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Technical note: A stochastic framework for identification and evaluation of flash drought

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Supplementary Text

potential evapotranspiration, Emax, is often estimated by Penman equation

$$E_{\max} = \underbrace{\frac{\Delta}{\rho_w \lambda_w (\Delta+\gamma)} Q}_{E_e} + \underbrace{\frac{\gamma}{\rho_w (\Delta+\gamma)} \left(\frac{\varepsilon}{p_0} \rho g_a \mathrm{VPD} \right)}_{E_v}, \quad (1)$$

where E_e is equilibrium evapotranspiration, E_v is the evapotranspiration due to drying power of the air, Δ is the slope of the saturation vapor pressure curve (a nonlinear function of air temperature), γ is psychrometric constant, λ_w is latent heat of water vaporization, Q is available surface energy, ε is the ratio of the gas constant for dry air to that of water vapor, p_0 is near-surface air pressure, ρ is air density, ρ_w water density, g_a is aerodynamic conductance, and VPD is vapor pressure deficit. Heatwave is often accompanied with high temperature and strong solar radiation, which tend to increase E_e; dry or moist heatwaves may also have abnormal VPD, which may influence E_v.

Supplementary Figures

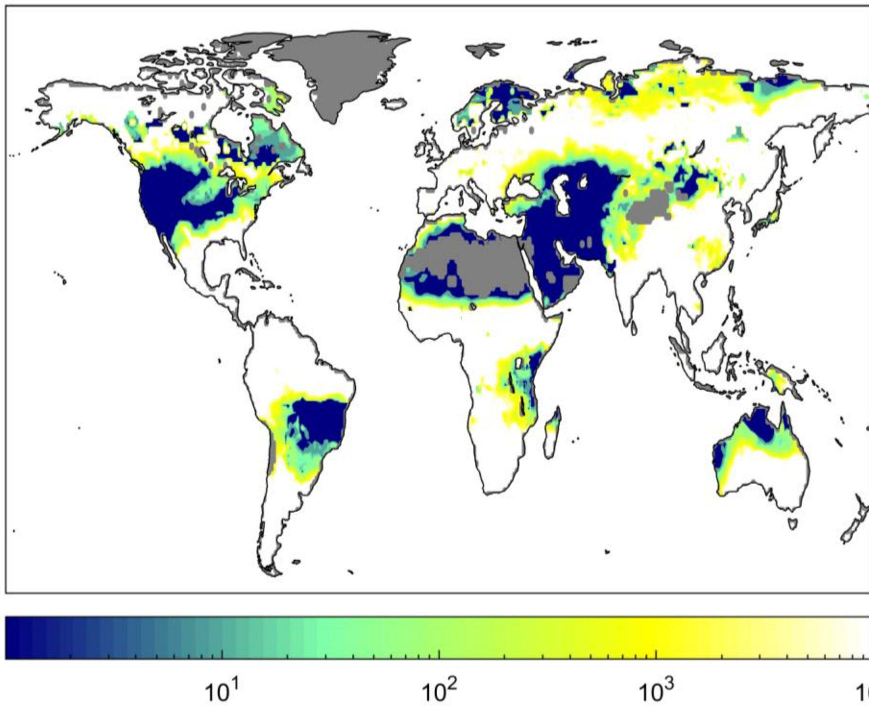

Fig. S1. Global distribution of the variance of the mean first passage time (VFPT) (units: day^2). The gray areas are hyper-arid regions, which are excluded from this analysis.