Using Neural Networks to speed up wave computations

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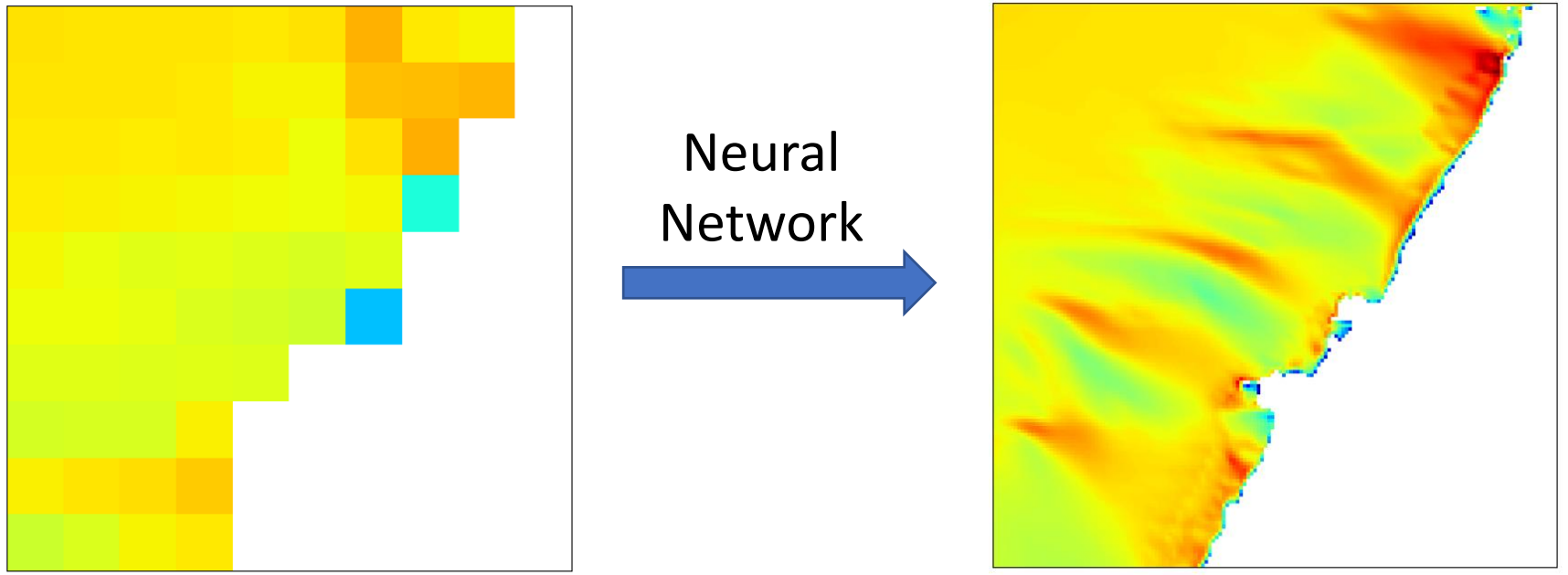
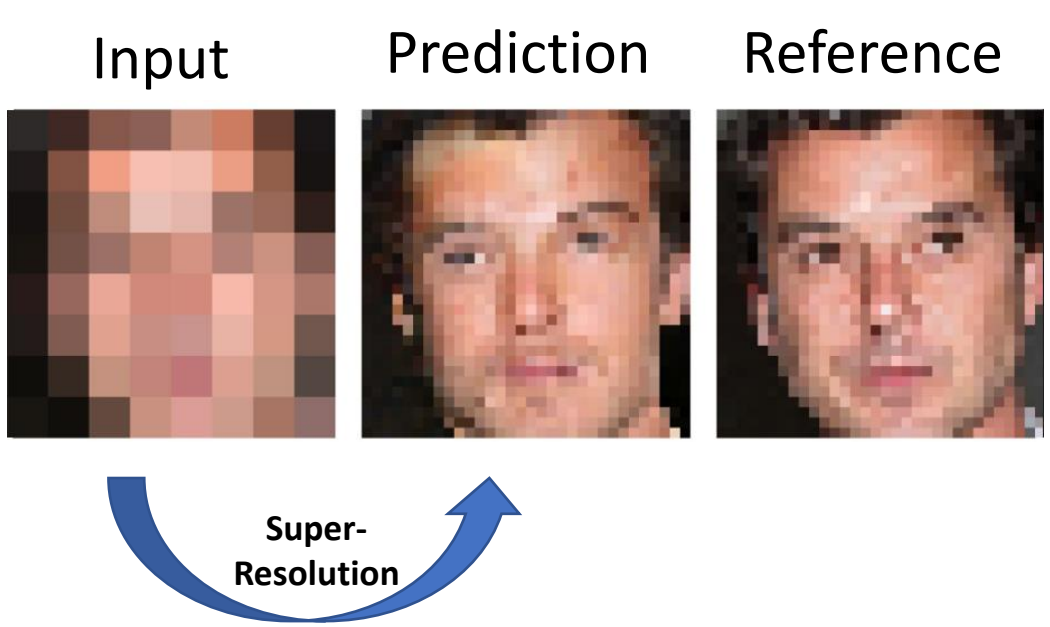
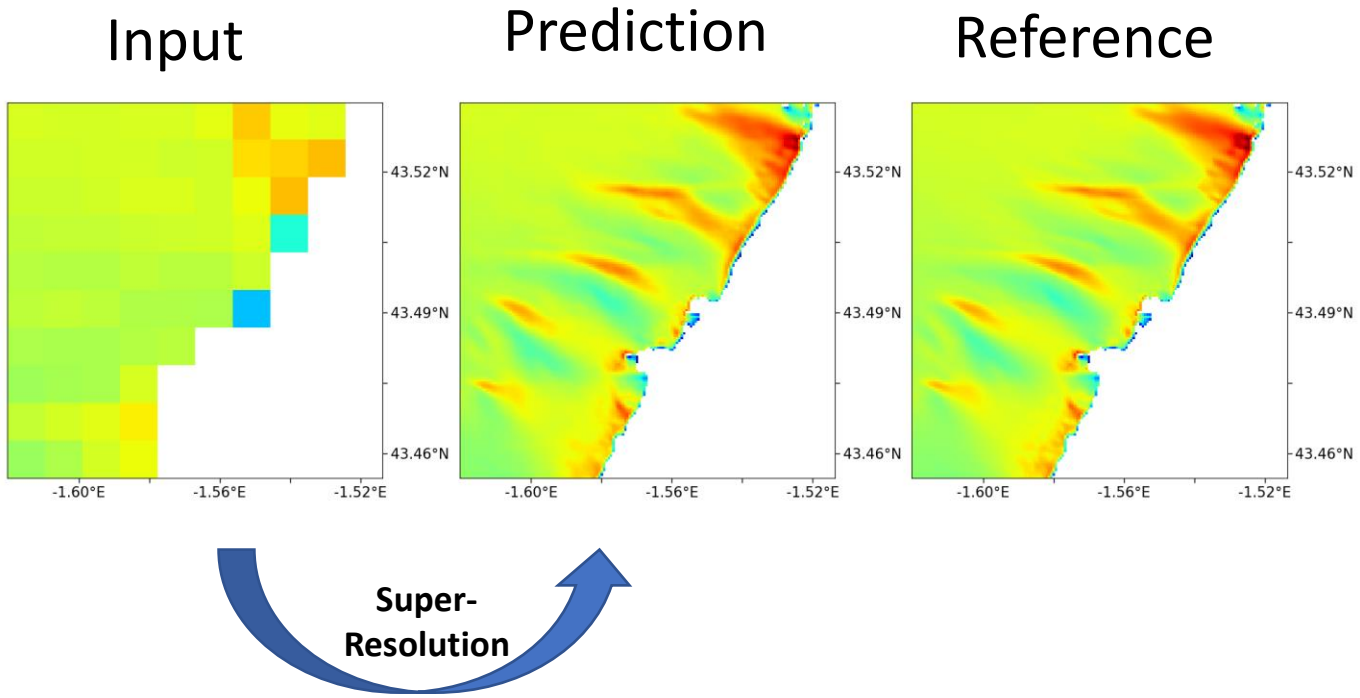
What is the idea?

- Computing local sea states in high-resolution is expensive
- Balance between accuracy and speed



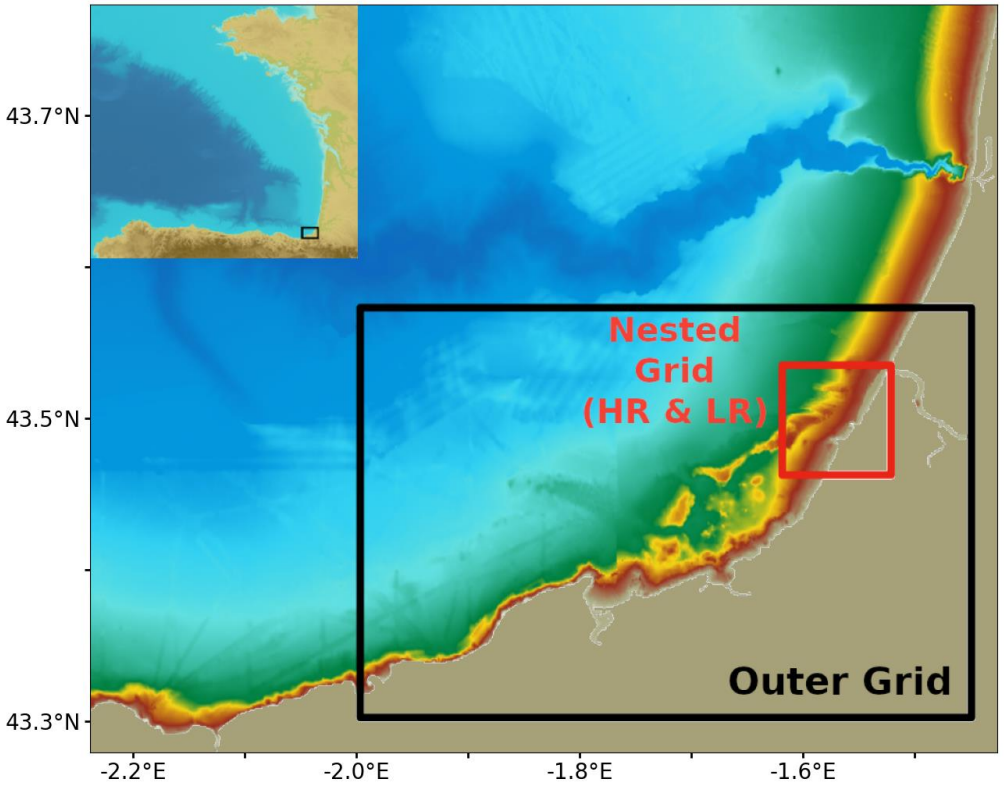
What is Super-Resolution?

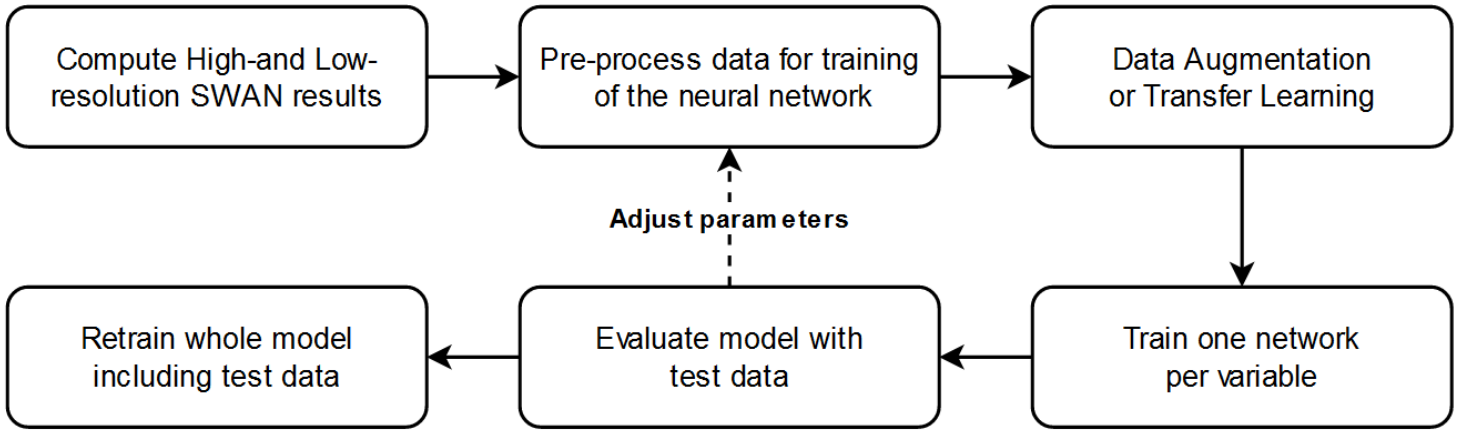




https://arxiv.org/abs/1702.00783

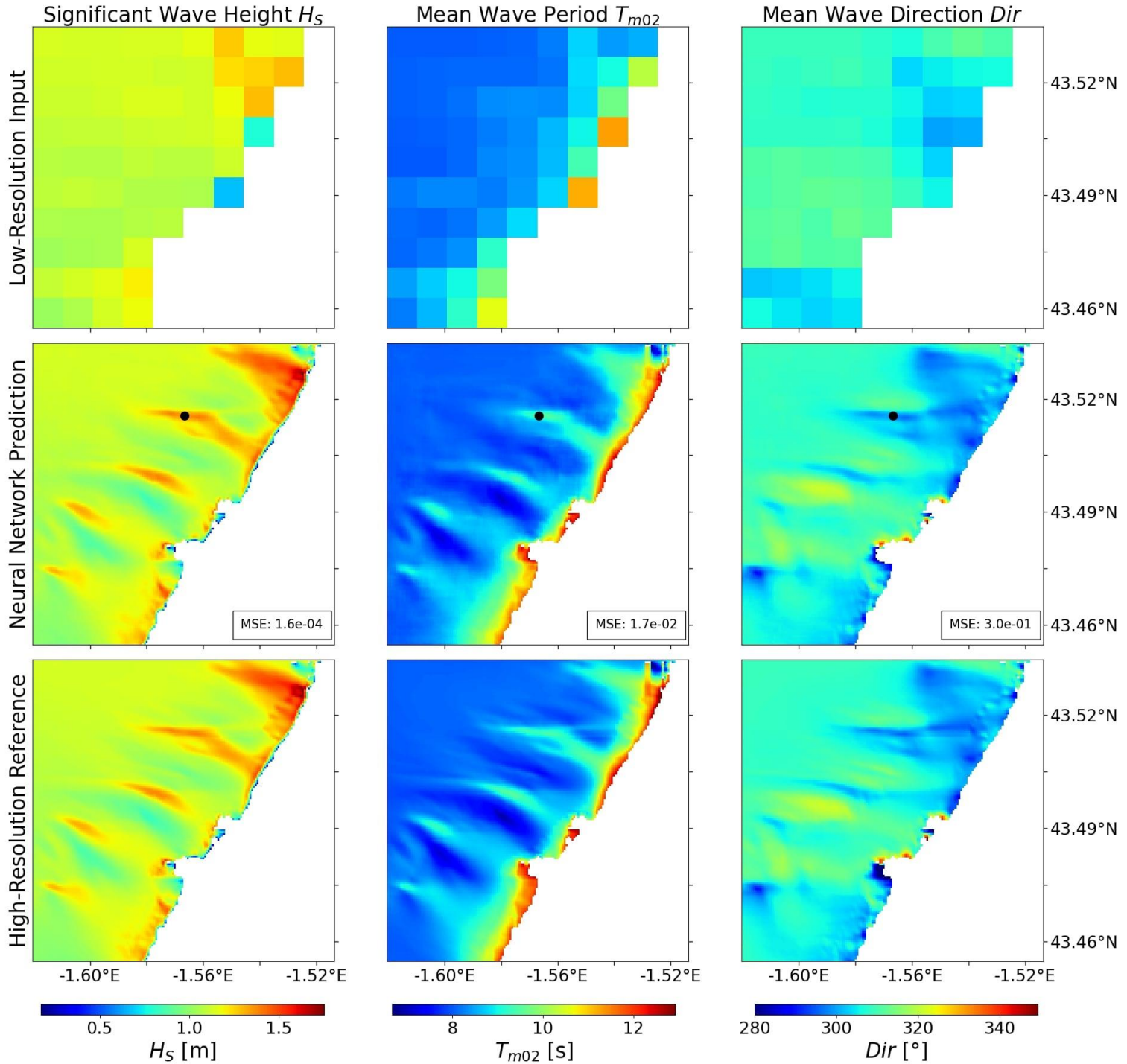
Our approach





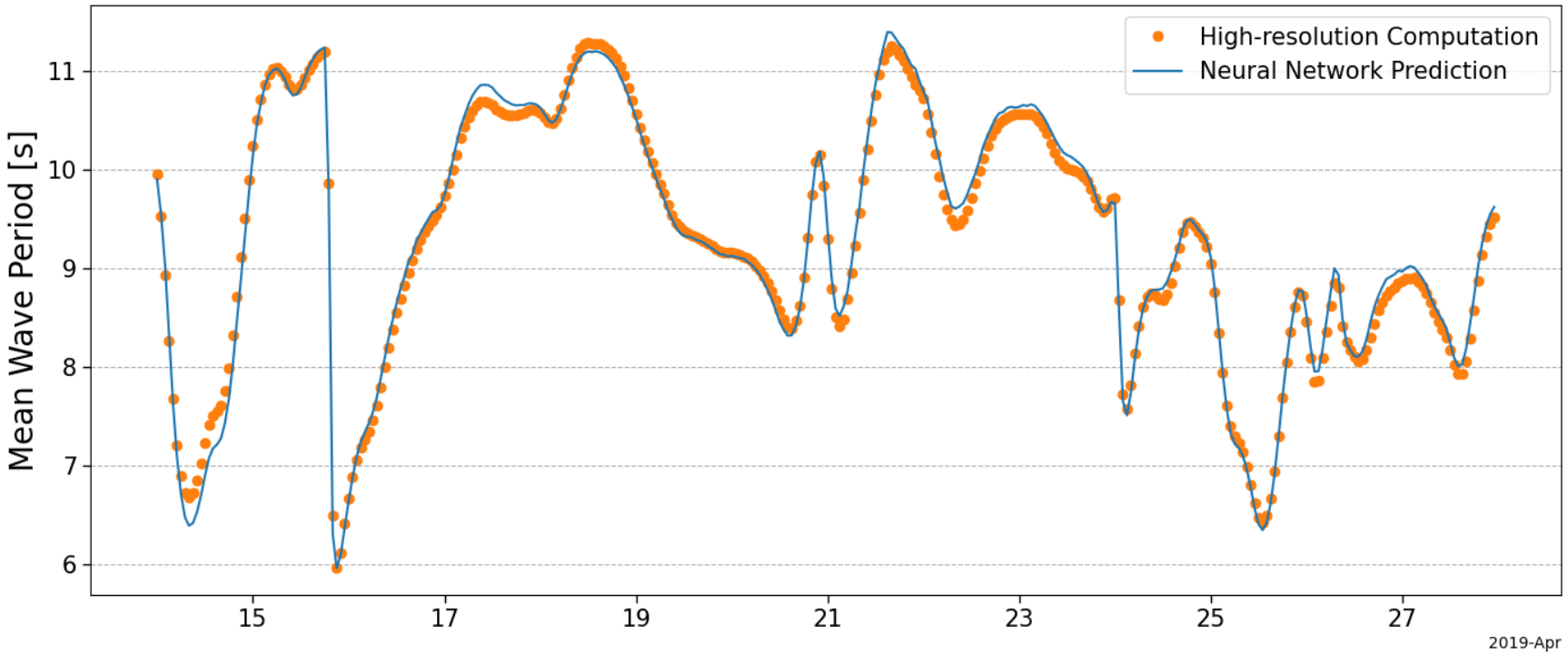
- Some variables are easier to predict → more consistent patterns

- 16x improvement of resolution with reasonable accuracy



Performance over time

- Two-weeks example of the test data
- Error usually under 5%



https://github.com/janfer95/SR_on_SWAN

Conclusion

- 50 times faster (after training) with reasonable accuracy

Training: 10-12h, but only one-time cost

High-Resolution SWAN computation: 7.5h

Low-Resolution SWAN computation + Prediction: 10min

- Data-sensitive, results depend on good training data

- Trained only for one part of the coast, but knowledge can be transferred
  → Transfer Learning

Thank you for your attention!

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Outstanding Student & PhD candidate Presentation contest

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