

Triggering Feedback Strength, Amplification Feedback Strength

• References:

- Findell, K. L., P. Gentile, 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. Not well suited to instantaneous estimates.