Table R1 Comparison of this study with existing high-resolution temperature/freeze–thaw related datasets.

Study/Data	Region	Variable	Spatial Resolution	Time Span	Method	Difference from This Study
Gao et al. (2023)	Yellow River Basin	Air temperature	1 km daily	1981–2020	Station + RS fusion	Air temp only; not ERA5-Land-based; no DEM lapse-rate correction.
Tao et al. (2022)	Global	LST	1 km daily	2003–2020	MODIS fusion	Starts 2003; not ERA5-Land-based; shorter time span.
Peng et al. (2019)	China	Air temperature	~1 km monthly	1901–2017	Statistical reconstruction	Air temp only; not surface temperature; no ERA5-Land + DEM correction.
He et al. (2021)	China	Air temperature	1 km monthly	1951–2020	Machine learning	ML-based air temp; not LST; no physical lapse-rate calibration.
ERA5 downscaling studies(Li et al., 2025)	China/Regional	T or LST	1 km	Various	Statistical / ML	High-resolution, but lacks explicit station-derived lapse-rate correction.
Other 1-km LST datasets(Liu et al., 2025; Zhang et al., 2023)	China/global	LST	1 km	Mostly post-2000	MODIS-based	Not ERA5-Land-based; limited time range.
This study	SAYR	DEM-corrected ERA5-Land LST	1 km monthly	1981–2020	Physical DEM lapse-rate correction	First 1981–2020 ERA5-Land LST with explicit monthly lapse-rate calibration for SAYR.