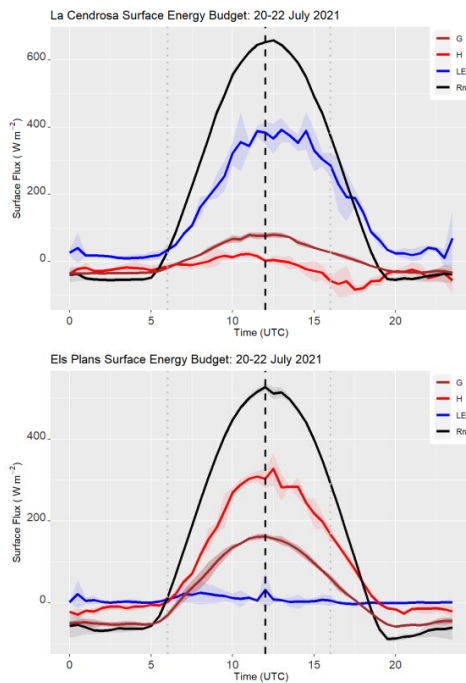# Evaluating the Controls of Evaporation using a Mixed-Layer Column Model

Mary Rose Mangan, Oscar Hartogensis, Jordi Vilà-Guerau de Arellano

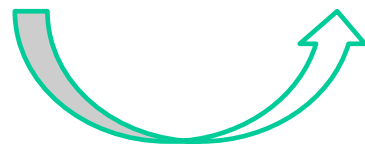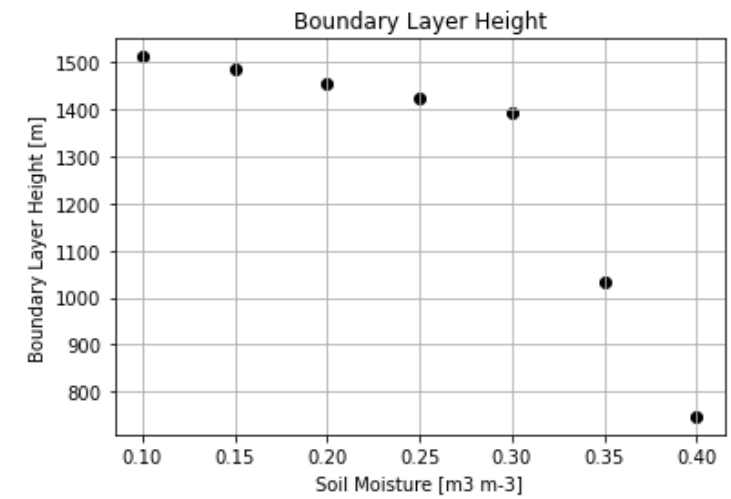Wageningen University, Meteorology and Air Quality Group
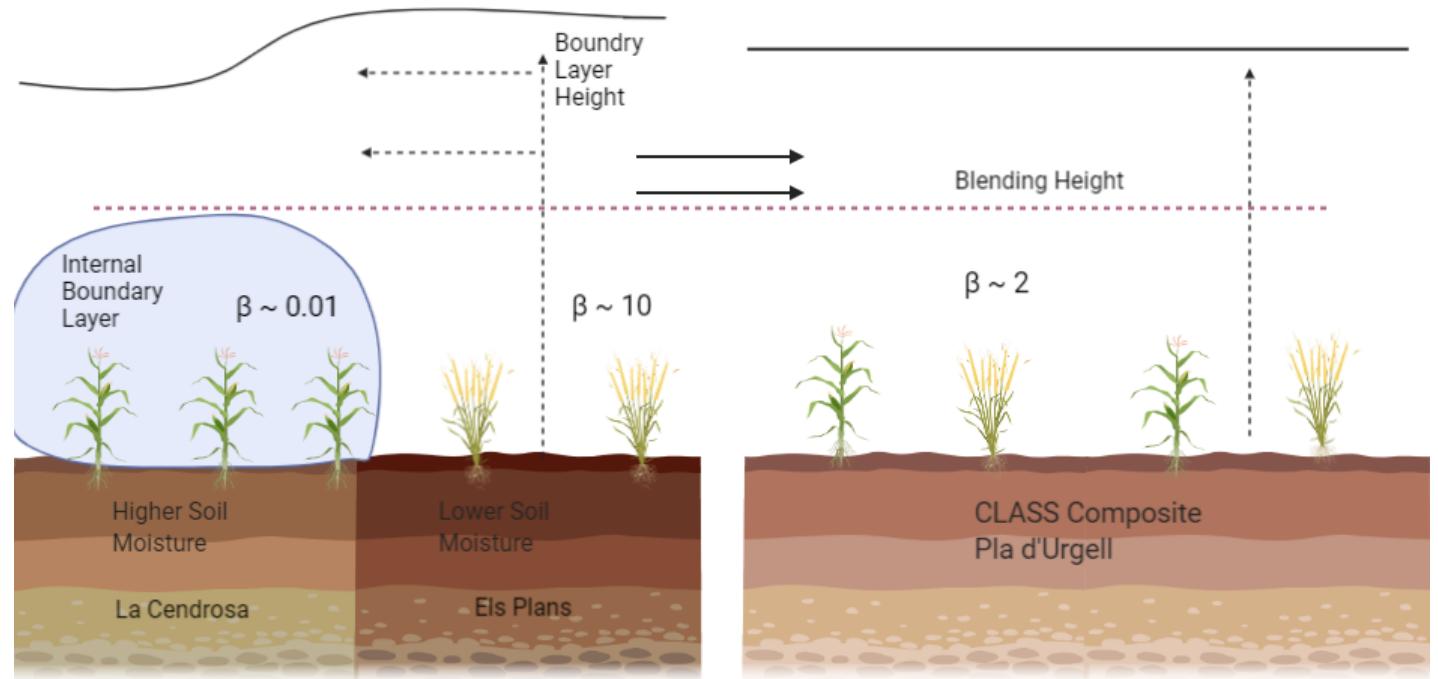
Motivation – Offline Cases

- Chemistry Land-surface Atmosphere Soil Slab model (CLASS) (Vilà-Guerau de Arellano et al, 2015)

- Composite case: "Golden Days" case: 20-22 July 2021

- Offline cases constrained by observations to capture the mixed layer correctly with a composite surface

  – Assumes that the boundary layer is formed by patchwork of surfaces

- Online cases expanded to account for soil moisture & advection

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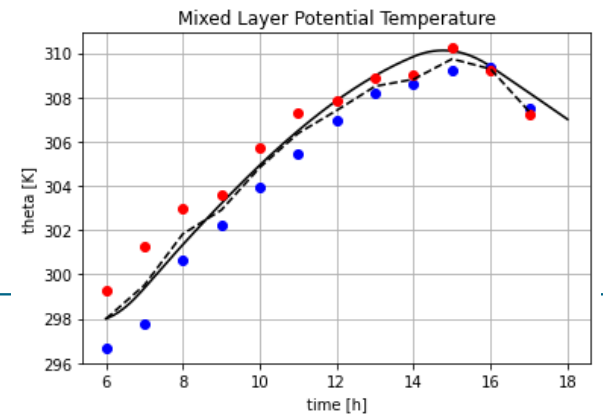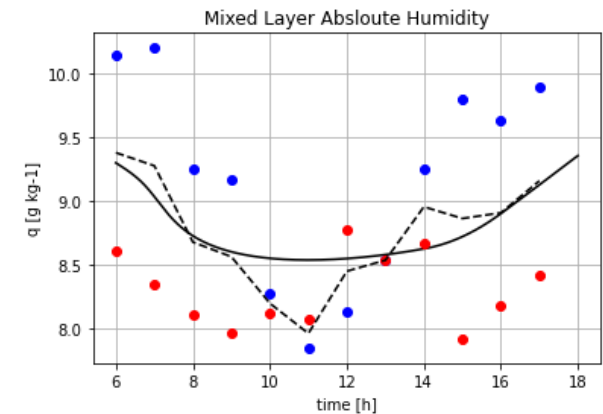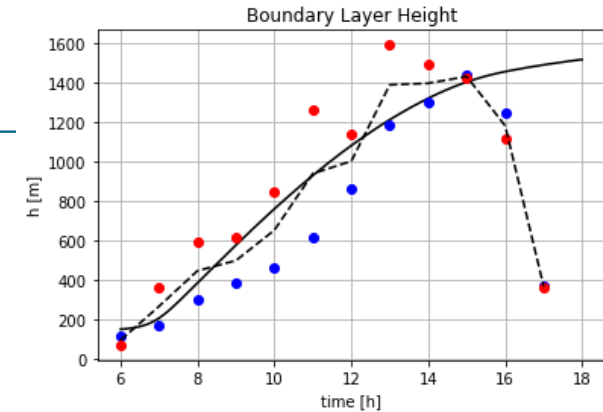
Motivation: Time Series Analysis to Parameter Space
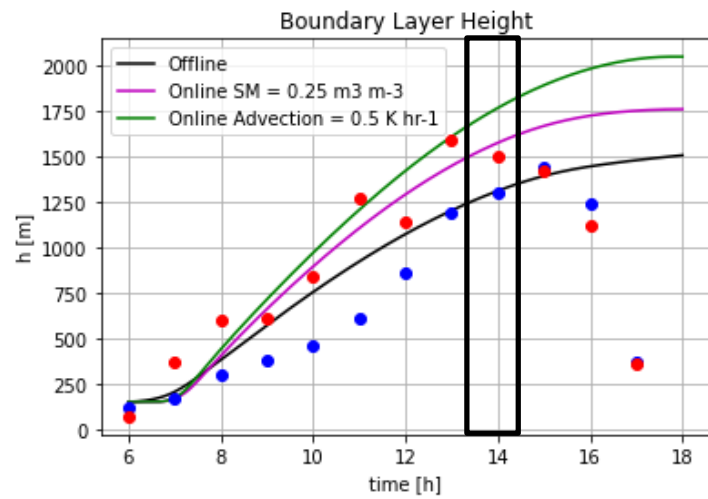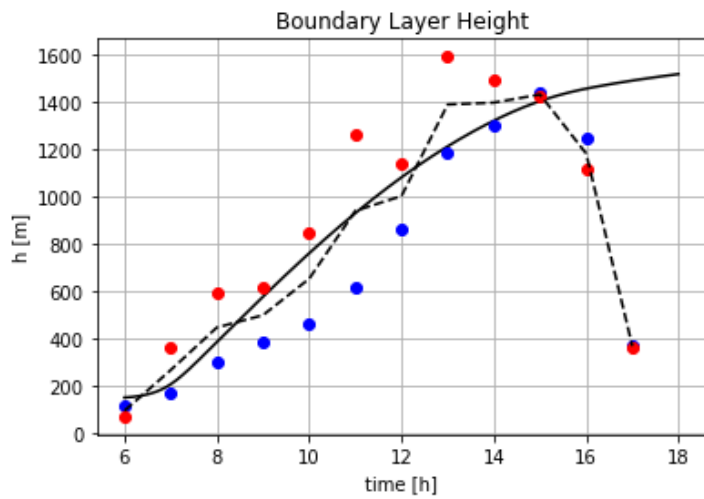
Offline -> Online

Parameter Space
at 14 UTC

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Method: Numerical Scheme for Online Cases

The modeled latent heat in the parameter space with varying heat advection and soil moisture at 14:00 UTC with the boundary layer height (solid lines) and Bowen ratios (dashed lines).
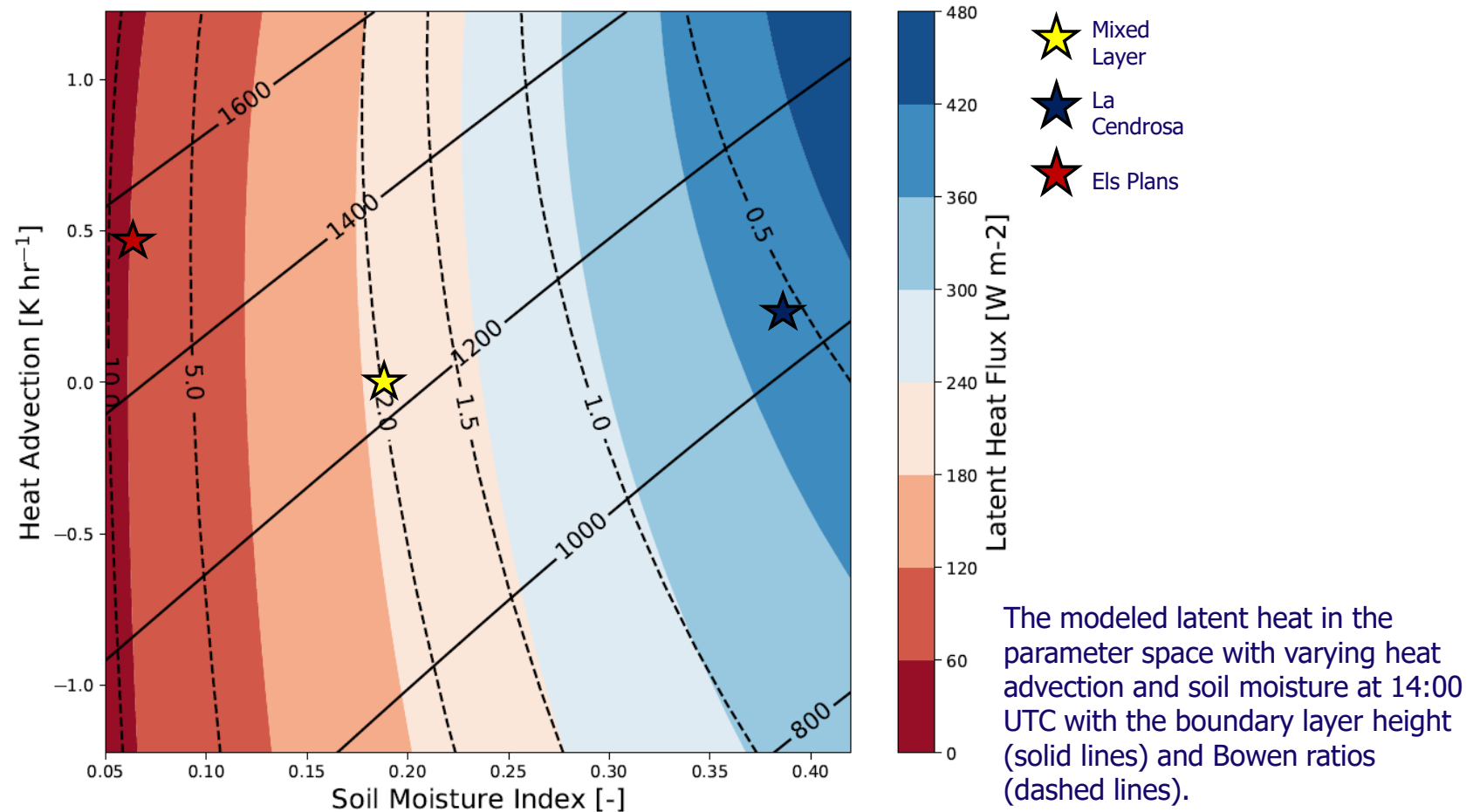
$$\frac{dLE}{dt} =$$

$+$ Radiative Forcing

$+$ Boundary Layer Forcing

$+$ Boundary Layer Feedbacks

$-$ Surface Layer Feedback

$-$ Land Surface Feedbacks

$\boxed{SW_{in}, LW_{in}, \alpha}$

$\boxed{\frac{d}{dx}(\theta, q)}$

$\boxed{w_e, h, \Delta q, \Delta \theta}$

$\boxed{H, LE}$

$\boxed{r_a}$

$\boxed{LW_{out}, G, r_s}$

Van Heerwaarden et al, 2010

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