

HS1.3 The Budyko framework under environmental changes

Conveners:

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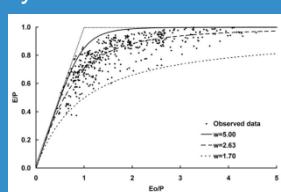
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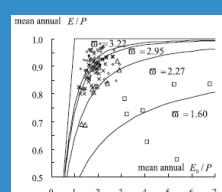
Description:

The Budyko framework allows estimation of actual evapotranspiration based on the balance between the supply of water and energy (they are usually represented by precipitation and potential evaporation). It is a steady state model and has been widely used to examine the terrestrial water budget at decadal and catchment scales. For its simplicity, the model is extremely powerful with model performance similar to that of complex hydrological models (when applied at the appropriate scales).

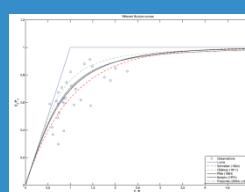
However, the wider application of the Budyko framework is hindered by two key issues. The first is its inability to deal with transient conditions – both short term variability and long-term change. This is due, at least in part, to the assumption of minimal water storage changes. The second is that, despite knowledge that localized conditions influence the accuracy of the model, little progress has been made in developing a comprehensive, process-based understanding of the location of observational data within the Budyko space. Advances in both issues would greatly enhance this modelling framework – but only if such advances maintain the great simplicity and power of the Budyko framework.



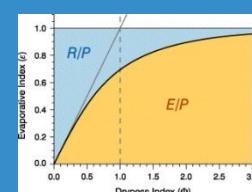
Zhang, 2004



Yang, 2007



Coenders, 2009



Donohue, 2012

This session seeks contributions which extend the theory or provide applications that address questions such as:

- How can soil water storage changes be incorporated in the Budyko framework?
- If freed from steady state conditions due to storage assumptions, can the model be applied annually, or even sub-annually, and can it account for the effects of climate seasonality and variability?
- How can we advance our process-based understanding of the role of local conditions (such as vegetation dynamics, land use, reservoirs, groundwater use) within the modelling framework?
- What contributions or insights to our understanding of the Budyko framework might be provided by new technologies, such as proximal sensing or remote sensing?
- How do spatial and temporal scales interact?
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Presenters:

Graham Farquhar, Dawen Yang,

