Using soft data to calibrate SWAT+ models

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Models calibrated only by looking at discharge timeseries may not represent catchment processes well

Preview

- What is Soft Calibration?
- How does it work?
 - Application on Upper Blue Nile
- Advantages
 - Next Steps

Many times, only time series data

is used to calibrate models



Soft calibration uses general

Information about the study area for calibration



Hard Calibration

Soft Calibration

review

What is Soft Calibration?

- How does it work?
 - Application on Upper Blue Nile
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Soft calibration aims to match model

hydrological components to soft data



Soft calibration aims to match model

hydrological components to soft data

Difference between simulated and soft data

Estimate new parameter – run model

Difference between simulated and soft data

Estimate new parameter – run model

Difference between simulated and soft data



Application on Upper Blue Nile



²⁵⁵ Hydrological response units in 58 Landscape units

Before Soft Calibration



After Soft Calibration



review

- What is Soft Calibration?
- How does it work?
 - Application on Upper Blue Nile
- Advantages
 - Next Steps

Soft Calibration helps achieve more

realistic scenario investigation studies





It complements hard calibration of models in data scarce areas

Next Steps

Multi-variate approach to minimise

parameter interaction effects

Making Global Soft Data available

Soft Calibration is a technique that is used to calibrate water balance components based on soft data

We developed and applied it on the Upper Blue Nile and results show that it can improve performance of models

It promotes realistic case study simulations, it is fast and can be used in data scarce areas.



Windows PowerShell - soft_calibration.py

```
Microsoft Windows [Version 10.0.17134.254]
(c) 2018 Microsoft Corporation. All rights reserved.
C:\modelling\calibration\soft_calibration>soft_calibration.py
       > running SWAT+ to get default run ratios
         Original Simulation Executing mo/day/yr 12 31 1974 Yr 6 of 6
         Execution successfully completed
        callibrating esco
       > iteration 1: testing value : 0.09523809523809523
         Original Simulation Executing mo/day/yr 12 31 1974 Yr 6 of 6
         Execution successfully completed
       > adjustment data
          x = 0 y = 60.2168
          x = 0.0952 y = 96.8508
       > iteration 2: testing value : -0.1565467416425543
         Original Simulation Executing mo/day/yr 12 31 1974 Yr 6 of 6
         Execution successfully completed
       > adjustment data
          x = 0.0952 y = 96.8508
          x = -0.1565 y = 11.7338
       > esco value set to -0.1565467416425543
```

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Ÿ	4	esco	abschg	-0.157	0	0	0	0	0	0	0	0	0
	5	cn2	abschg	-4.624	0	0	0	0	0	0	0	0	0
	6	lat_len	pctchg	-11.000	0	0	0	0	0	0	0	0	0
	7	perco	abschg	0.000	0	0	0	0	0	0	0	0	0