Motivation: Model uncertainty
Earth2Observe [1] is a project combining observations and modelling to assess global water resources. As part of this seven global models, forced with WFDEI 0.5° resolution meteorological data [2], have been used to estimate daily evaporation globally for the years 1979-2012. We have calculated the overall mean total evaporation and interception from each of the models, and used these to find an overall interception fraction. We see a wide range of estimates of interception fraction between models, ranging from 5% to 20% globally, with an ensemble mean of 10%. Areas dominated by trees generally have higher interception than grasses and shrubs, with the ensemble mean approaching 50% in the Amazon basin. The variation between models is largest in tropical regions, where evaporation is high and canopy capacity is large. This study intends to use site observations to validate the models and investigate the sources of model uncertainty.

Conceptual model
We construct a simple conceptual model, which consists of two coupled water stores: 1) transpiration store, which is effectively the root zone soil moisture 2) interception store, which is the water on the surface of the leaves. We assume that the portion of the canopy surface which is:

\[ \text{store size} \times \text{PE} \]

Measurements of interception at flux sites will be used to estimate interception. We ran JULES [4] at these sites and compared the modelled total evaporation with observed latent heat flux over the full run. JULES reproduces the evaporation well, but underestimates for sites with high observed evaporation. JULES estimates interception fraction of between 10% and 45%, with trees having higher interception fraction than other vegetation types. However, we do not have observations of interception fraction at these sites, so we wish to investigate whether the signal of the different components is detectable in the total latent heat flux measurements. As open-path IRGAs (open symbols) are not able to provide reliable flux measurements when the canopy is covered with water, we select only the sites which have closed-path IRGAs (closed symbols).

Concluding remarks
- Uncertainty on interception fraction between models globally, with estimates ranging from 5% - 20%.
- Fully fitting to flux data does not constrain parameters as data are noisy and interception and transpiration inversely correlated
- Constrained fits suggest model is overestimating interception fraction, and require further study
- Measurements of interception at flux sites will be used to validate the conceptual model

References: