DeepHydro: Petrus 2.0

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The Elbe catchment

- Catchment: All precipitation drains into the river
- 4th largest river catchment of EU

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https://commons.wikimedia.org/wiki/File:Elbe-niedrig.jpg

https://commons.wikimedia.org/wiki/File:Elbe_Einzugsgebiet.png

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The Elbe catchment

- Strong flood events in 2002, 2006, 2013
- Low-flow period 2003, 2005

→ Need for accurate prediction of streamflow

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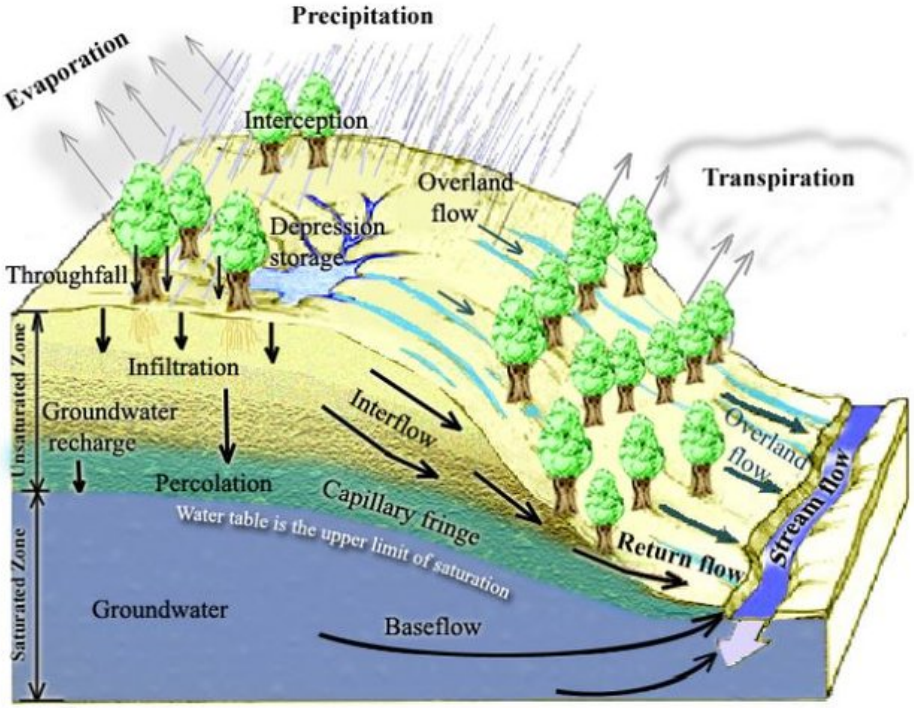
The hydrological system

Different hillslopes react differently!



Dol Raj Chalise: Evaluating Temporal and Spatial Scale Issues with Hydrologic Models in the Black Hills, South Dakota (2013)

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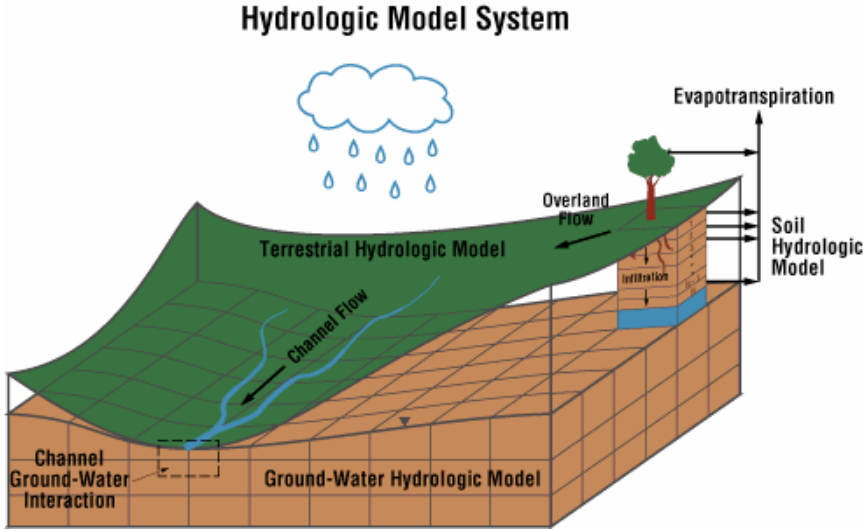
Traditional physical modeling

- Grid volumes = mini storages
- Information missing
- Costly assumptions+parametrization

→ Deep Learning: Identify spatial units



http://www.essc.psu.edu/hms/hms/

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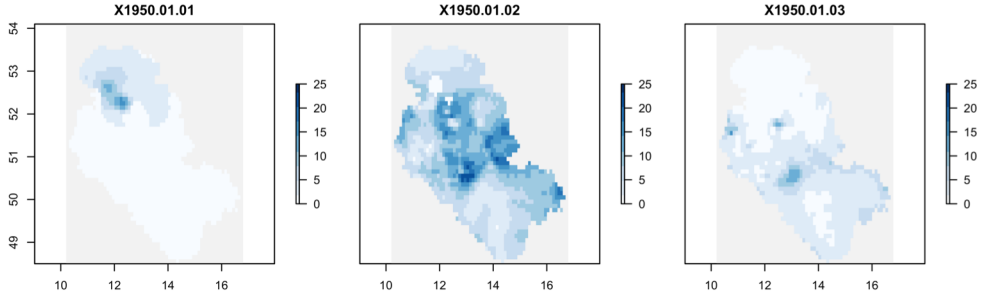
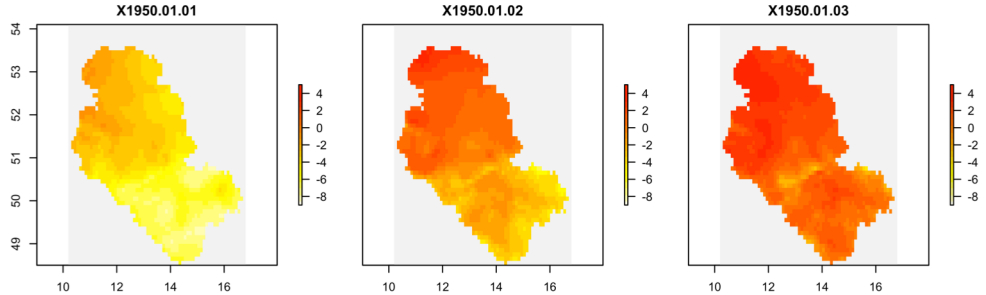
Data

Precipitation



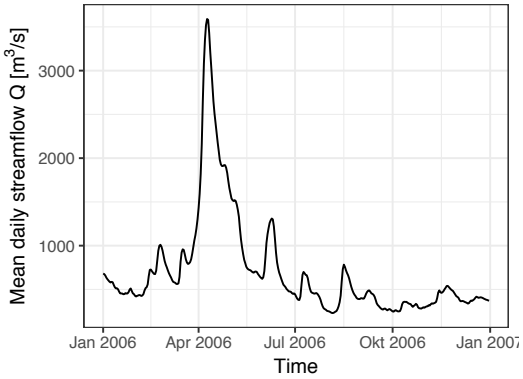
Air temperature



Input

CNN-LSTM

- Patterns
- Time-lags



Target

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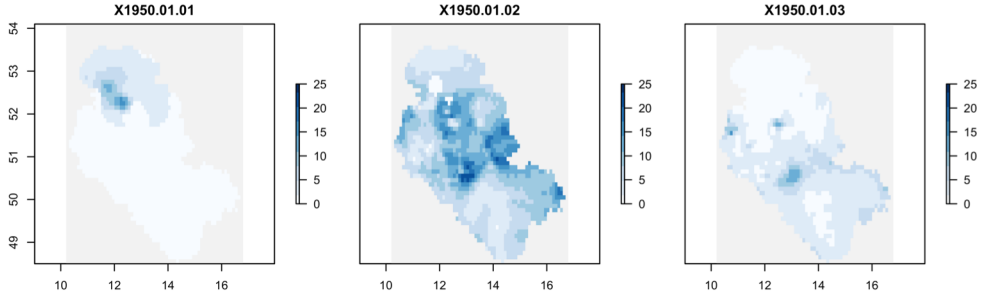
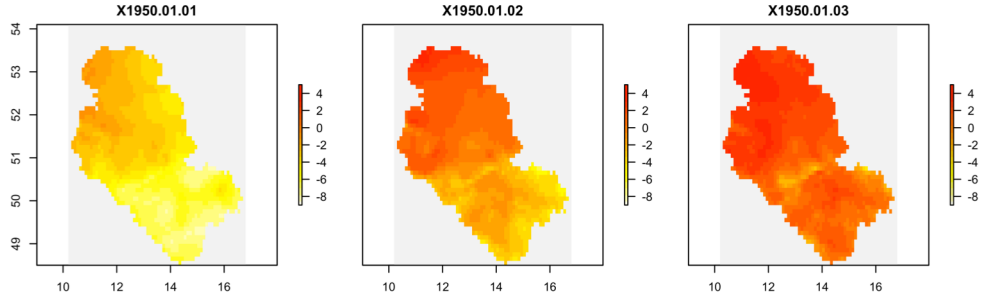
Data

Precipitation



Air temperature



Input

- Daily mean values
- 1950 – 2016

Input:

- Precipitation + Temperature
- Dimensions: 56 x 66 x 24472

Target:

- Dimensions: 1 x 24472

Our goals

- Evaluate Performance of Deep Learning
- Evaluate gain in accuracy by including spatial information
- Gain knowledge:
    - Quantify the “Elbe`s memory“
    - Saliency maps: Identify flood-inducing patterns in precipitation + temperature
- Learn a lot
- Networking

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Thanks for your attention!