



Rijkswaterstaat
Ministry of Infrastructure and the
Environment



Behind the scenes of the runoff performance

An analysis of internal states and fluxes of process-based models

Laurène Bouaziz

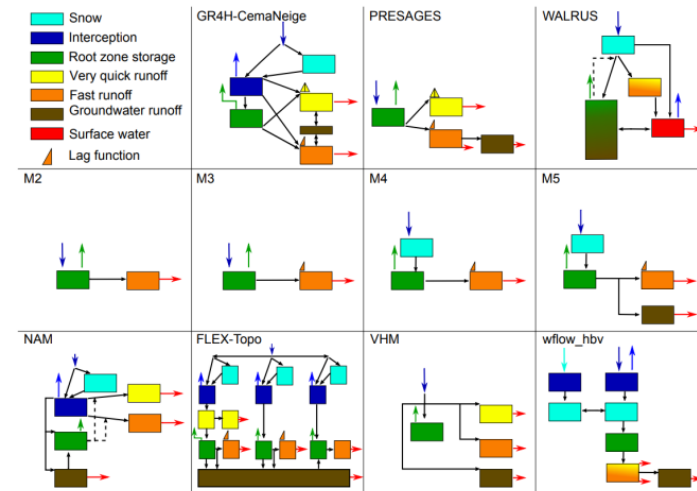
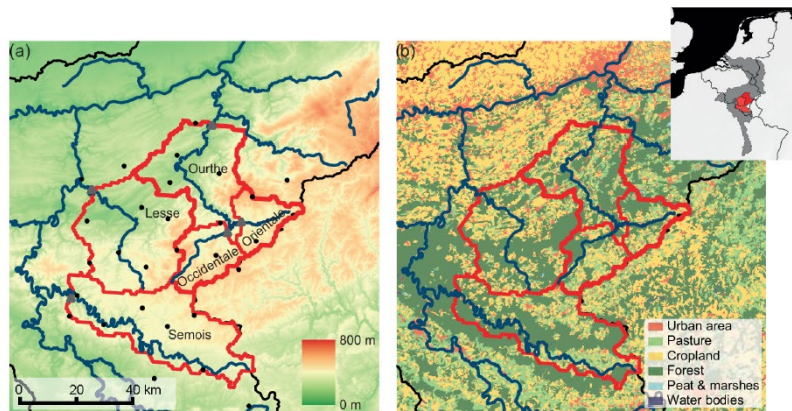
13-09-2019

Introduction – follow up comparison

Looking beyond general metrics for model comparison – lessons from an international model intercomparison study

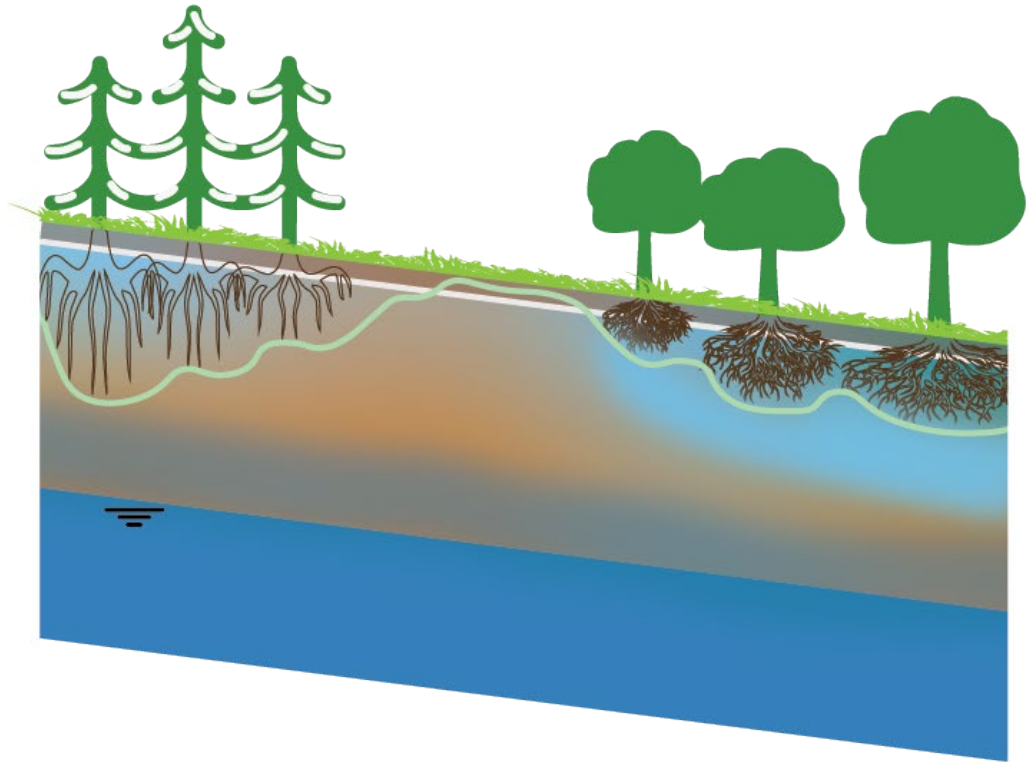
Tanja de Boer-Euser¹, Laurène Bouaziz², Jan De Niel³, Claudia Brauer⁴, Benjamin Dewals⁵, Gilles Drogue⁶, Fabrizio Fenicia⁷, Benjamin Greller⁸, Jiri Nossent^{8,9}, Fernando Pereira⁸, Hubert Savenije¹, Guillaume Thirel¹⁰, and Patrick Willem^{3,9}

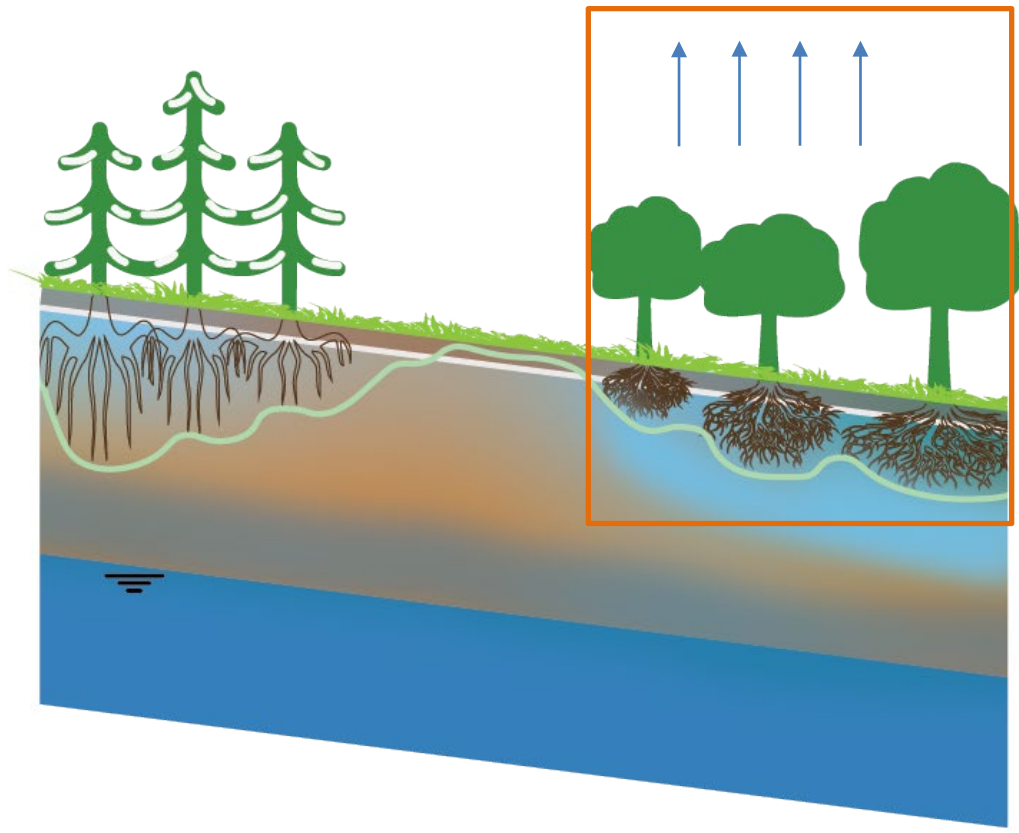
Hydrol. Earth Syst. Sci., 21, 423–440, 2017



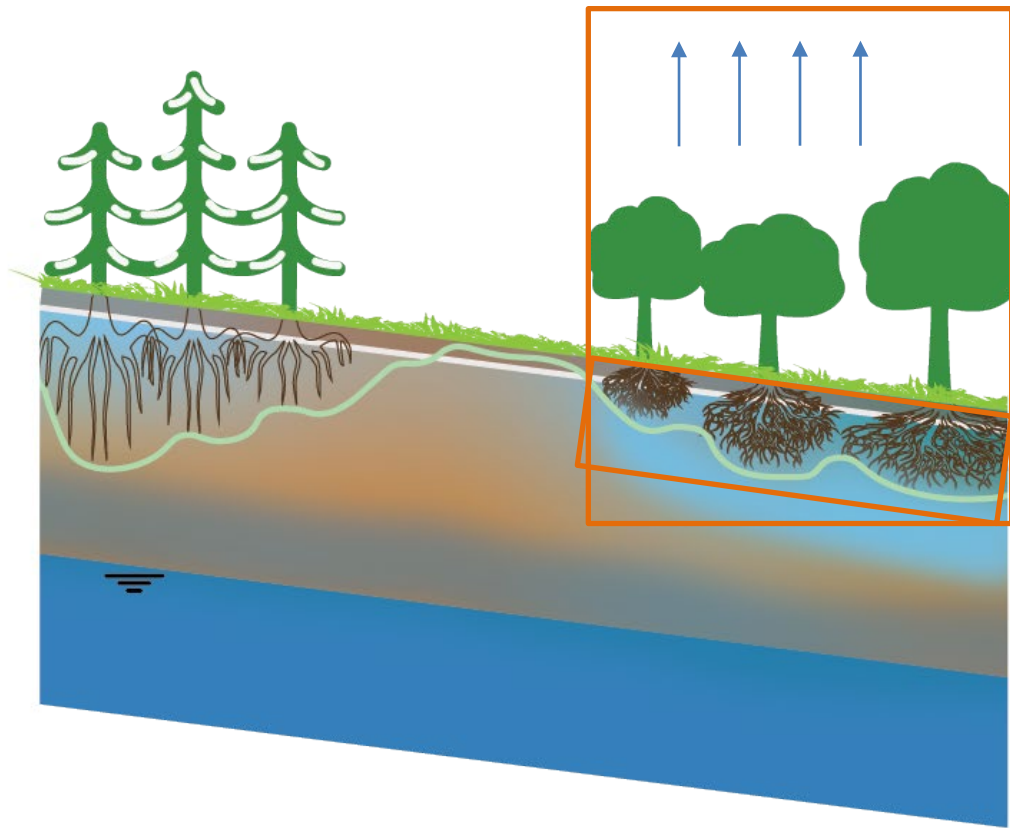
Hypotheses

1. *Process-based models with similar runoff performance show similar dynamics of internal states and fluxes*
2. *Identify and explain model strengths and weaknesses through a comparison of modeled states and fluxes with multiple remotely-sensed products*





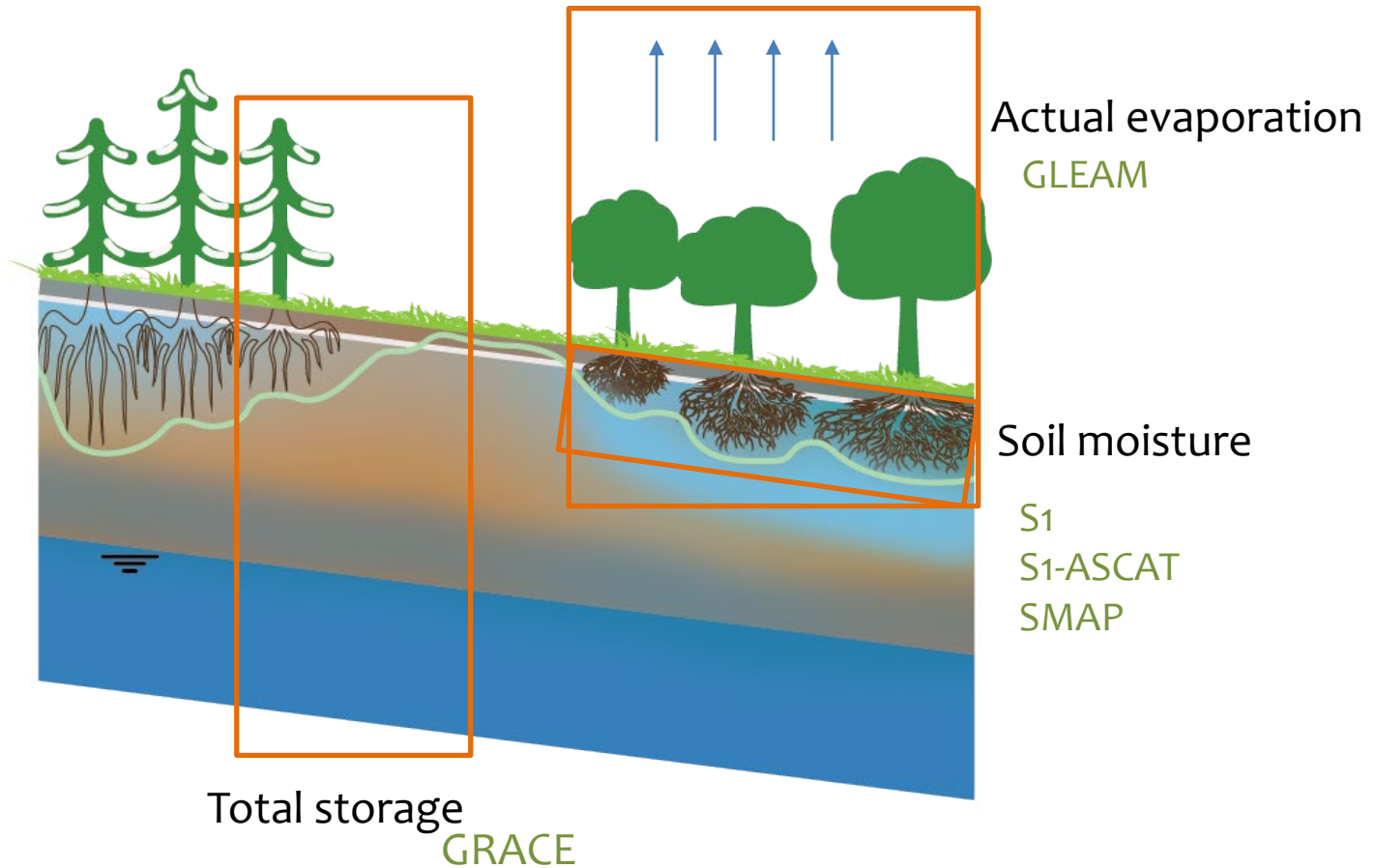
Actual evaporation
GLEAM

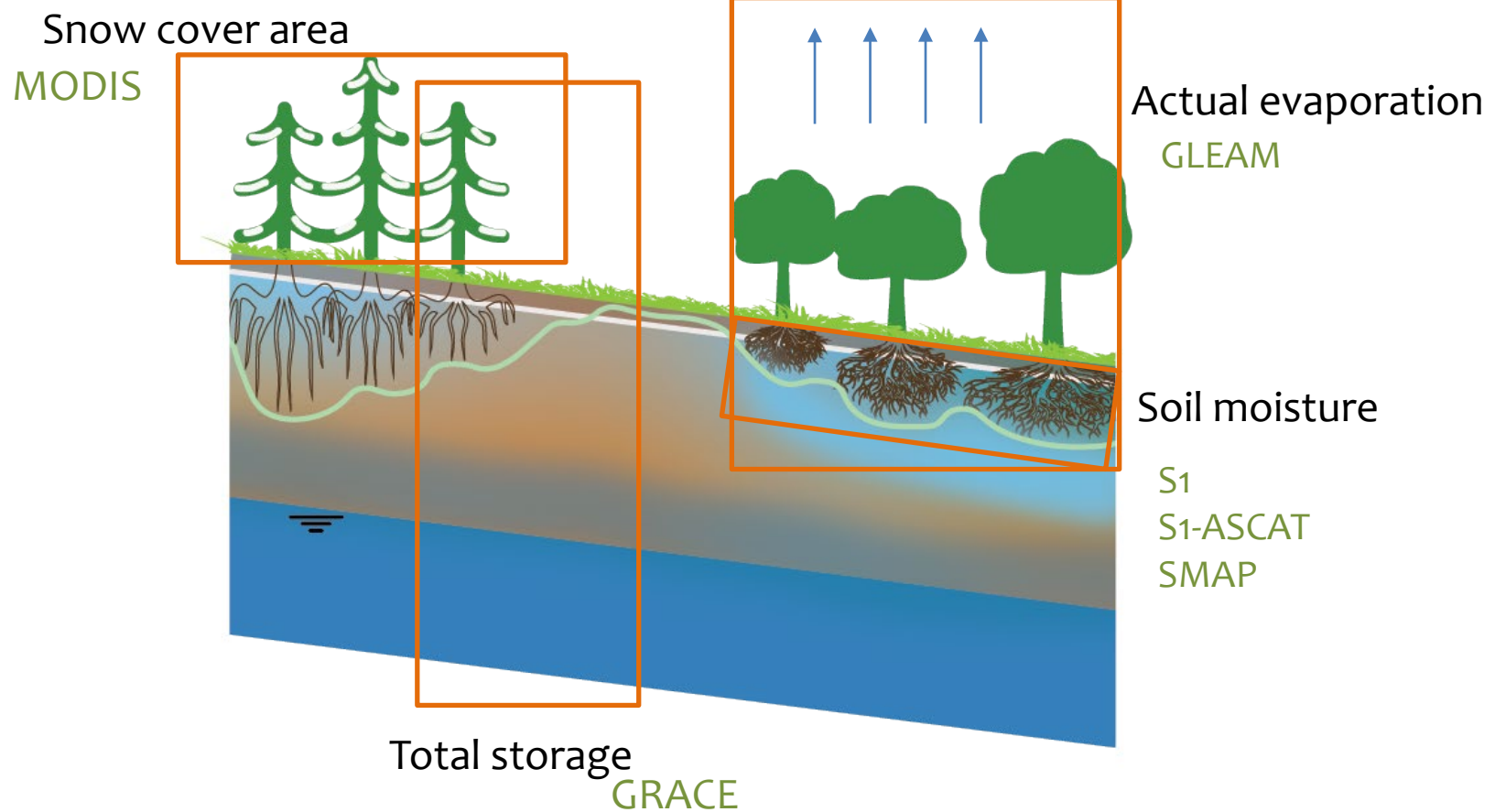


Actual evaporation
GLEAM

Soil moisture

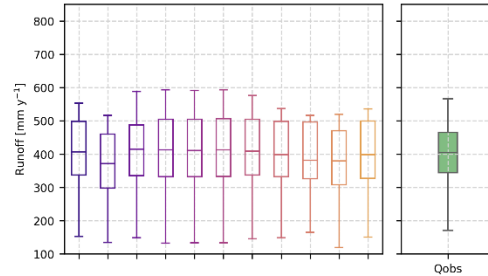
S1
S1-ASCAT
SMAP



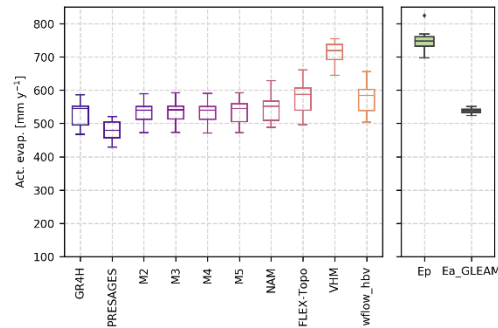


Water balance (Lesse)

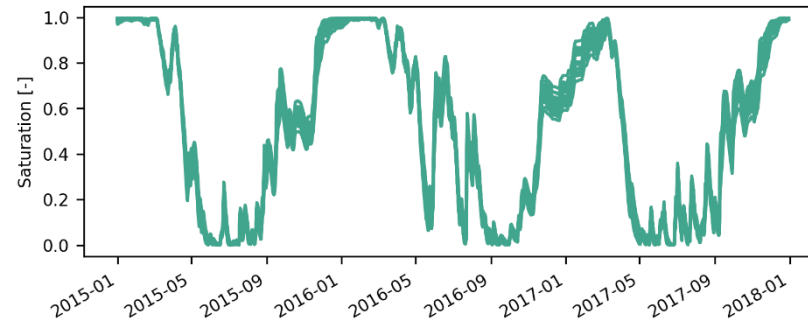
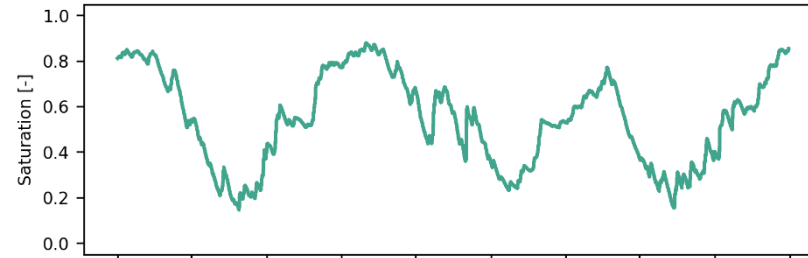
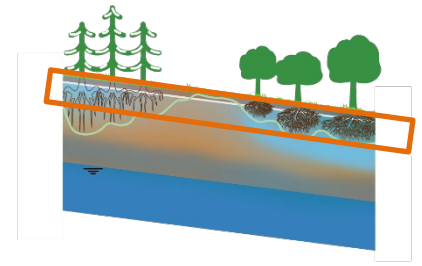
Mean annual runoff
(2001-2016)



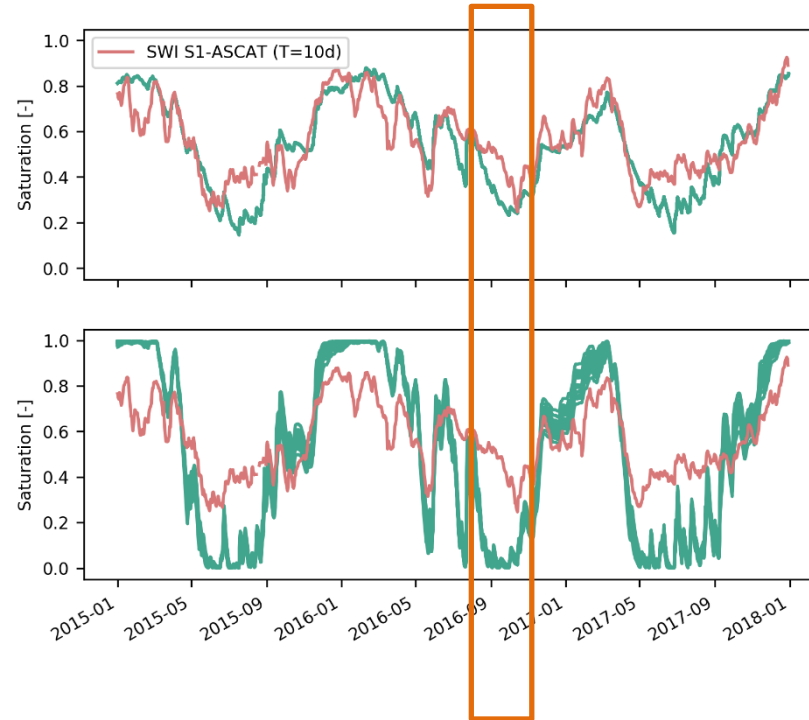
Mean annual evaporation



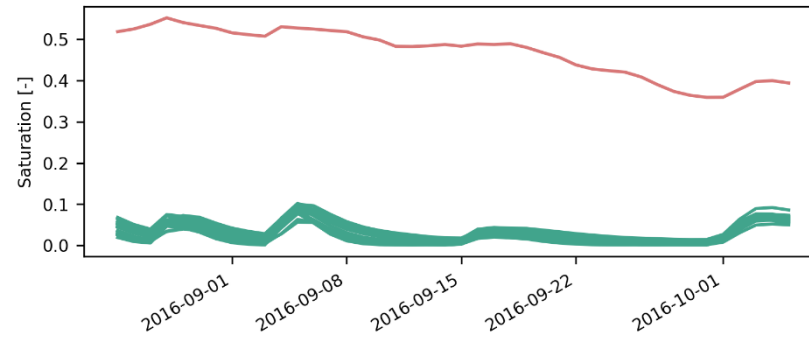
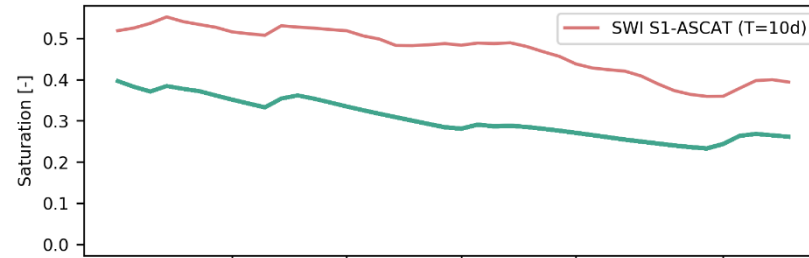
Root-zone soil moisture



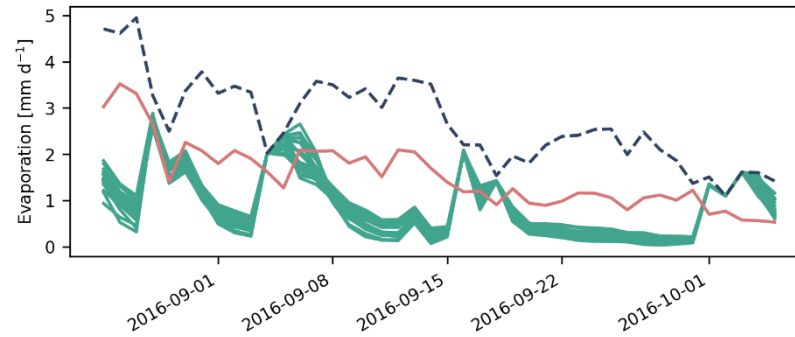
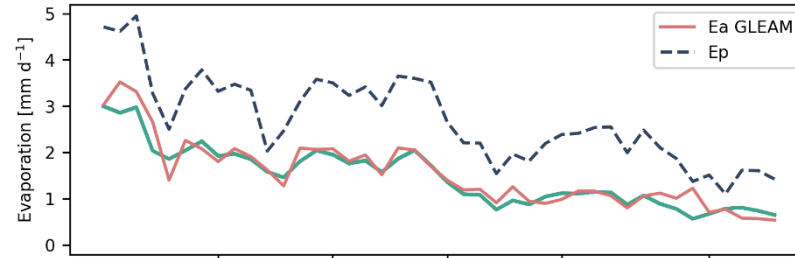
Root-zone soil moisture



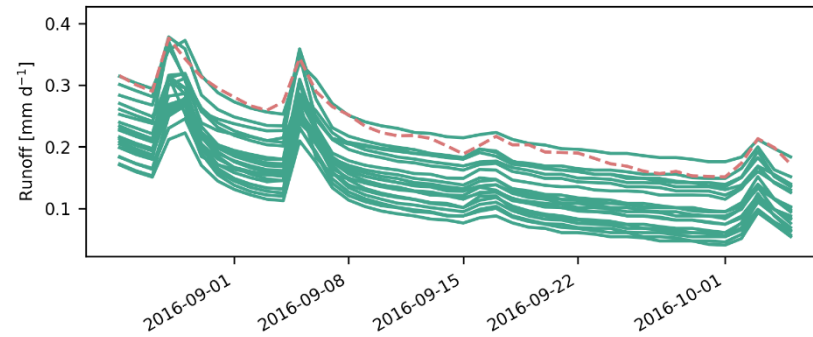
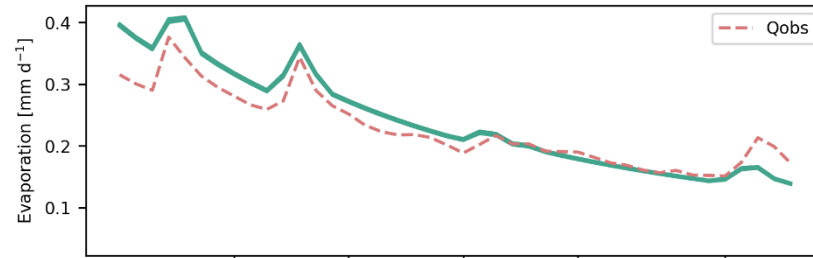
Root-zone soil moisture



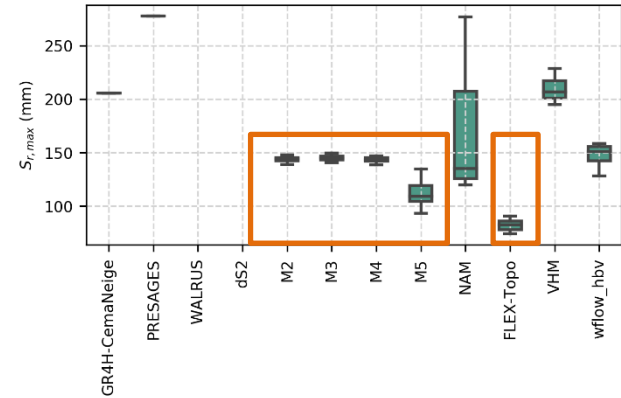
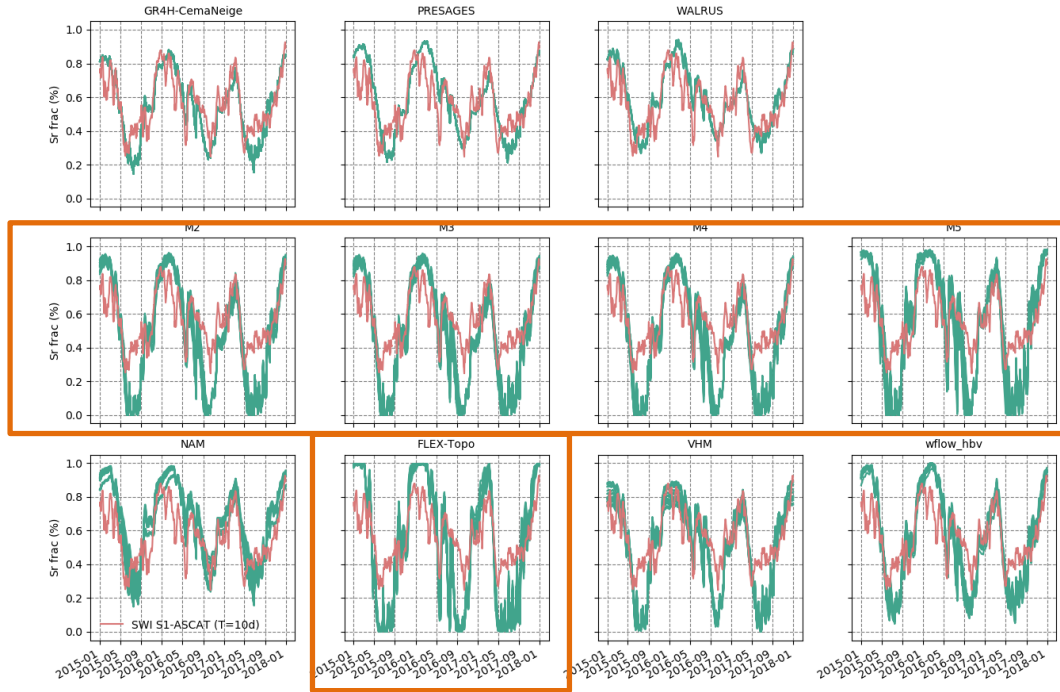
Evaporation



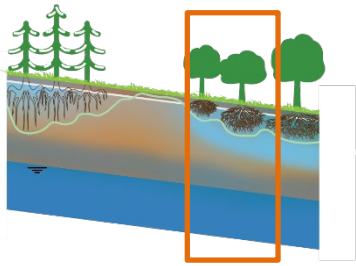
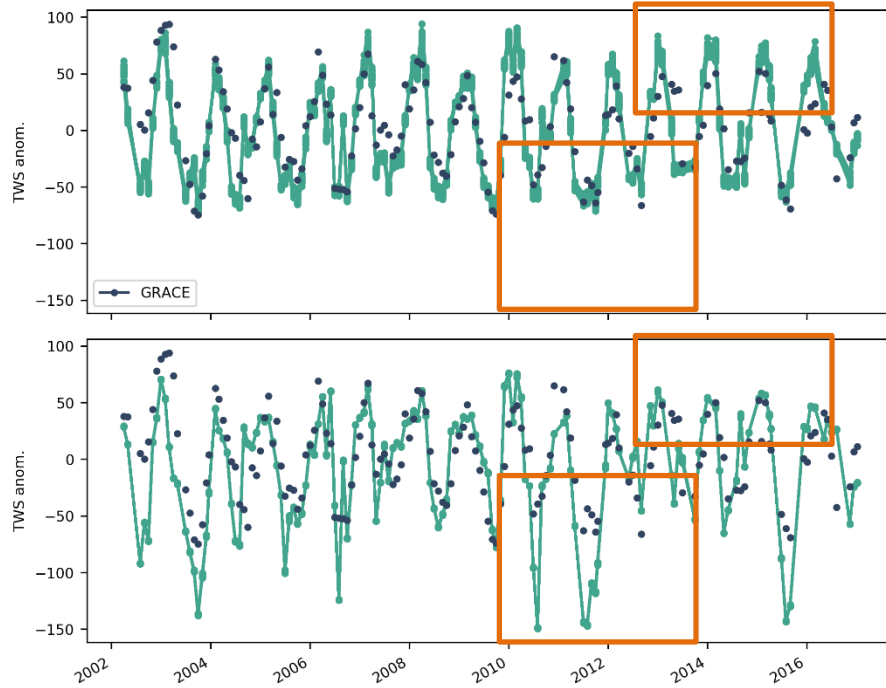
Runoff



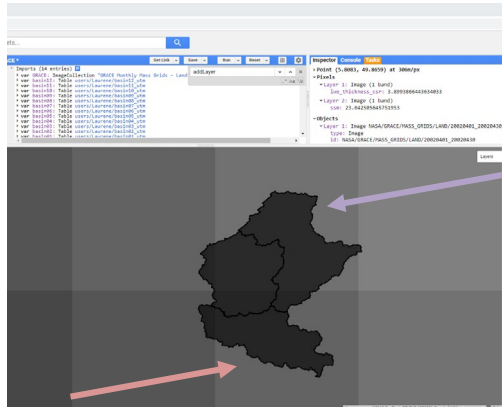
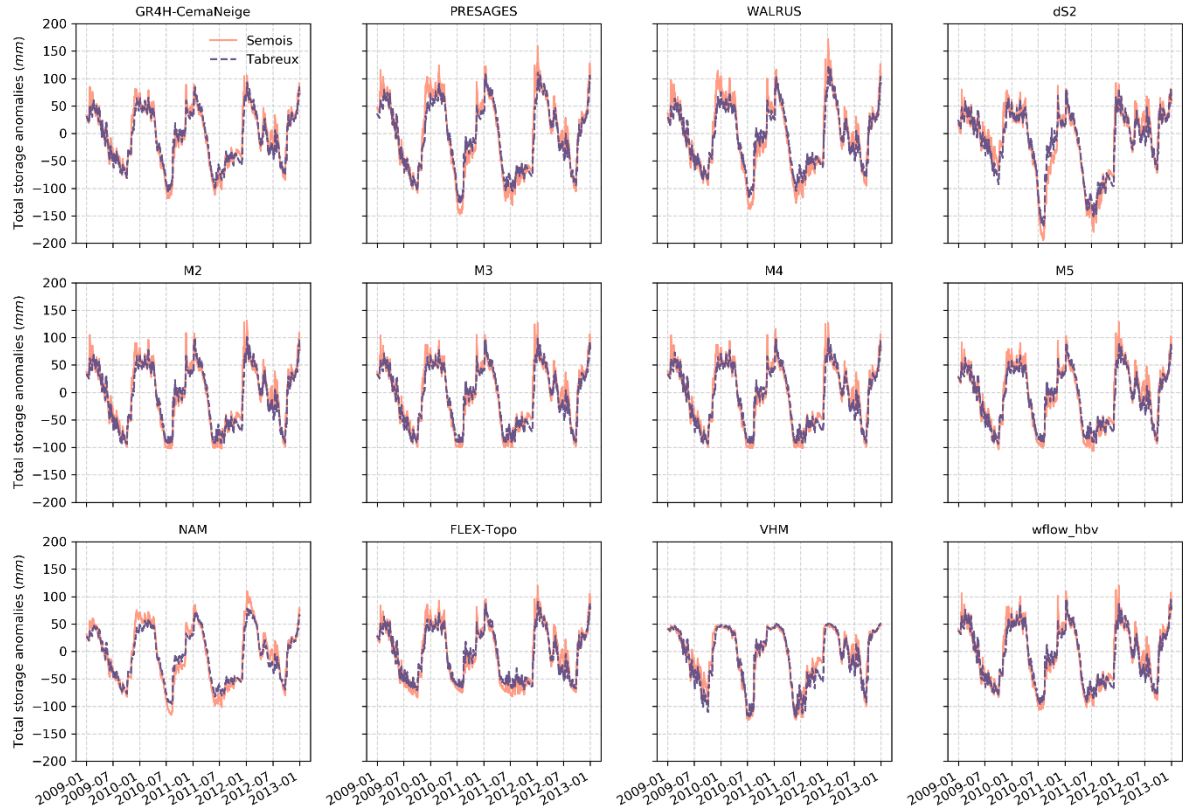
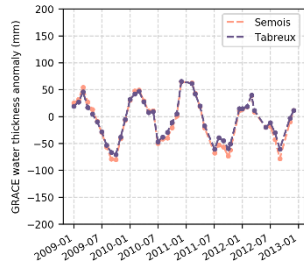
Root-zone soil moisture



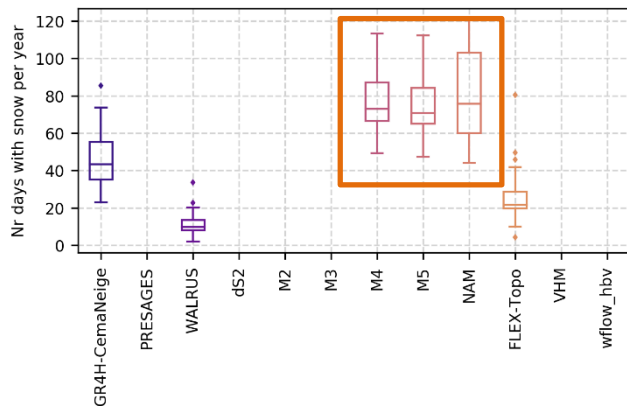
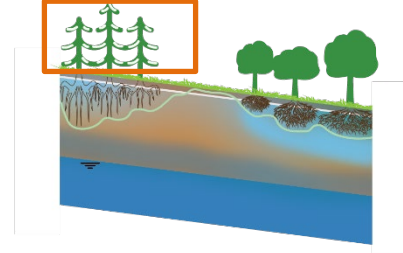
Total storage anomalies - GRACE



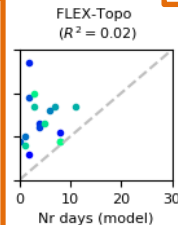
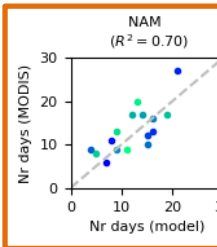
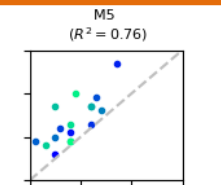
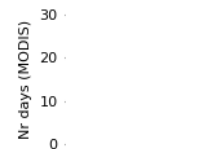
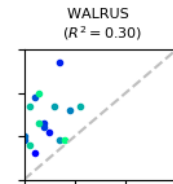
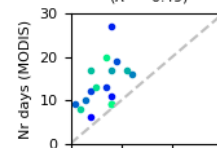
Total storage – spatial variability



Snow – number of days



• 2001 • 2003 • 2005 • 2007 • 2009 • 2011 • 2013 • 2015 • 2017
• 2002 • 2004 • 2006 • 2008 • 2010 • 2012 • 2014 • 2016



Summary

- Differences
 - Water balance
 - Drying out of soil moisture
 - Total storage anomalies
 - Number of days with snow
- Model structure? Parametrization?
- Become aware of aspects that could be improved

Conclusion

1. *Process-based models with similar runoff performance show rather similar dynamics of internal states and fluxes, but also important differences*
2. *Identify and explain model strengths and weaknesses through a comparison of modeled states and fluxes with multiple remotely-sensed products*

Thanks & Discussion

