[Coupling metrics to diagnose land-atmosphere interactions]

Triggering Feedback Strength, Amplification Feedback Strength

- Reference:
  - Findell, K. L., P. Gentine, B. R. Lintner and C. Kerr, 2011: Probability of afternoon precipitation in eastern United States and Mexico enhanced by high evaporation. *Nature Geosci.*, **4**, 434–439, doi: 10.1038/ngeo1174.

- Principle:
  - Triggering feedback strength (TFS), relates the probability Γ of afternoon rainfall greater than 1mm to evaporative fraction (EF), scaled by the variability of EF, making it an index in the vein of Guo et al. (2006):

$$TFS = \sigma_{EF} \frac{\partial \Gamma(r)}{\partial EF}$$

  - Amplification feedback strength (AFS) quantifies how accumulated rainfall varies with EF when afternoon rainfall does occur.

$$AFS = \sigma_{EF} \frac{\partial E(r)}{\partial EF}$$

    where $E(r)$ is the expected value of afternoon rainfall amount given conditions of convective triggering potential (CTP), humidity index in the lower troposphere (HI_{Low}) and EF.

- Data needs:
  - Afternoon precipitation, surface latent and sensible heat fluxes, and the profile data needed to calculate CTP and HI_{Low}.

- Observational data sources:
  - Well suited to application to radiosonde profiles collocated with surface rain gauges.

- Caveats:
  - Requires a large amount of data to generate stable estimates, such as climatologies calculated from reanalyses (cf. Findell et al. 2015). Not well suited to instantaneous estimates.

Supported by NASA/MAP Grant: NNX13AQ21G