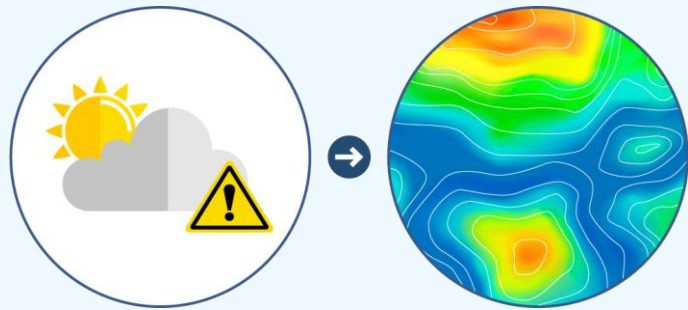


# SIGMAformer: Smarter Global Weather Forecasting



Weather forecasting is  
challenging



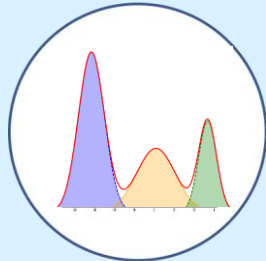
Complex, nonlinear  
spatiotemporal patterns



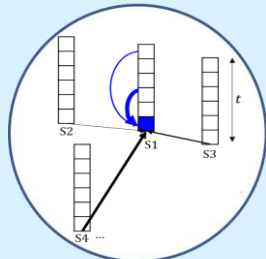
Novel  
spatiotemporal  
forecasting  
architecture

## SIGMAformer

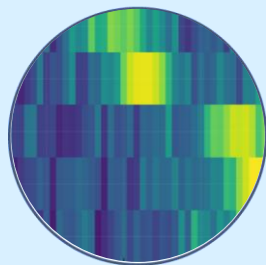
(Spatiotemporal Gaussian Mixture  
correlation Transformer)



GMPE → identifies  
critical patterns



DSTC → temporal +  
spatial correlation +  
adaptive weighting



Reduces noise,  
emphasizes key  
patterns

## Results

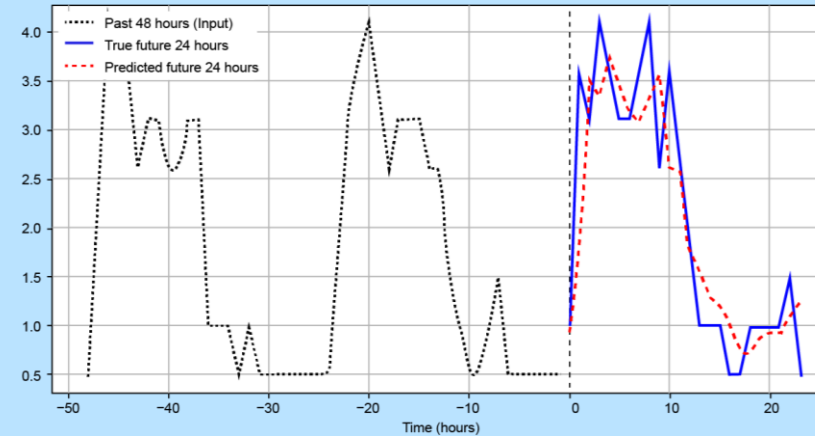


Outperforms state-of-the-art models

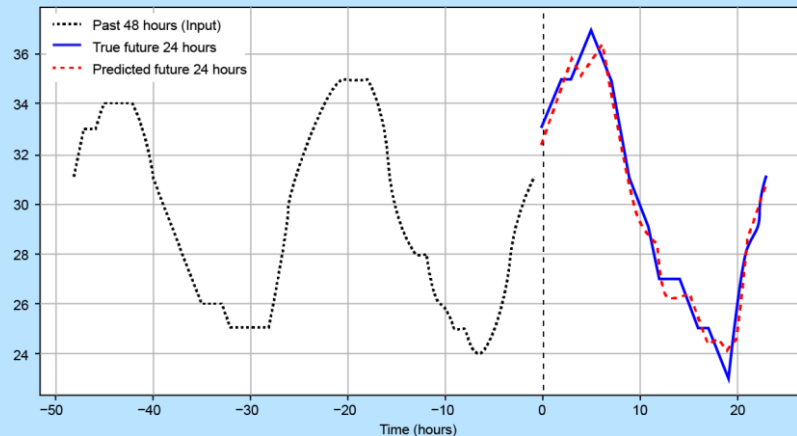


Interpretable insights into global  
weather patterns

Wind speed

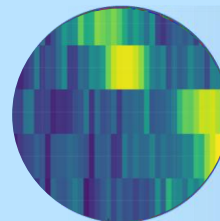


Temperature

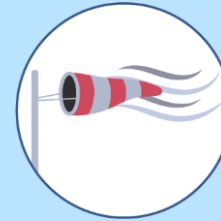


Consistently  
outperforms  
baselines

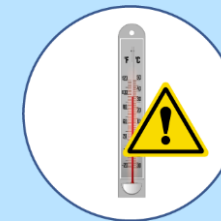
## Ablation studies



Removing  
DSTC



↑ 7.18% in  
MSE (wind  
speed)



↑ 7.22% in  
MSE  
(temperature)



↓ performance  
without  
DSTC

MSE: Mean squared error; MAE: Mean absolute error; GMPE: Gaussian mixture pattern extractor; DSTC: Dynamic spatiotemporal correlation

**SIGMAformer enhances global weather forecasting by capturing critical spatiotemporal patterns efficiently**