

Comments on Feng et al. 2025 April

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1. ***“a multi-decadal global daily land surface actual evapotranspiration dataset enhanced with explicit soil moisture constraints in remote sensing retrieval”***

Could the title possibly be better expressed, thus-?

“Global daily evapotranspiration estimated from land surfaces by remote sensing over multiple decades, including explicit soil moisture constraints to remote data retrieval.”

2. *“We integrated this approach into the process-based land surface 20 ET/heat fluxes algorithm (P-LSH, or P-LSHv1), developing an improved version, P-LSHv2. Using observations from 106 global flux towers, we calibrated biome- and climate-specific parameters and quantified moisture constraints across diverse climates and land cover types. P-LSHv2 achieves notable improvements in ET estimation, with a reduced Root Mean Square Error (RMSE) of 0.67 mm d⁻¹ and an increased correlation coefficient (R) of 0.81, outperforming its predecessor, P-LSHv1, particularly in arid regions.”*

A most efficient description of complex processes, but, should (R be R²)?

3. *“Leveraging the P-LSHv2 algorithm, we have produced a long-term global daily ET dataset spanning 1982-2023, providing a valuable resource for research on terrestrial water and energy cycles and climate change. The dataset is freely available at <https://doi.org/10.11888/Terre.tpd.301969> (Feng Jin, 2025).”*

This is a very generous offer of free access to your data, Jin.

I just question your choice of the word ‘Leveraging’. I know I am a 72-year old, old fashioned bloke who still used printed map books to figure out where to drive in the city, but still have a more than adequate mental map of the whole of SW Australia to call on from long years of driving around helping agriculture. But the point is that the word ‘Leveraging’ primarily reminds me of the very skilled Aussie tyre fitter who I often had to call upon to change a tyre or two on the government car I was driving around. So maybe for the sake of a broad readership of your extensive paper, the word ‘employing’ may be a more suitable one in these circumstances? Just a respectful suggestion.

4. *“Due to the water potential gradient between leaf and air, water is transported from soil to vegetation roots, and leaves, and then dissipated into the atmosphere through stomata. Therefore, soil water content serves as the direct water pool for vegetation and regulates the magnitude of water extracted by vegetation roots (Feng et al., 2022; Liu et al., 2020b)”*

This is an eloquent, but oversimplified, physical explanation of evapotranspiration. It requires inclusion of the biological need and purpose of transpiration by plants and the vital role to sensory and growth behaviour that plant root tips play in semi-arid ecologies especially in landscapes with soil types of poor water-holding capacity. This text is extracted from one of the research papers I am developing.

“Dexter (1986) described the behaviour of plant roots seeking biopores, some concepts have been put forward, such as “trematotropism” and “oxytropism”. Gregory (2009) summarised that ‘Roots grow towards areas of higher water potential ... and that roots could sense a water potential gradient as small as 0.5 MPa mm⁻¹ so that hydroresponsiveness may contribute to both avoidance of drought stress and modifications to root system architecture’. This knowledge strongly suggest that the soil profile structure needs some degree of heterogeneity varying from loose structure for ease of root

exploration to more dense components (clods or ridges) which allow only slow or little root growth and can retain moisture at higher potential; more readily available at times when growing conditions are drier. In a similar manner, roots seek out some nutrients along gradients of their occurrence in the soil profile as nutrients are supplied to the root surface by mass flow and diffusion'.”

Thus, by logical deduction, the ability of root tips to search out water in the soil profile may have more control on ET than the simple vapour deficit gradient. Additionally, since most of the evaporated water is used to cool leaves on hot afternoons, any undersupply and overheating leads to a breakdown of ET pathways through the plant tissue and a reduction of ET despite a strong VP gradient. Such processes do need to be explained and included in this MS, and there may well be more research of that aspect, since I am not fully up-to date with that research sector.

Comments completed up to page 4. PSB 2/4/2025