



## Challenge

- ❑ Various studies investigated the fate of evaporation and the origin of precipitation with numerical moisture tracking
- ❑ Examples for tackled research questions:
  - Moisture dependencies between different regions, impacts of land cover changes on the hydrological cycle, questions regarding the seasonal and inter-annual variability of precipitation
- ❑ To facilitate future applications, datasets on the fate of evaporation and the sources of precipitation are needed
- ❑ Since most studies are on a regional level and focus more on the sources of precipitation, the goal is to provide a readily available global dataset on the fate of evaporation for a fine-meshed grid of source and receptor cells
- ❑ Additionally, source-receptor matrices for land areas of a high potential interest (countries or basins) are targeted

## Data and Methodology

- ❑ ERA-Interim reanalysis data<sup>1</sup> (2000 - 2018) were used as input for
  - Evaporation, precipitation, wind components, humidity, surface pressure etc. (3 - 6 hour time steps)
  - Download of the data at model levels spanning the atmosphere from zero pressure to surface pressure
- ❑ Usage of the WAM-2layers model<sup>2</sup> on a 1.5° \* 1.5° grid: Tracking model with assumption of two well-mixed layers
- ❑ Water balance as underlying principle<sup>2</sup>

$S_k$ : atmospheric moisture storage in layer k

t: time

u, v: wind components

$E_k$ : evaporation entering layer k

$P_k$ : precipitation removed from layer k

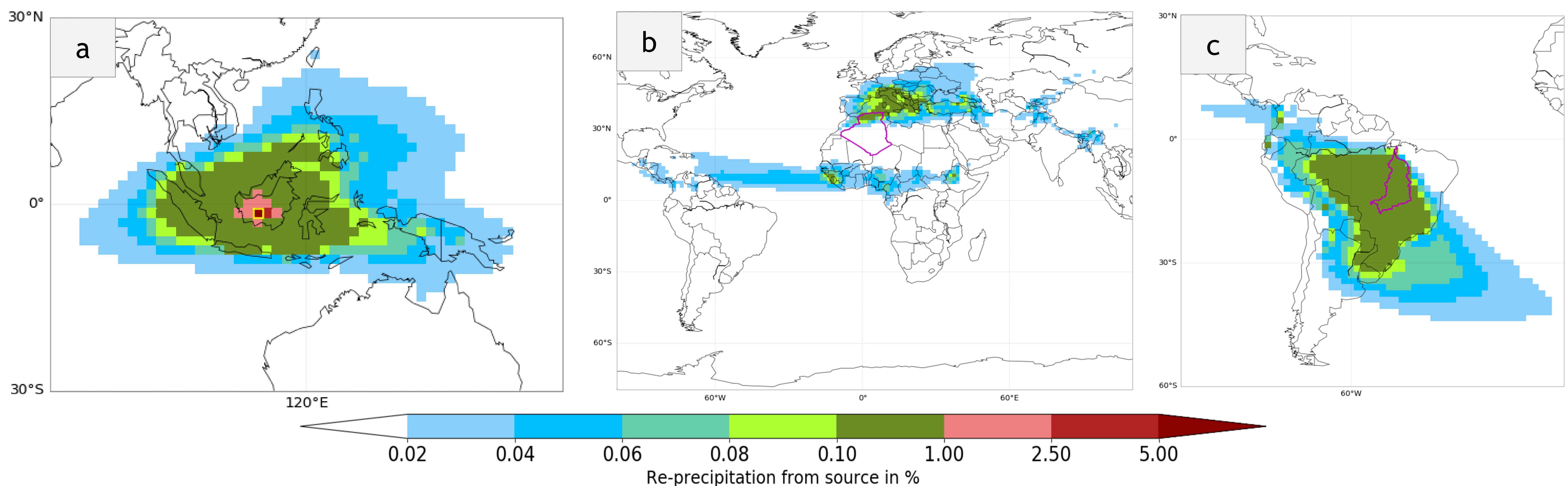
$\xi$ : residual

$F_v$ : vertical moisture transport between bottom and top layer

$$\frac{\partial S_k}{\partial t} = \frac{\partial (S_k u)}{\partial x} + \frac{\partial (S_k v)}{\partial y} + E_k - P_k + \xi_k + F_v$$

- ❑ Forward tracking of atmospheric moisture from 8684 land grid cells (all land cells except those located in Greenland and Antarctica) to 25680 cells on earth plus aggregation to countries and basins within ArcGis and Python

## Results & Conclusions



**Figure 1** Main areas of re-precipitation for an example source cell (a - 1.5° S, 112.5° E - Central Kalimantan on the island Borneo - outlined yellow), an example country (b - Algeria - outlined purple) and an example basin (c - Tocantins basin - outlined purple)

- ❑ Evaporationsheds in monthly resolution for 8684 land cells, 265 countries and 8223 basins
  - Represent downwind atmosphere/surface that receives precipitation from a specific location's evaporation
- ❑ Source receptor tables highlighting the main fate of evaporation and the top contributors to precipitation
- ❑ Could be used for investigations into average annual, seasonal and inter-annual sink and source regions of atmospheric moisture from land masses for most of the regions in the world
- ❑ Data availability:
  - Dataset with sample scripts: <https://doi.pangaea.de/10.1594/PANGAEA.908705>
  - Screening-Tool: <https://wf-tools.see.tu-berlin.de/wf-tools/evaporationshed/#/>
  - Paper (currently in public discussion phase): <https://www.earth-syst-sci-data-discuss.net/essd-2019-246/>