The SEN12MS-CR-TS Dataset for Multi-Sensor Cloud Removal in Satellite Image Time Series [1]

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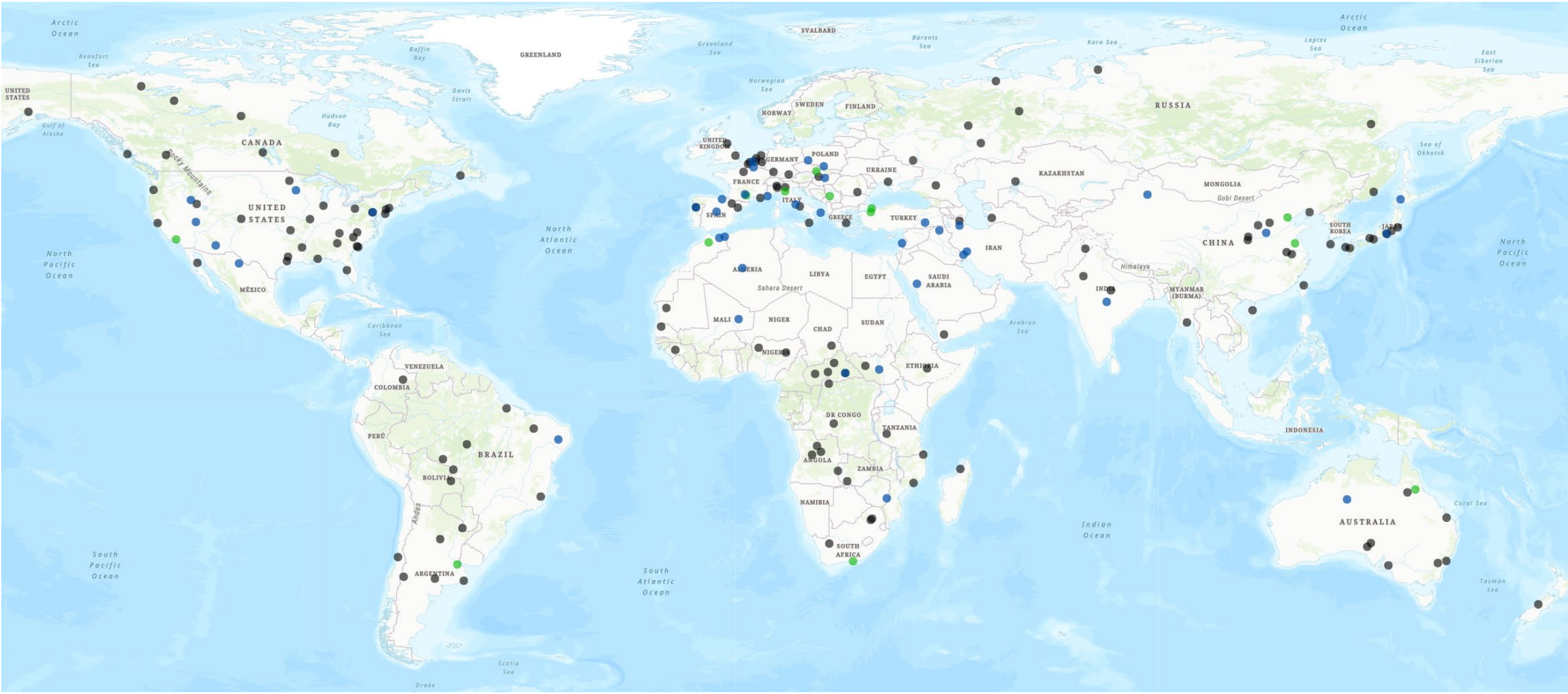
Publication: SEN12MS-CR-TS - A Remote Sensing Data Set for Multi-modal Multi-temporal Cloud Removal

- what: a data set for cloud removal in optical satellite images
- why: about 60 % of Earth observations are affected by clouds [2]
- how: provide training & testing data with
  - Sentinel-1 & (cloudy / cloud-free) Sentinel-2 time series
  - for 53 globally distributed ROI
  - 30 observations acquired throughout 2019

→ aim: provide benchmark for cloud removal in Sentinel-2 data
→ purpose: facilitate image processing, network pre-training etc

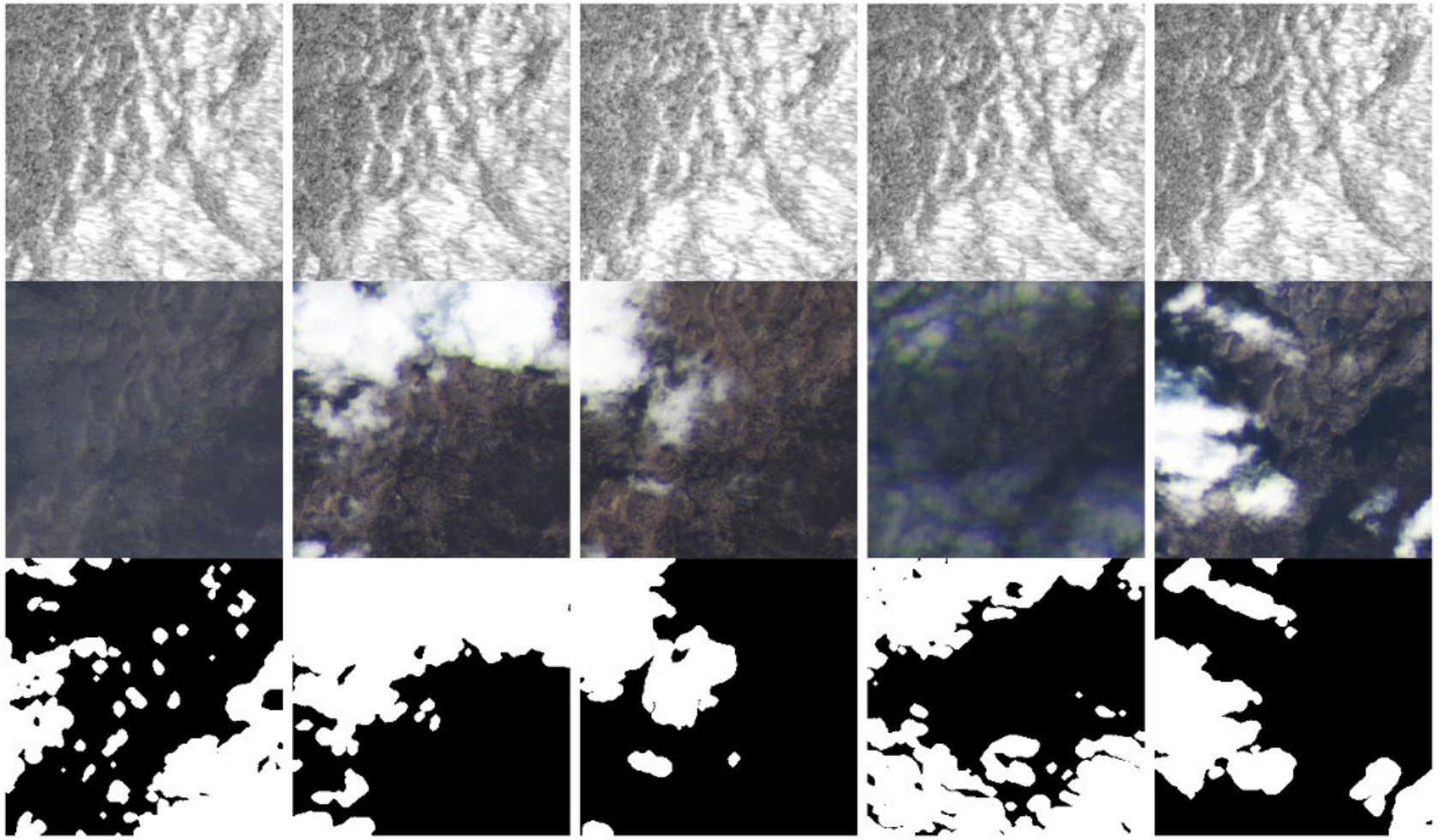
~ backward-compatible to prior data sets [3, 4]

SEN12MS-CR-TS: Spatial distribution

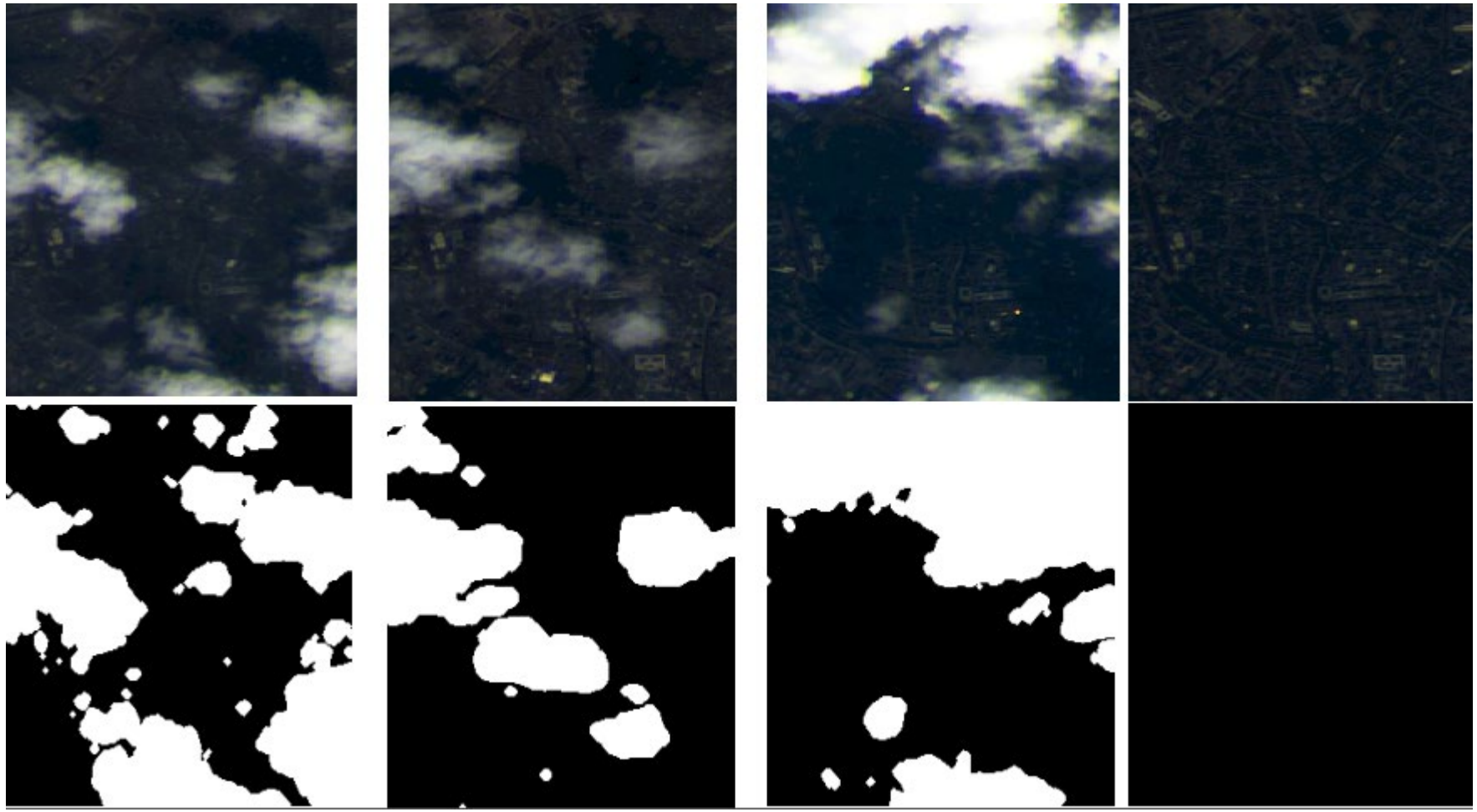


SEN12MS-CR-TS: Heterogeneity

exemplary data: paired Sentinel-1, Sentinel-2 and cloud masks

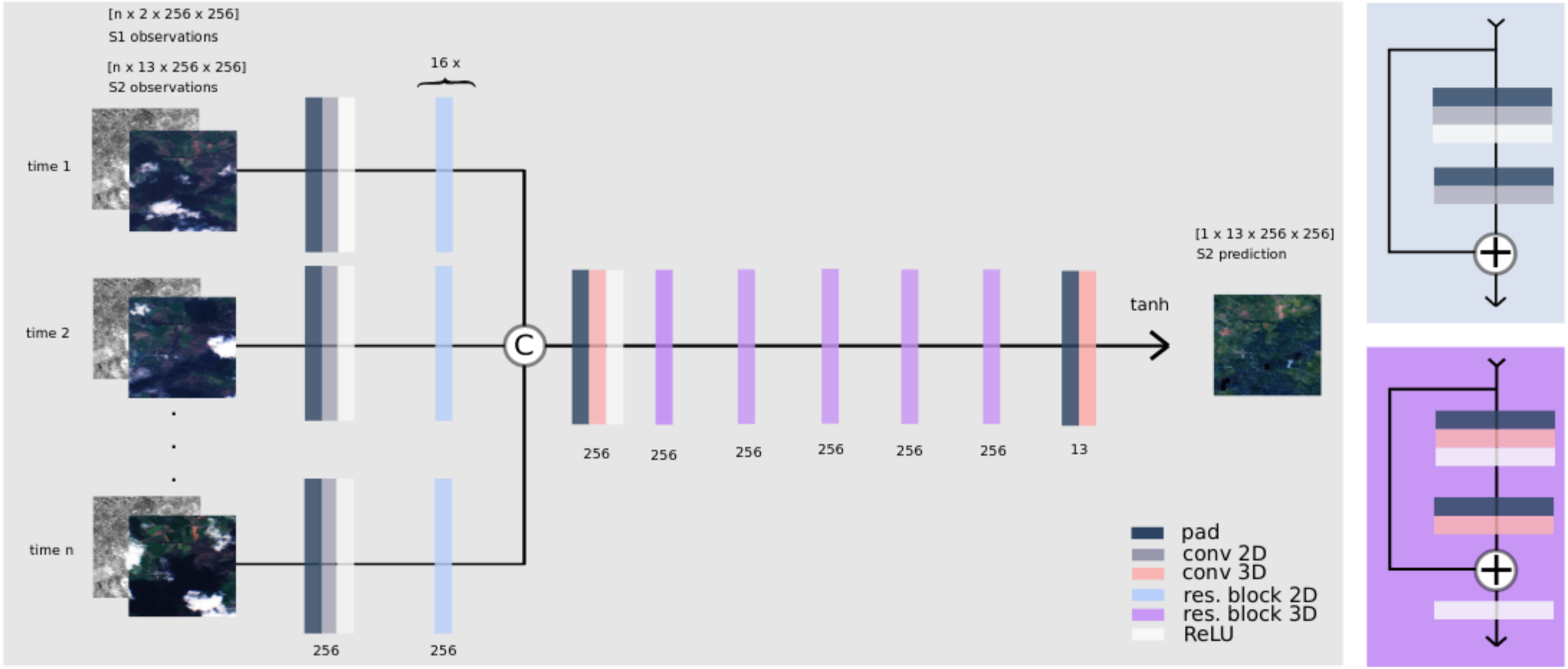


scenario: seq2point cloud removal --- given t cloudy input time points, predict 1 cloud-free output

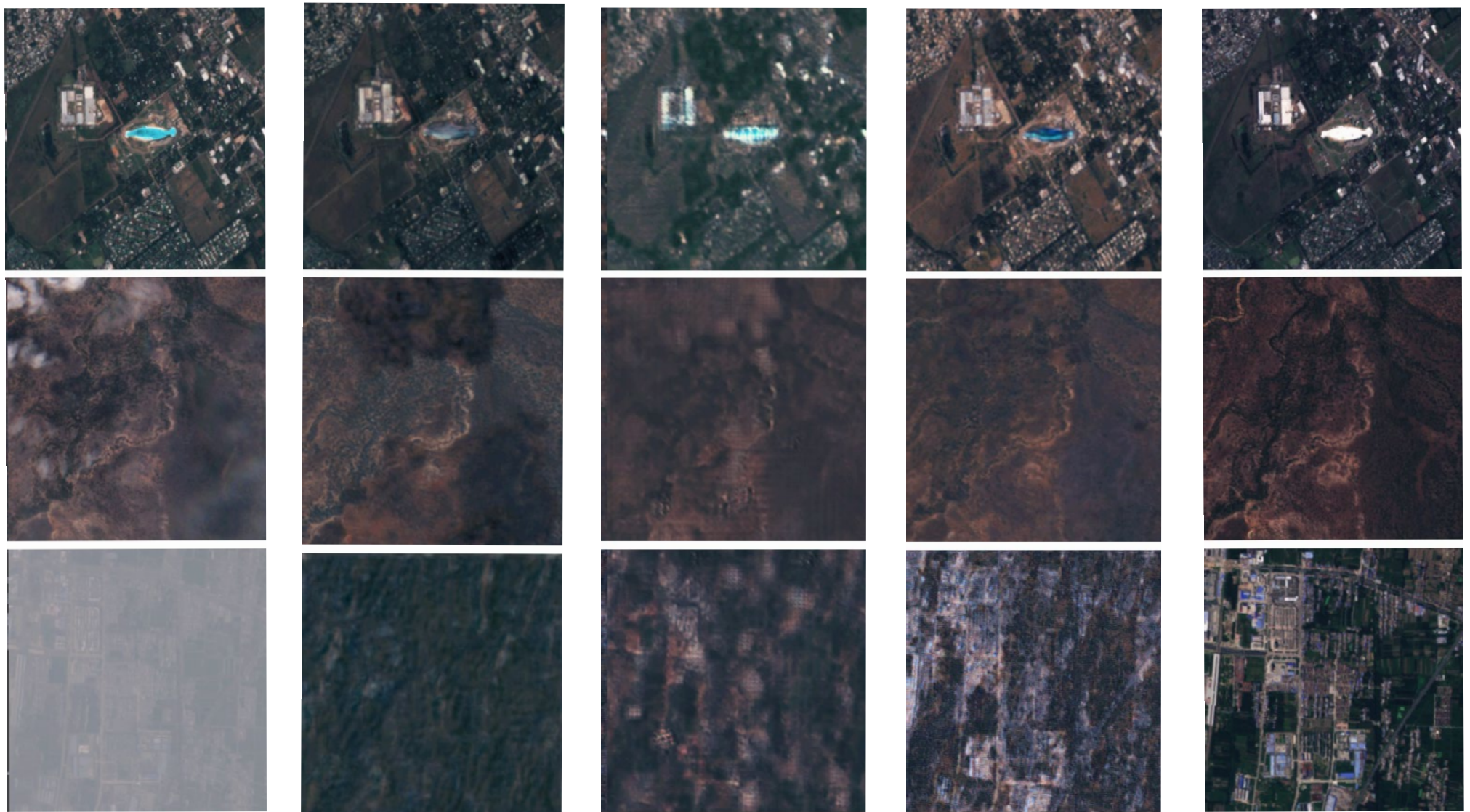


seq2point cloud removal

- integrates information across time and modalities

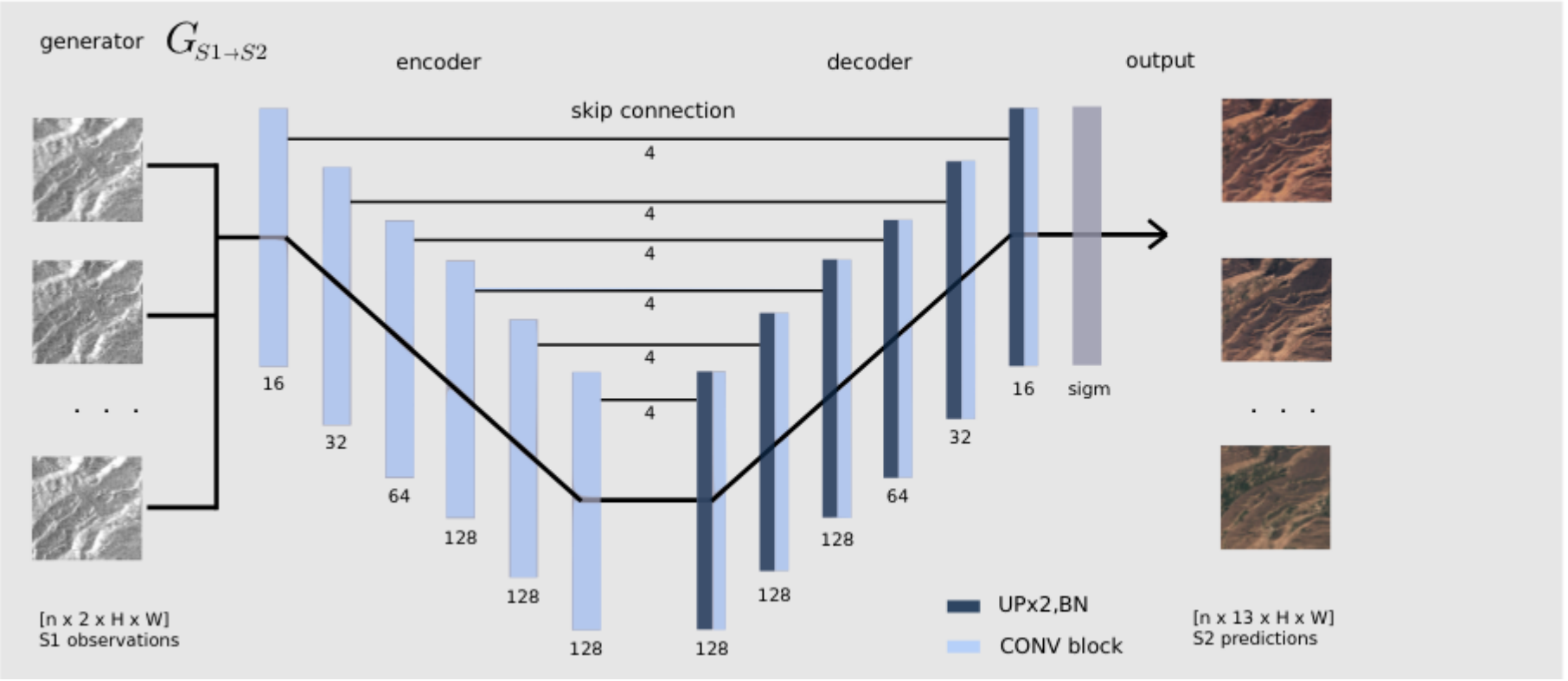


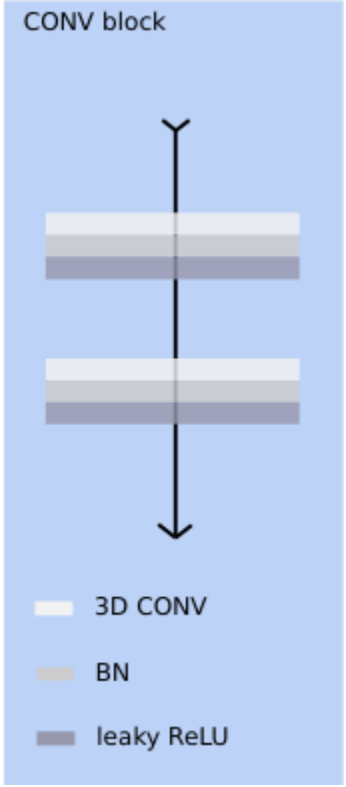
seq2point cloud removal



seq2seq cloud removal

- follows an intrinsic learning approach, trained on the sequence of interest [5, 6]





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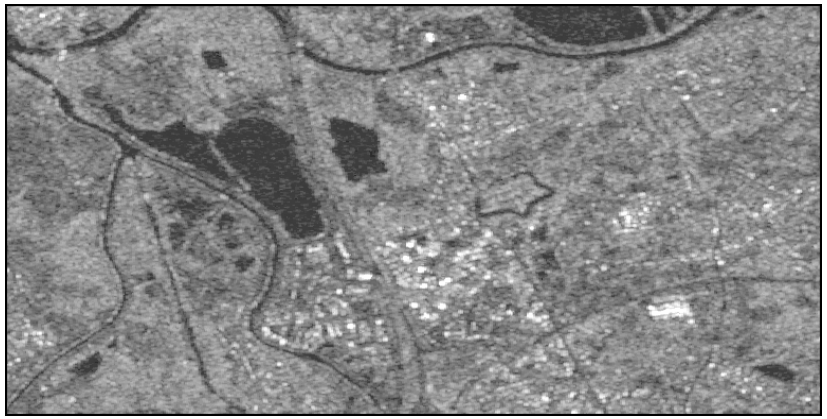
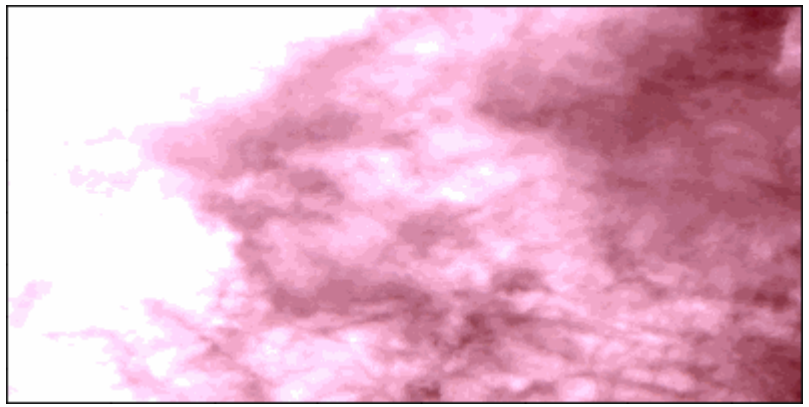
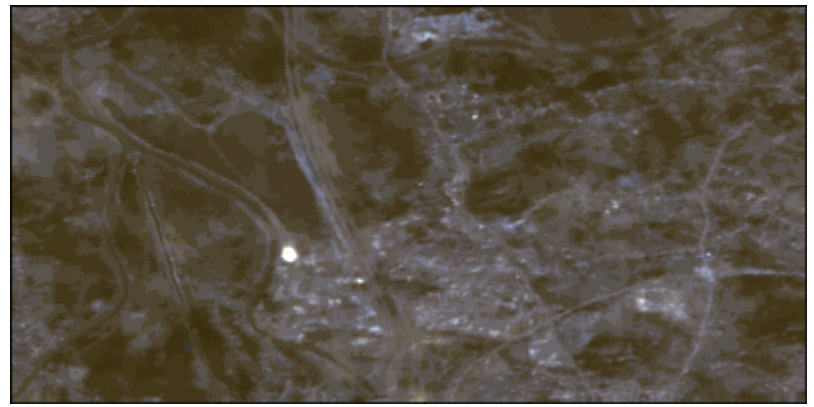

Summary: SEN12MS-CR-TS - A Remote Sensing Data Set for Multi-modal Multi-temporal Cloud Removal

- contains: - Sentinel-1 & (cloudy / cloud-free) Sentinel-2 time series
  - for 53 globally distributed ROI
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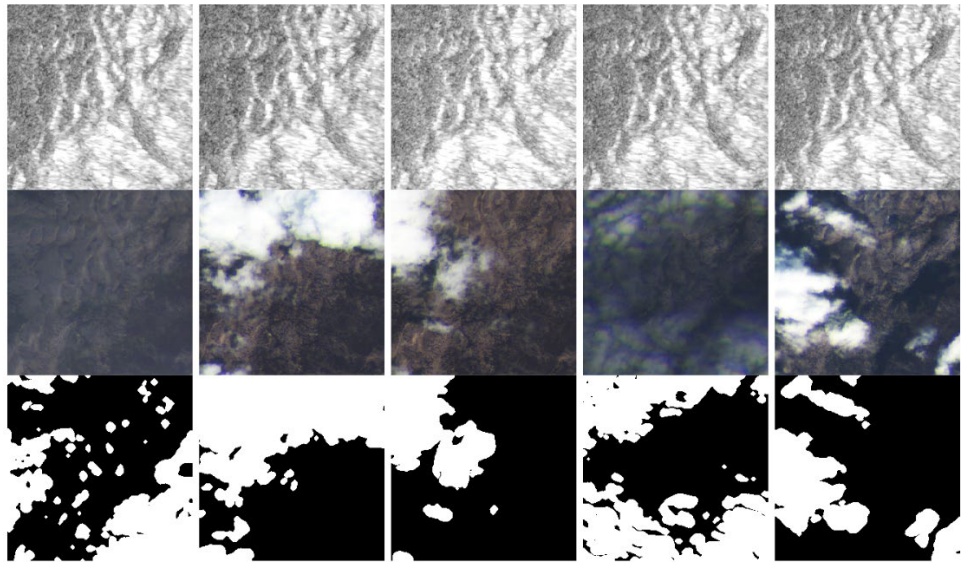
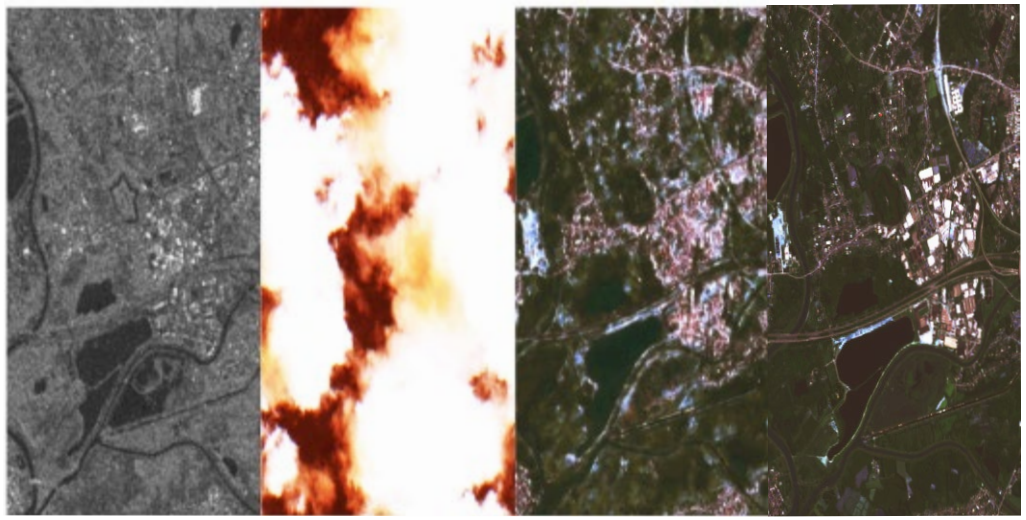


https://patrickTUM.github.io/cloud_removal/

email: patrick.ebel@tum.de



Thanks for your attention!

References

[1] P. Ebel, Y. Xu, M. Schmitt and X. X. Zhu, "SEN12MS-CR-TS: A Remote-Sensing Data Set for Multimodal Multitemporal Cloud Removal," in IEEE Transactions on Geoscience and Remote Sensing, vol. 60, pp. 1-14, 2022, Art no. 5222414, doi: 10.1109/TGRS.2022.3146246.
[2] King, M. D., Platnick, S., Menzel, W. P., Ackerman, S. A., & Hubanks, P. A. (2013). Spatial and temporal distribution of clouds observed by MODIS onboard the Terra and Aqua satellites. IEEE transactions on Geoscience and Remote Sensing, 51(7), 3826-3852.
[3] Schmitt, M., Hughes, L. H., Qiu, C., & Zhu, X. X. (2019). SEN12MS--A Curated Dataset of Georeferenced Multi-Spectral Sentinel-1/2 Imagery for Deep Learning and Data Fusion. arXiv preprint arXiv:1906.07789.
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[5] Ulyanov, D., Vedaldi, A., & Lempitsky, V. (2018). Deep image prior. In Proceedings of the IEEE conference on Computer Vision and Pattern Recognition (pp. 9446-9454).
[6] Ebel, P., Schmitt, M., & Zhu, X. X. (2021, July). Internal Learning for Sequence-to-Sequence Cloud Removal via Synthetic Aperture Radar Prior Information. In 2021 IEEE International Geoscience and Remote Sensing Symposium IGARSS (pp. 2691-2694). IEEE.