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## A Novel Hybrid Spatio-Temporal Autoregressive Model

### Communication Info

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- (2) Spatial weight
- (3) Stationarity
- (4) Unilateral process

### Abstract

In this work, we propose a novel hybrid spatio-temporal autoregressive model that integrates the generalized spatio-temporal autoregressive model, which captures global spatial interactions through a spatial weight, and the unilateral spatio-temporal model, which represents directional local propagation. These two models differ in both structure and stationarity conditions. Therefore, a stationarity condition for the hybrid model is derived to ensure the existence of a causal stationary solution. The proposed hybrid model is further examined through simulation and a real data application.

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### References

- [1] Basu, S. and Reinsel, G. C. *Advances in applied Probability*, 25(3), 1993, 631–648
- [2] Martin, R.. *Journal of statistical planning and inference*, 50(3), 1996, 395–411.
- [3] Pickard, D. K, *Advances in applied probability*, 12(3), 1980, 655–671.
- [4] Suhartono, S. and Subanar, S, *Journal of the Indonesian Mathematical Society*, 13(1), 2007, 115–122.
- [5] Tory, E. and Pickard, D. *Advances in applied probability*, 24(1), 1992, 95–112.