## Priestley-Taylor ratio

- References:
  - Betts, A. K., 1994: Relation between equilibrium evaporation and the saturation pressure budget. *Bound.-Layer Meteor.*, **71**, 235-245, doi: 10.1007/BF00713740.
  - Lhomme, J.-P., 1997: An examination of the Priestley-Taylor equation using a convective boundary layer model. *Water Resour. Res.*, **33**, 2571-2578, doi: 10.1029/97WR01897.
  - Betts, A. K., 2004: Understanding hydrometeorology using global models. *Bull. Amer. Meteor. Soc.*, **85**, 1673-1688, doi: 10.1175/BAMS-85-11-1673.

- Principle:
  - The coefficient in the Priestley-Taylor formulation for potential evaporation accounts for the fact that entrainment at the top of a growing boundary layer will dry the boundary layer, so that the atmospheric capacity to "absorb" water vapor from surface evapotranspiration is greater than near-surface humidity would suggest. $\alpha$ >> 1 is indicative of the mixing of dry air – larger values of $\alpha$ suggest stronger entrainment of dry air, concomitant with a deeper boundary layer, and/or reduced bulk aerodynamic resistance and/or increased canopy resistance.
  - Betts defines it as a ratio:
$$\alpha = EF(1-\varepsilon)/\varepsilon, \qquad EF = \lambda E/(\lambda E + H), \qquad \varepsilon = (\lambda/c\_p\ )dq\_s/dT$$
    where the slope of the saturation mixing ratio with temperature is evaluated at the LCL temperature.

- Data needs:
  - Surface fluxes, near surface temperature and humidity. Can be evaluated instantaneously or with time-averaged data, but is more valid on short time scales.

- Observational data sources:
  - Ideally suited to FLUXNET or other flux tower measurements.

- Caveats:
  - Usual caveats about LCL estimation apply.
  - Because this term convolves surface controls (that affect EF) and implied conditions at the top of the PBL, the two cannot be separated without other information or analyses (e.g., mixing diagram information; cf. Lhomme 1997).

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