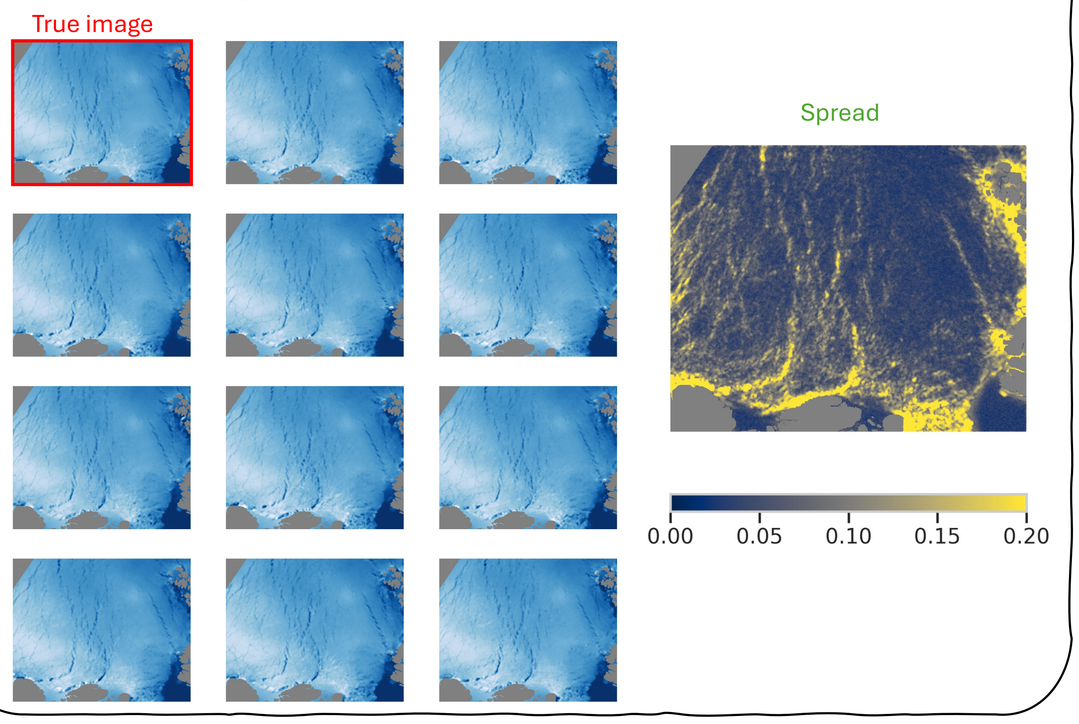
Principle of the diffusion model

Observable low-resolution images → A high-resolution image



Ensemble generation

The generated process depends on the noise and enables to generate an ensemble of likely high-resolution images.



Power Spectrum