Local audit: AppEEARS MOD16A2GF point series

Date: 14 November 2026 (AEDT)
Verdict: APPROVE WITH THE EXISTING POINT-SCALE AND QC CAVEATS

Verified metadata

- Product: Terra MODIS MOD16A2GF.061, layer ET_500m, year-end gap-filled 8-day ET total at one AppEEARS point sample (25.3°S, 133.8°E; h30v11), 2000-01-01–2025-09-30.
- The MOD16 Version 6.1 User Guide defines ET as an 8-day total in kg/m² (water-equivalent mm), encoded with scale factor 0.1; a normal year's final composite is 5 days and a leap year's is 6 days. LP DAAC support confirms that AppEEARS CSV exports already incorporate product scale factors. The local CSV's decimal values are therefore treated as scaled values and are not multiplied by 0.1 a second time.
- QA definition: MODLAND bit 0 = 0 is “good quality” (main algorithm); bit 0 = 1 marks backup/other or fill. QC value 255 is fill. The project's primary screen excludes QC=255 and bit 0=1. The User Guide explains that MOD16A2GF gap-filling applies to the input LAI/FPAR series; QC indicates those input conditions. The project's stricter filter is retained for consistency, with a sensitivity analysis to show its effect.

Local reproducibility checks

- Re-read the 1,185 source CSV rows: 1,171 primary-good, 3 backup/other, 11 QC fill.
- The source export's first and last composite dates are 2000-01-01 and 2025-09-30, respectively. The analysis contains 308 monthly aggregates from February 2000 through September 2025: all January 2000 composites have QC=255 fill, so that month has no valid monthly estimate. This reconciles the source-row span with the shorter monthly table.
- Recomputed the monthly daily-rate series from raw composites and actual inclusive intervals. The 308 stored monthly values matched to maximum absolute error 4.44×10□¹□ mm/day.
- Annual means require all 12 months and at least 95% valid-day coverage. The primary trend has 24 complete years, 2001–2024; 2000 has insufficient quality coverage and 2025 is partial. Valid annual coverage is 95.6%–100% for included years.
- Recalculated the primary trend: Sen +0.03601 mm/day/decade; OLS +0.01704; 95% normal-reference HAC interval for OLS [−0.03203,+0.06611]; HAC p=q=0.49609.
- Recalculated a sensitivity that admits the 3 valid backup/other composites while still excluding 11 fill rows: Sen +0.03534; OLS +0.01540; HAC 95% interval [−0.03367,+0.06447]; p=0.53843. The interpretation remains no established trend at this pixel.

The daily allocation assumes each composite's total is evenly spread over its actual covered dates. That is a transparent unit-conversion convention, not daily information supplied by MODIS. This remains one modeled satellite-product pixel; it is not an Australia-wide ET estimate or an independent ground truth.

Sources

- NASA/LP DAAC product record: https://doi.org/10.5067/MODIS/MOD16A2GF.061
- MOD16 Version 6.1 User Guide: https://modis-land.gsfc.nasa.gov/pdf/MOD16C61UsersGuideV11Mar112021.pdf

- LP DAAC support response confirming AppEEARS CSV scale-factor handling: https://forum.earthdata.nasa.gov/viewtopic.php?t=5682
- Raw export, decoded QA, and reproducible calculations are in this folder; qa_sensitivity.py writes qa_sensitivity.json.