What balloon soundings can tell us about surface heat flux partitioning

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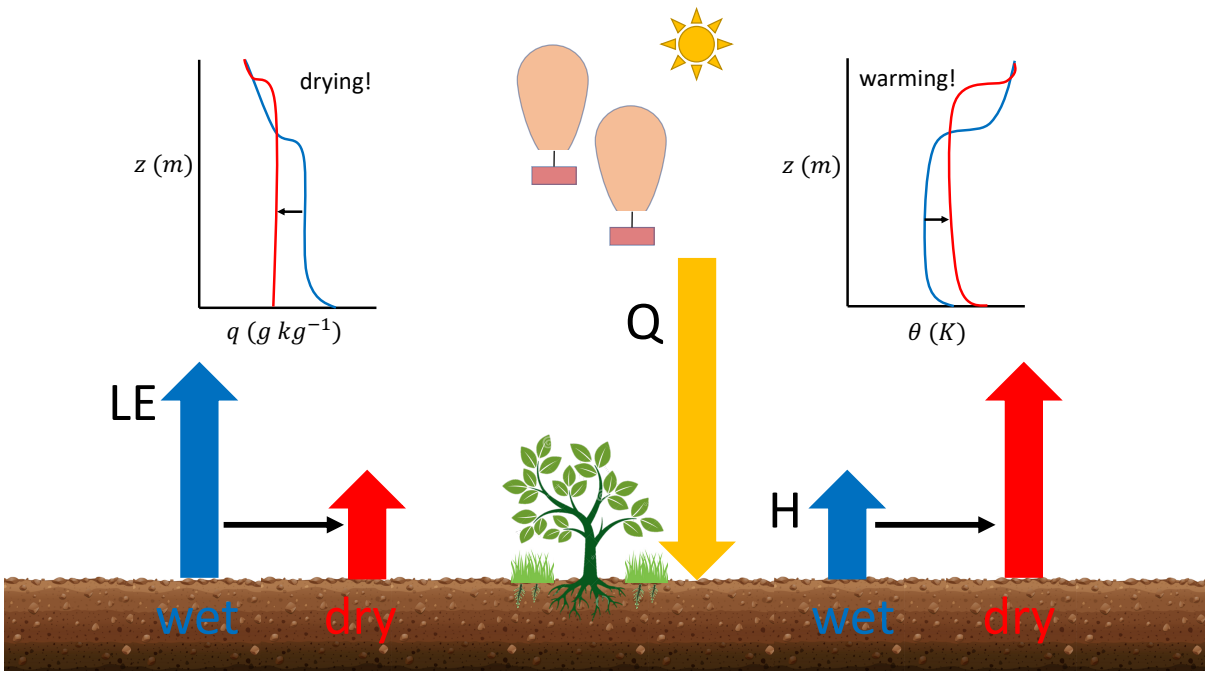
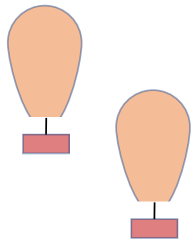


1. Methods & Materials

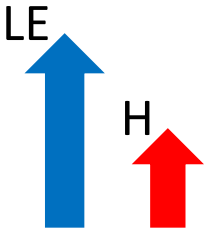
1) We **filter the global balloon sounding data** from the IGRA data set for convective summer conditions (Durre et al., 2006).
   - **After filtering:** 4236 soundings days distributed over 97 stations globally.

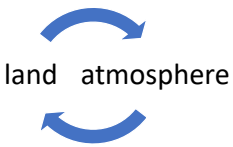


CLASS4GL

2) We **constrain an atmospheric boundary layer model (CLASS4GL)** with temperature and humidity from balloon soundings (Wouters et al., 2019).

3) Using this model, we **estimate the sensible heat flux (H) and the latent heat flux (LE)**.





4) We **investigate land-atmosphere interactions** by using:
   - Satellite soil moisture (SM; ESA CCI) at 1°x1°grid cell resolution at the time and location of the balloon soundings (Dorigo et al., 2017).
   - Surface heat fluxes H&LE from CLASS4GL

For detailed results, please contact jasper.denissen@bgc-jena.mpg.de

3. Take home messages

- For the first time, land surface conditions have been estimated from atmospheric measurements!
- Surface heat flux partitioning changes between water- and energy-limitation, at the CSM, which is determined at $\approx .21\,\mathrm{m}^3\,\mathrm{m}^{-3}$
- Atmospheric boundary layer growth is enhanced under water-limited conditions.

Thank you for your attention. Questions/comments?

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