Performance of GSMaP satellite rainfall products over Solo River basin, Jawa

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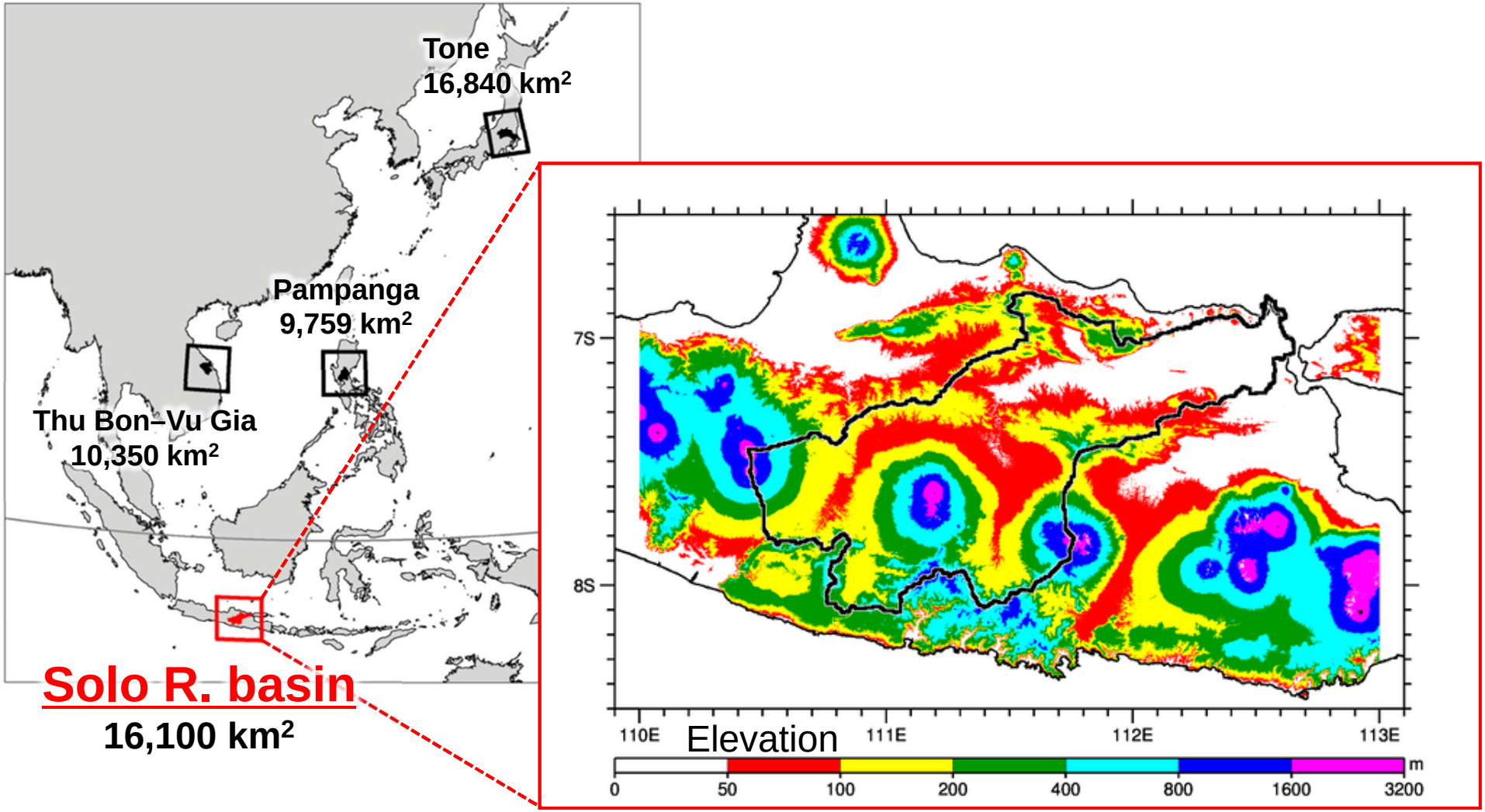
Objective

- **To know performance of GSMaP satellite rainfall products**
  - **GSMaP vs surface gauge observations**
  - **Knowing reason why the performance is good or not so good**
  - **Better use of GSMaP in hydrology**
  - **Contribution to GSMaP algorithm development**

Study region



Kakenhi # 25882049 for FYs 2013 & 2014

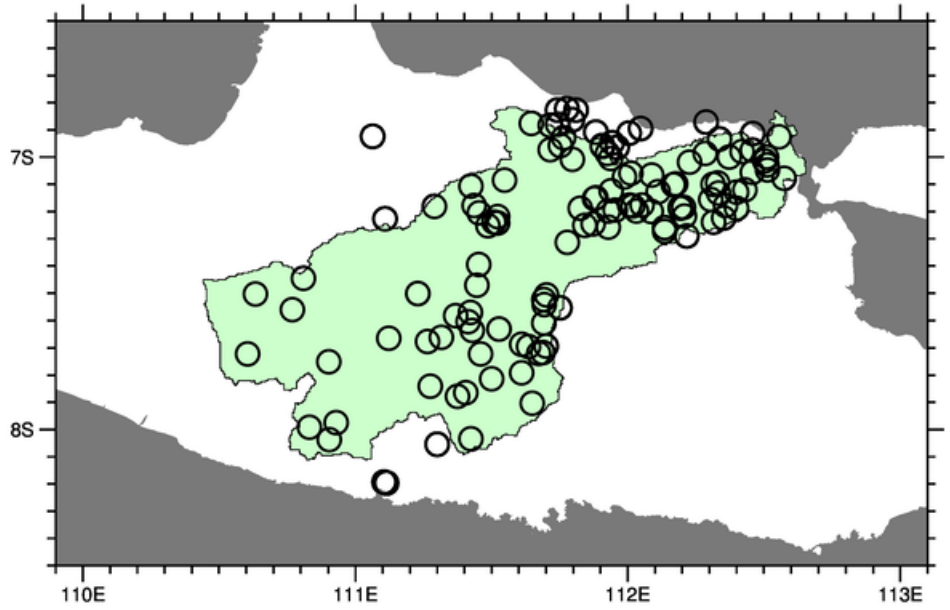
Data

- **Satellite rainfall estimates**
  - **GSMaP_MVK, ver. 5.222.1**
  - **GSMaP_Gauge, ver. 40**
  - **Mar. 2000–Nov. 2010, hourly, 0.1º grid**
- **Surface gauge rainfall**
  - **2002–2009, daily, 103 stations**

- **Target period: 2002–2009 (8 years)**

Surface gauge observations

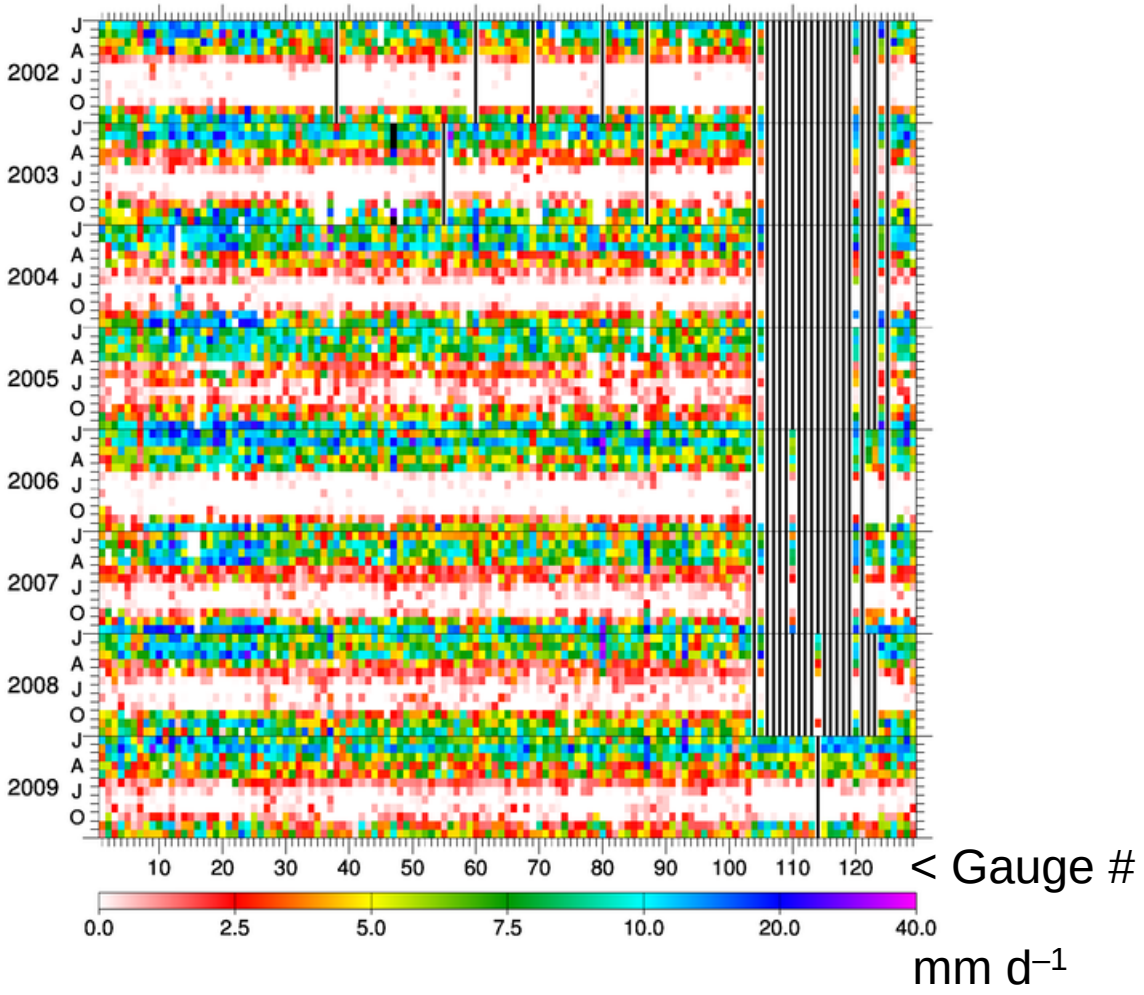
129 stations, 2002–2009, daily



Manually measured, recorded and digitized data
from Ministry of Public Works (PU), Indonesia

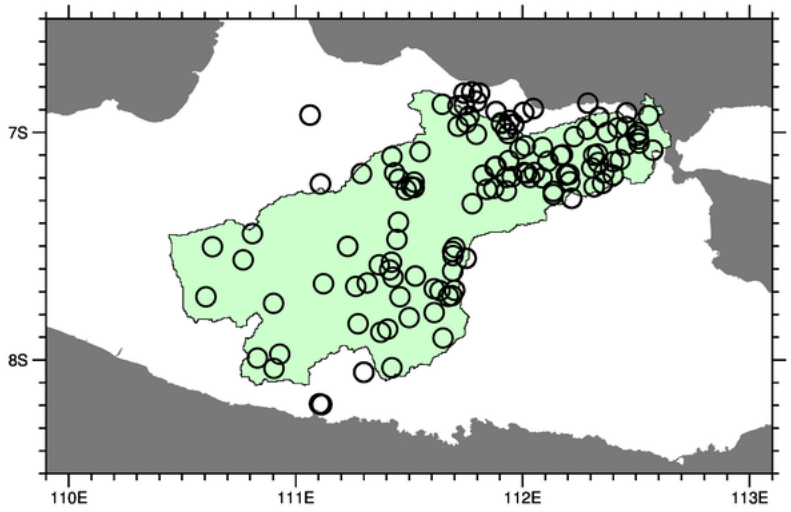
Monthly-mean daily rainfall

129 stations, 2002–2009



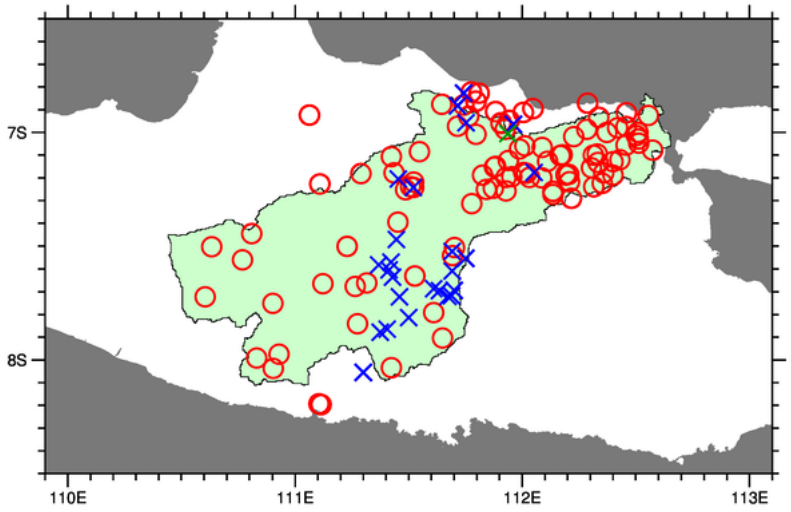
Surface gauge observations

Before simple QC



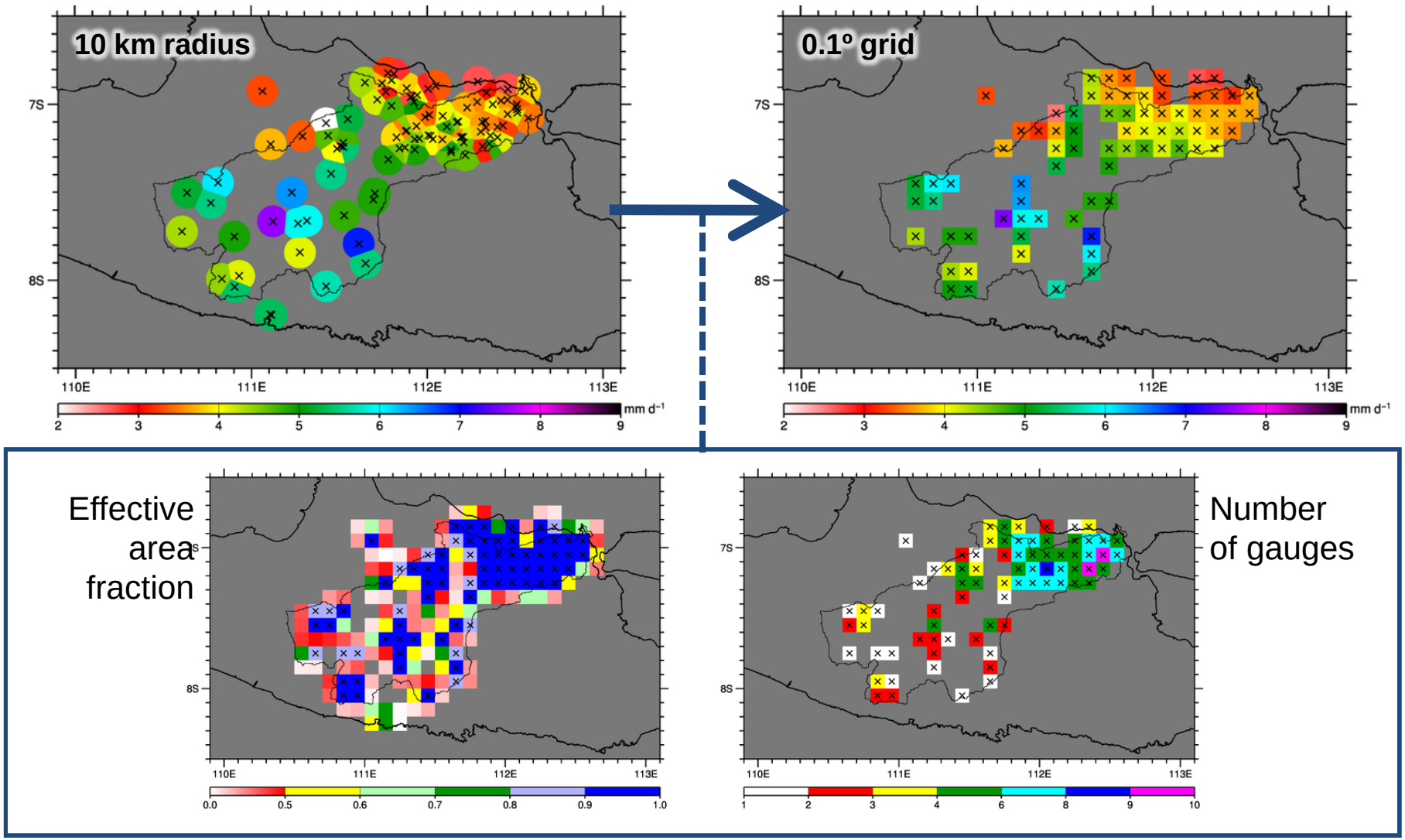
129 stations

After simple QC



103 stations

Surface gauge observations



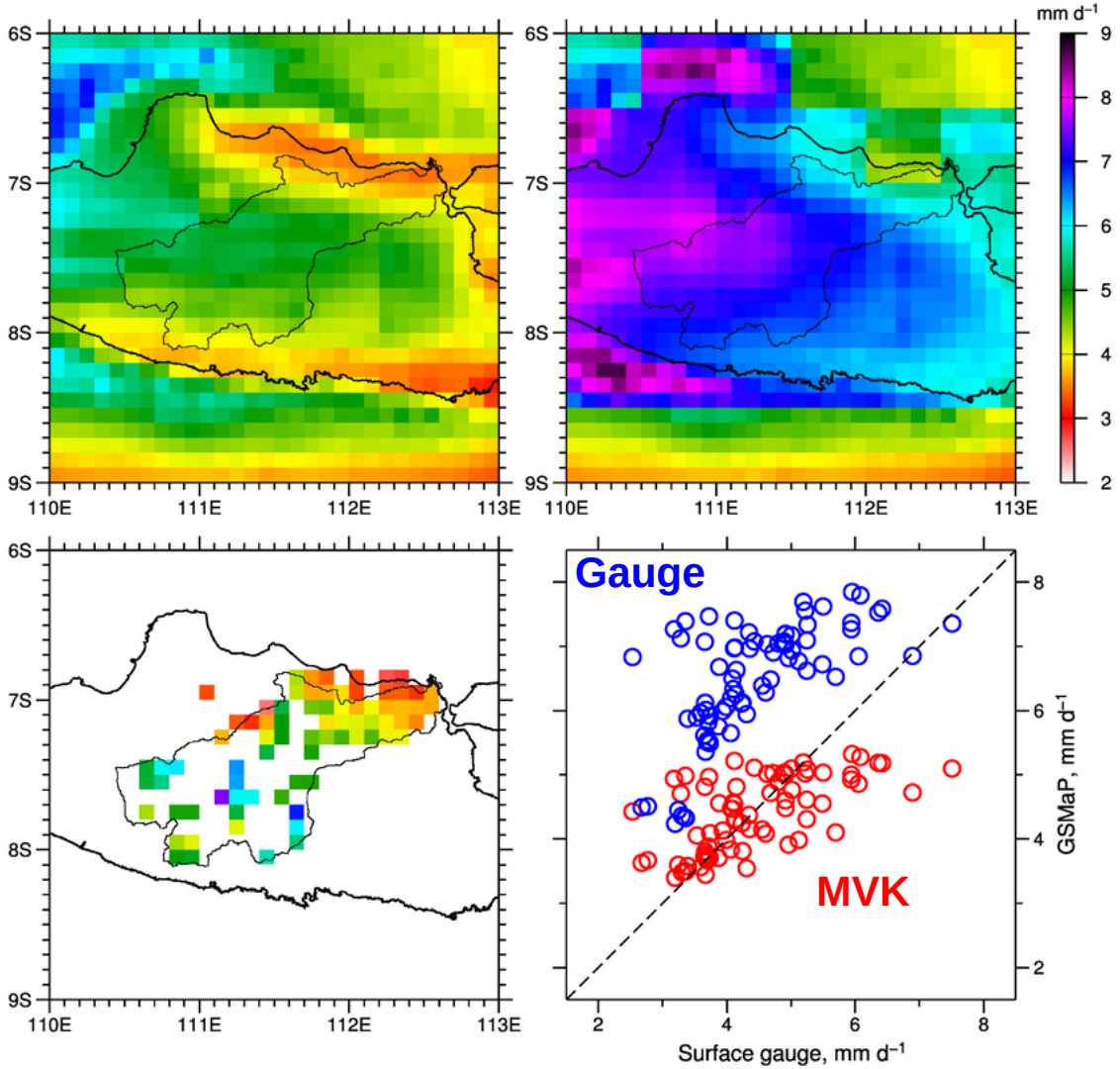
Mean daily rainfall

2002–2009

GSMaP_MVK

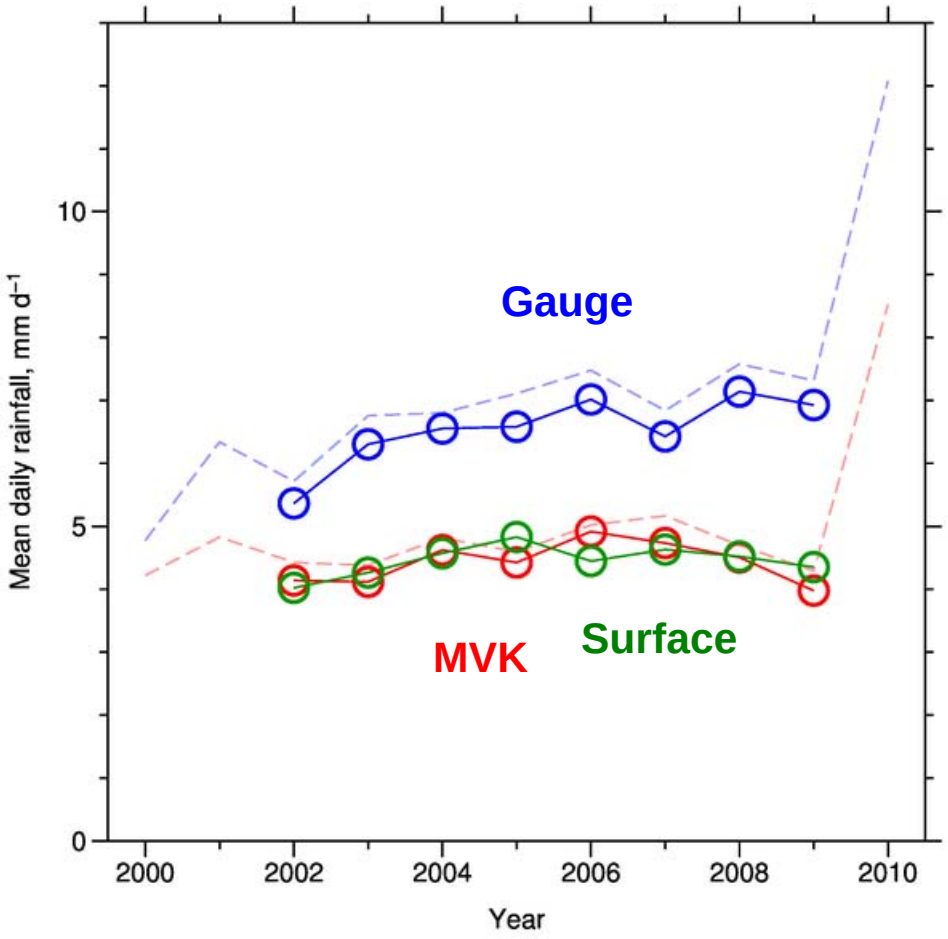
GSMaP_Gauge

Surface gauge



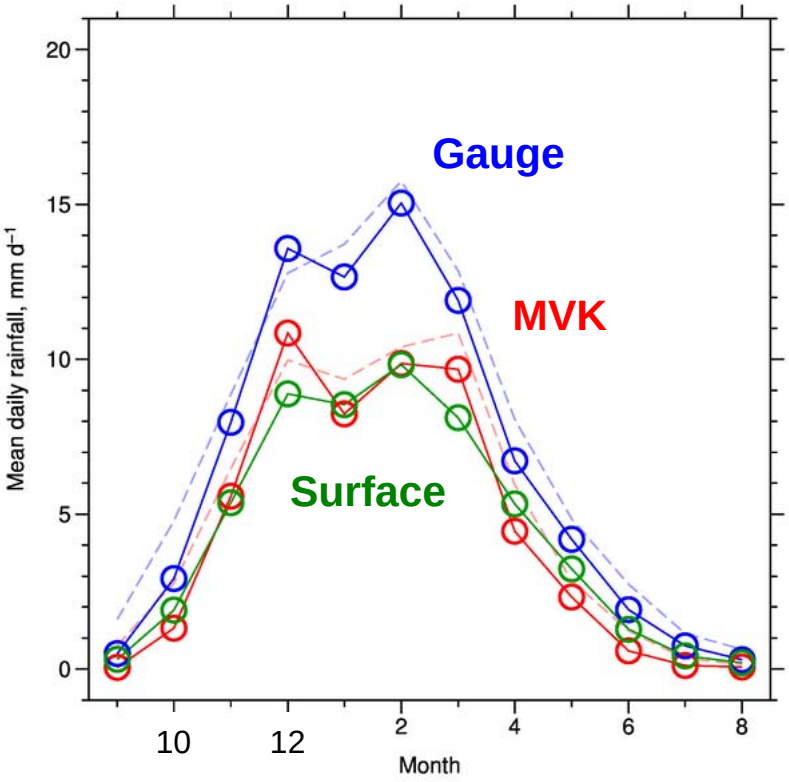
Year-to-year variations

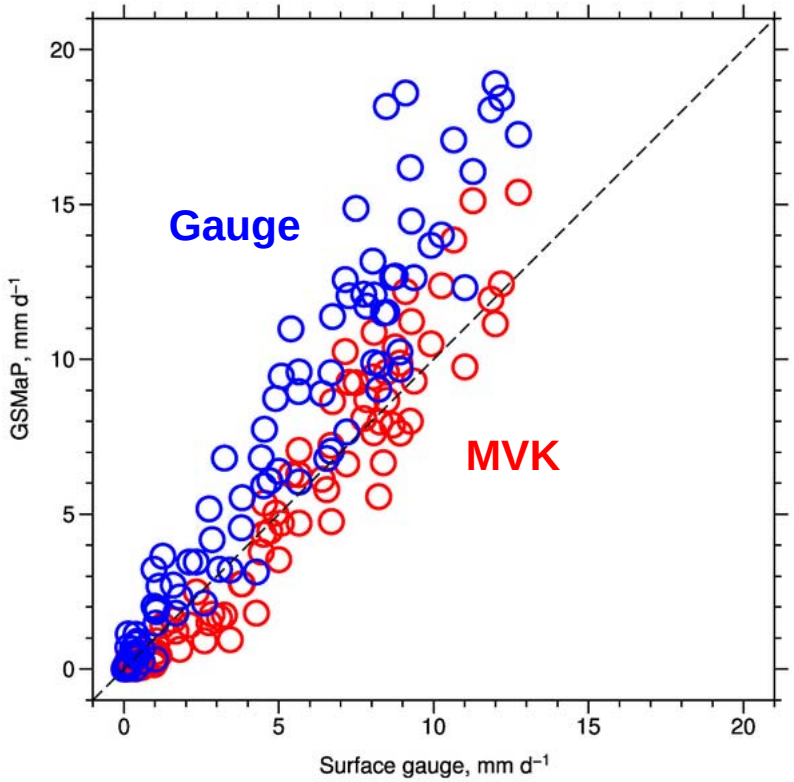
MVK, Gauge & surface, basin mean, 2002–2009



Seasonal variations

MVK, Gauge & surface, basin mean, 2002–2009

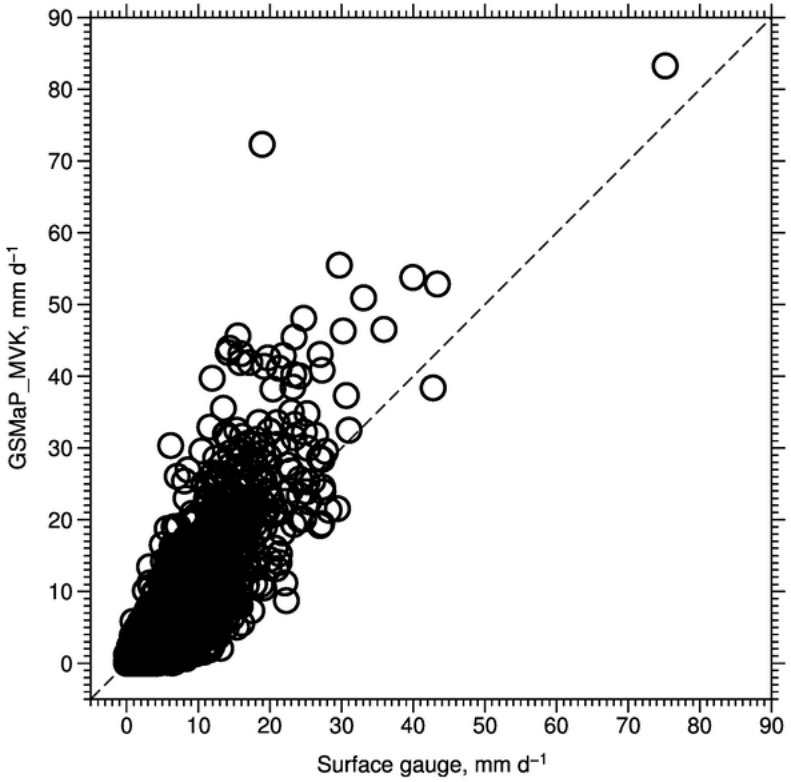




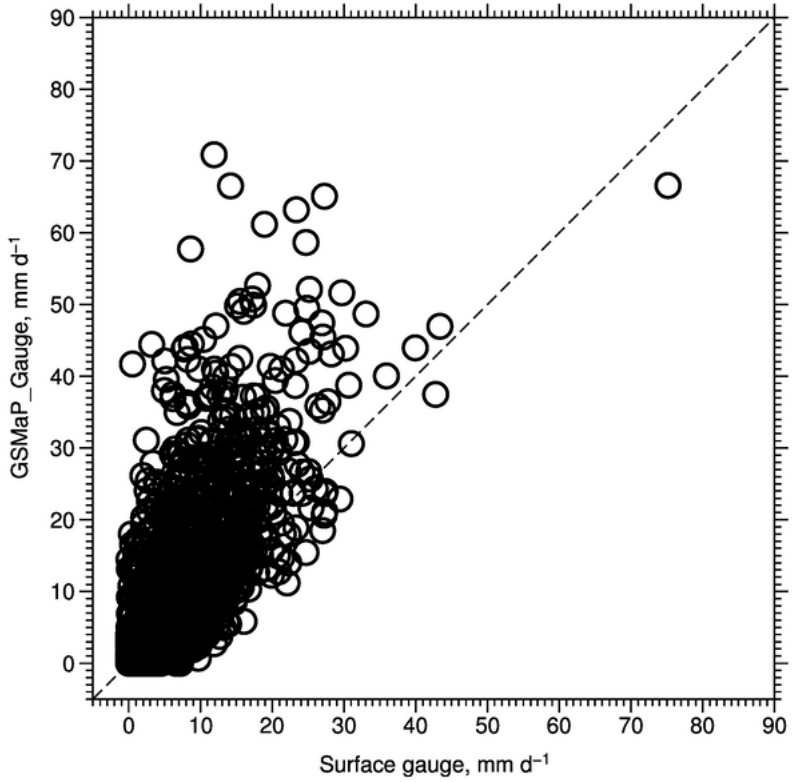
Comparison of daily values

Basin mean, 2002–2009

GSMaP_MVK



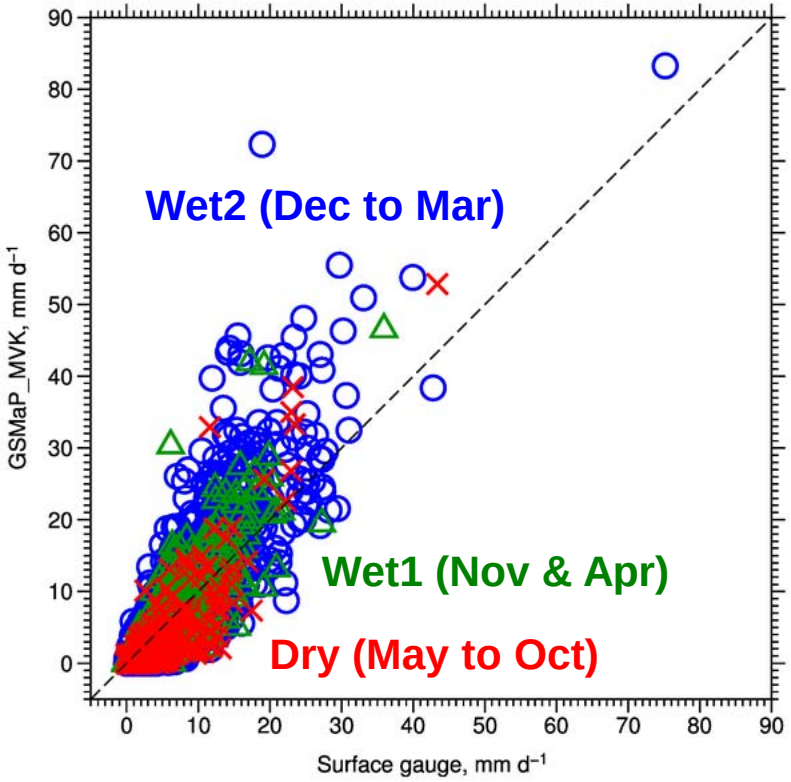
GSMaP_Gauge



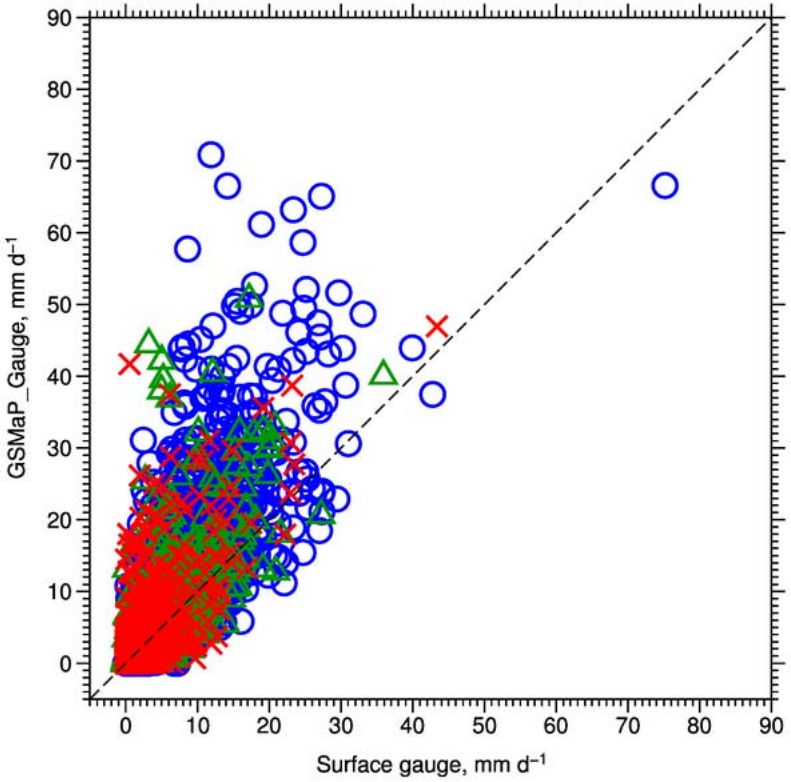
Comparison of daily values

Basin mean, 2002–2009, dry, wet1 & wet2

GSMaP_MVK



GSMaP_Gauge



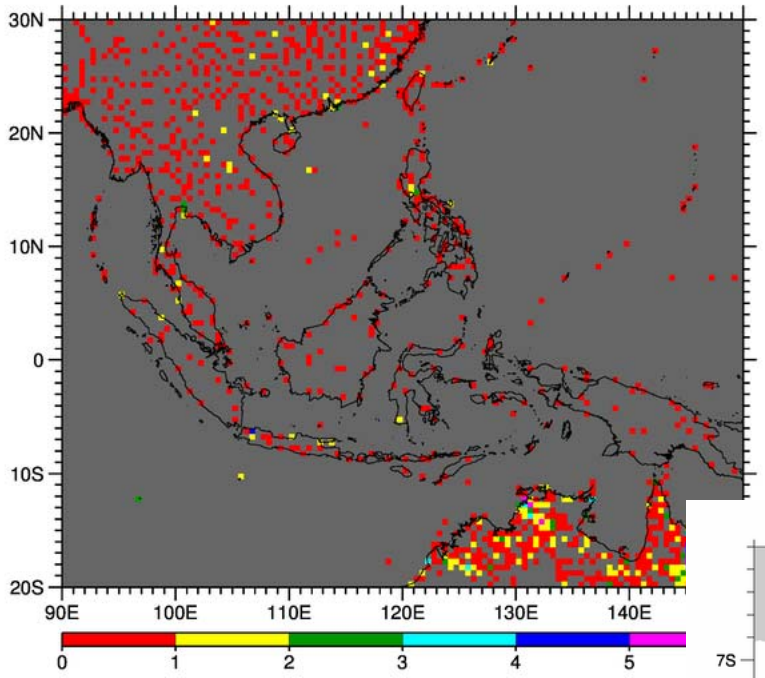
CPC Unified Gauge-Based Analysis is good for Solo River basin?

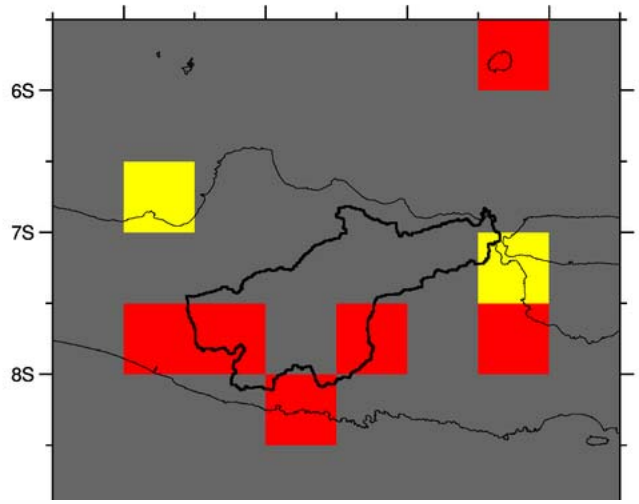
Q1: How many rain gauges for the basin?

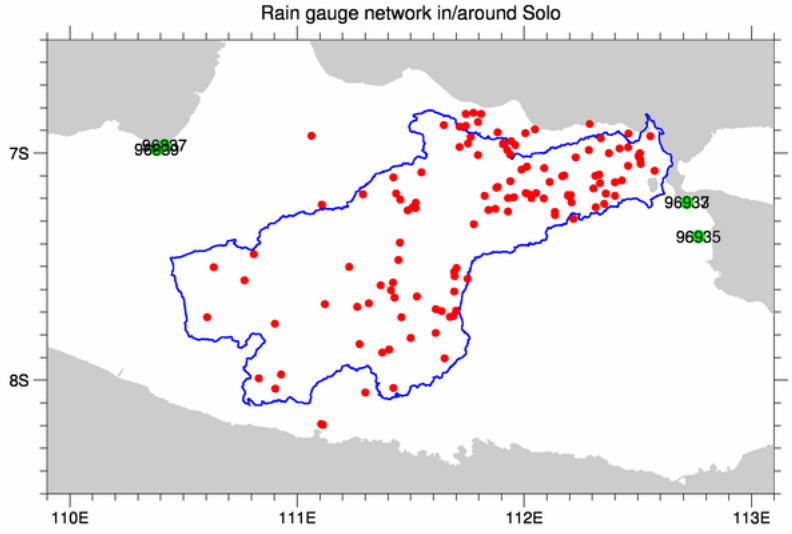
Q2: End of Day (EOD) time is okay for the basin?

CPC UGA is good for Solo basin?

Q1: How many rain gauges?

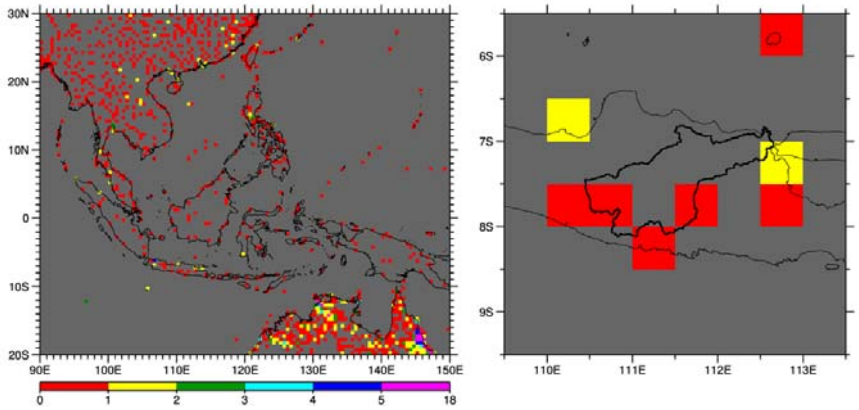


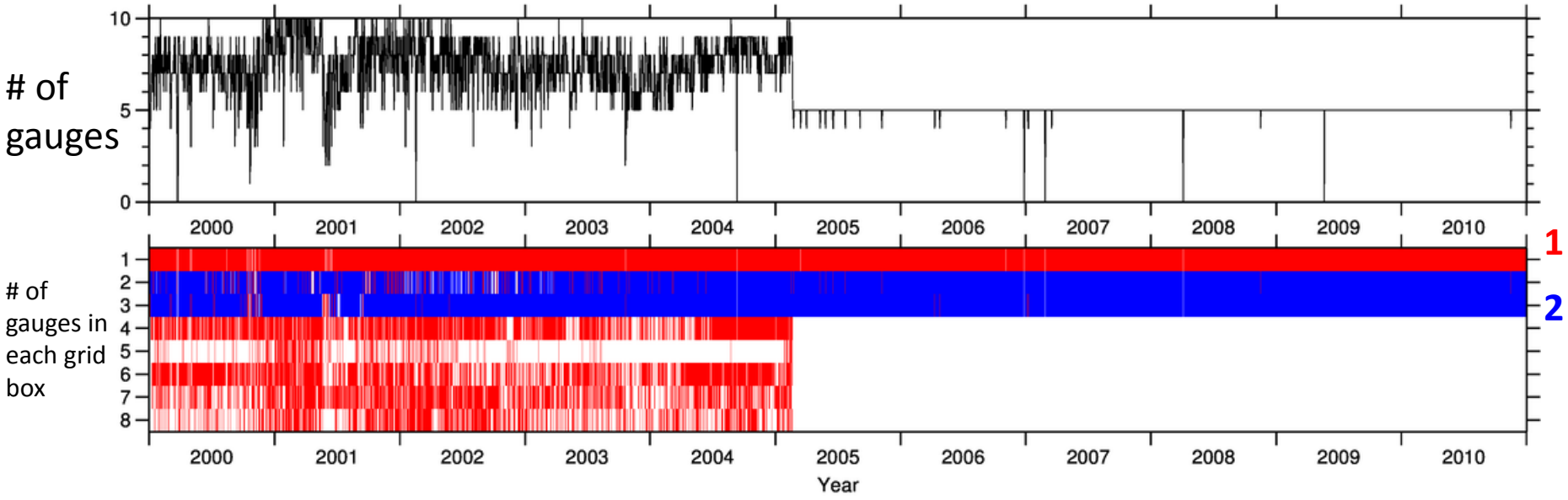




CPC UGA is good for Solo basin?

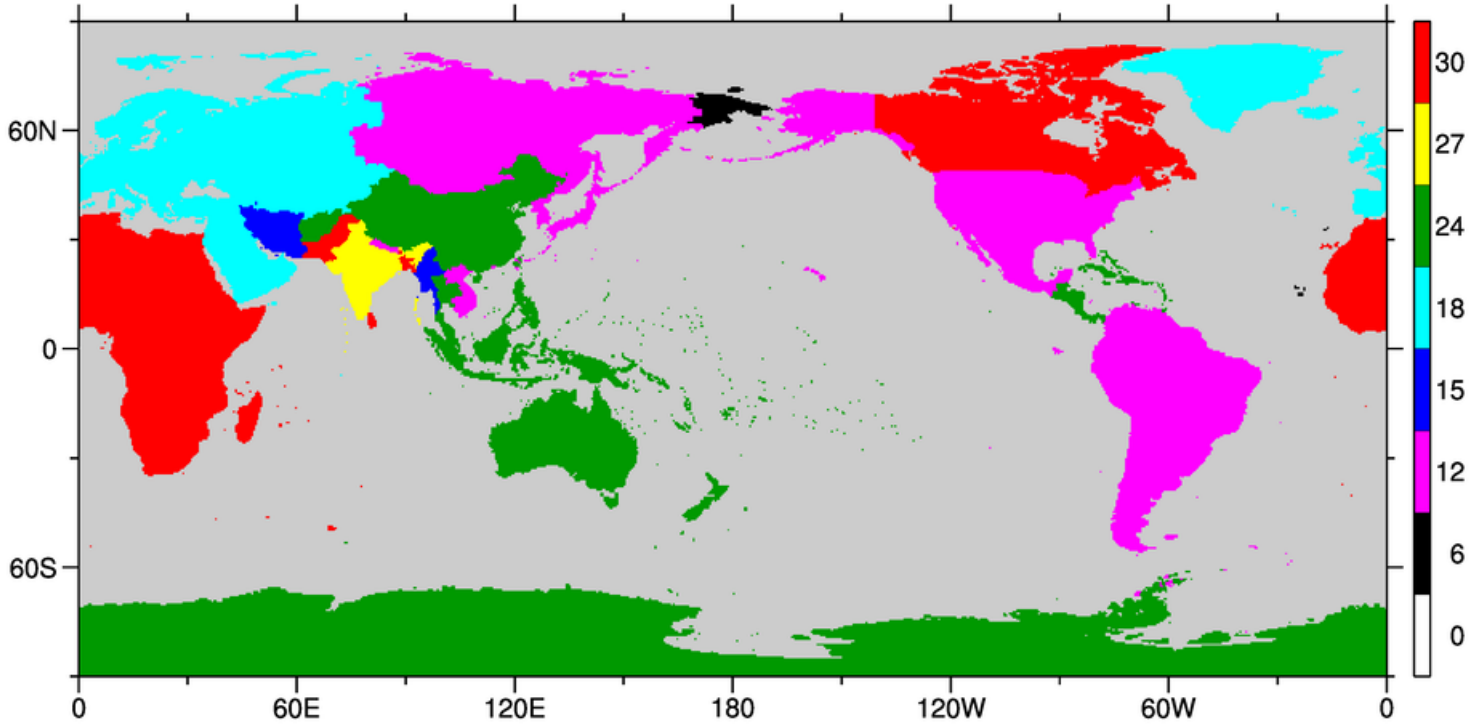
Q1: How many rain gauges?





CPC UGA is good for Solo basin?

Q2: End of Day (EOD) time?



Meaning of daily rainfall values:

EOD for IMC in CPC UGA = 24:

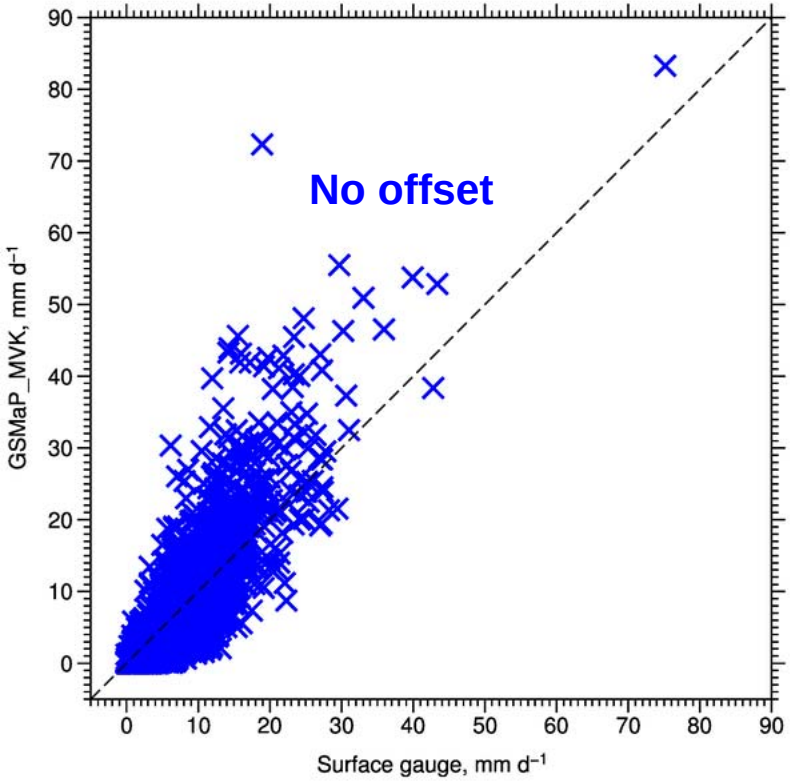
total rainfall from **00 Z (07 LT) on the day** to **00 Z (07 LT) on the next day**

PU/BMKG: total rainfall from **07 LT on the previous day** to **07 LT on the day**

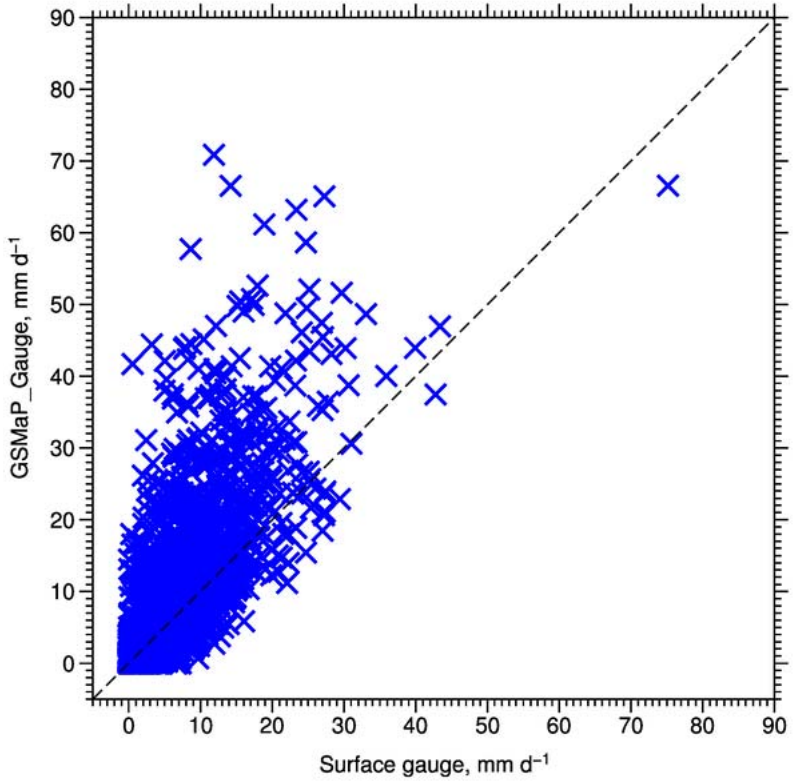
Offset effect in comparison of daily values

Basin mean, 2002–2009, w/o offset & w/ 1-day offset

GSMaP_MVK



GSMaP_Gauge



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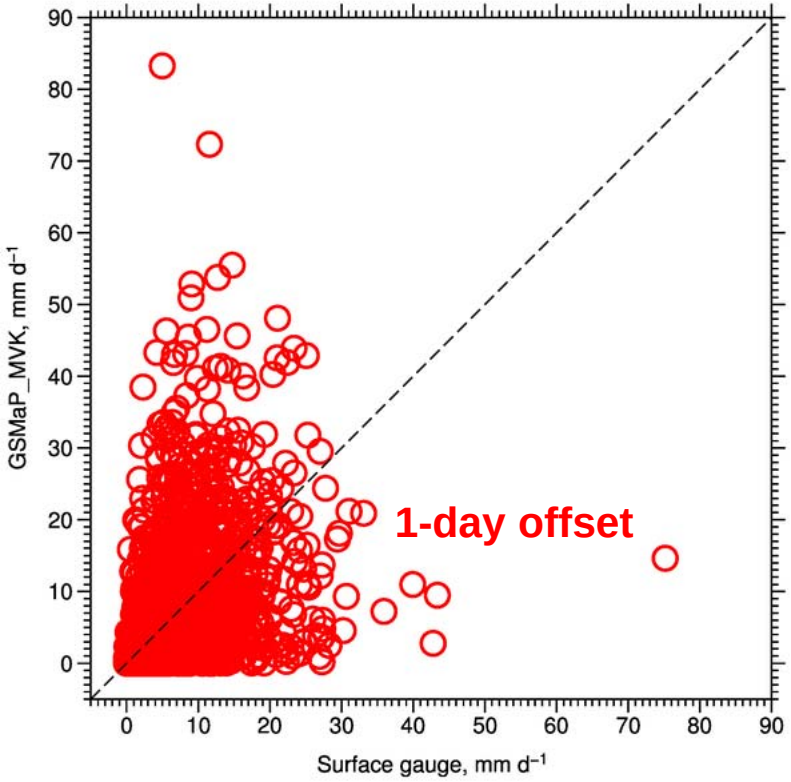

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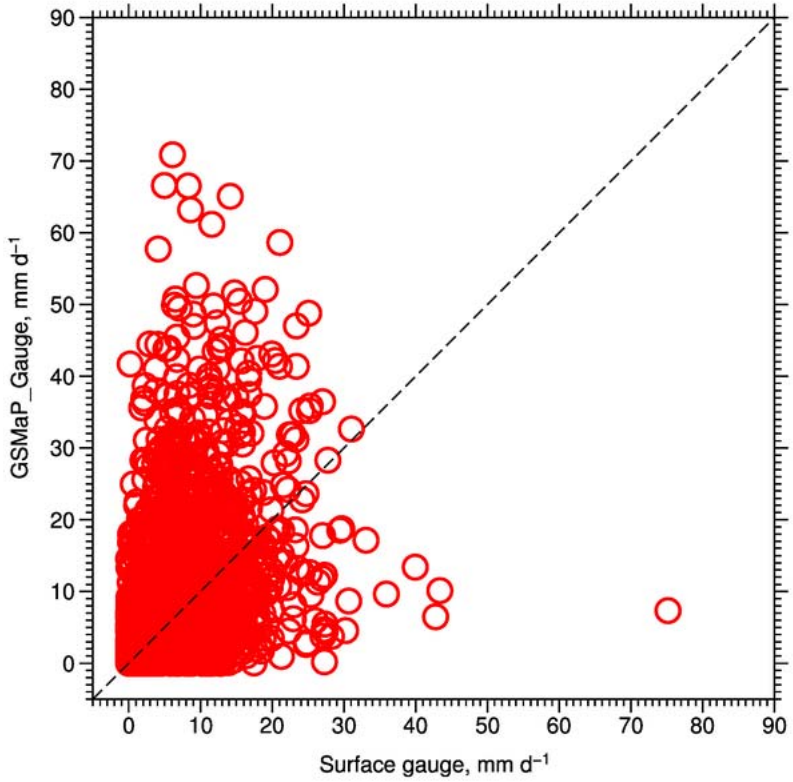

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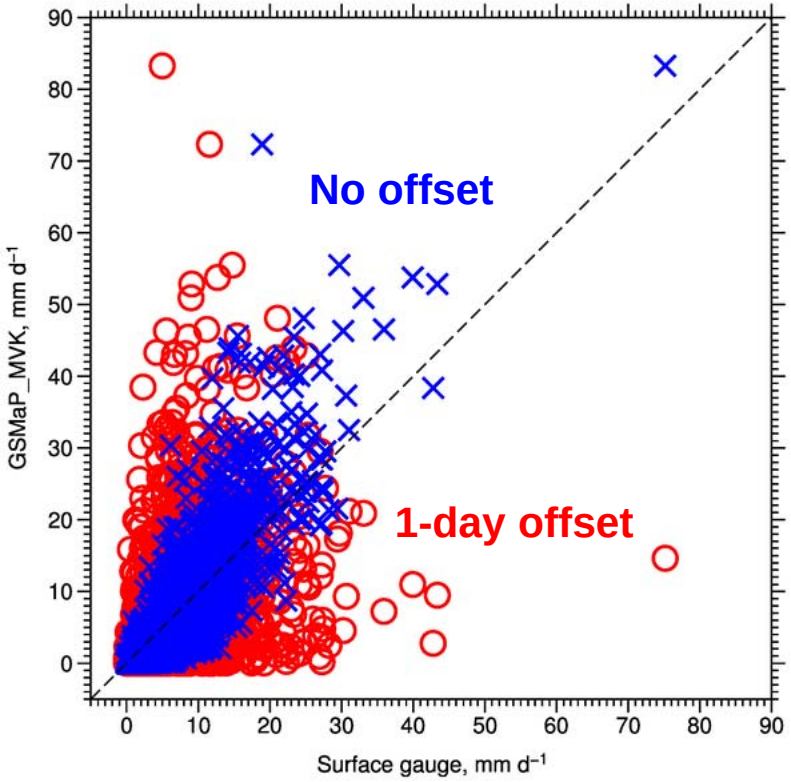

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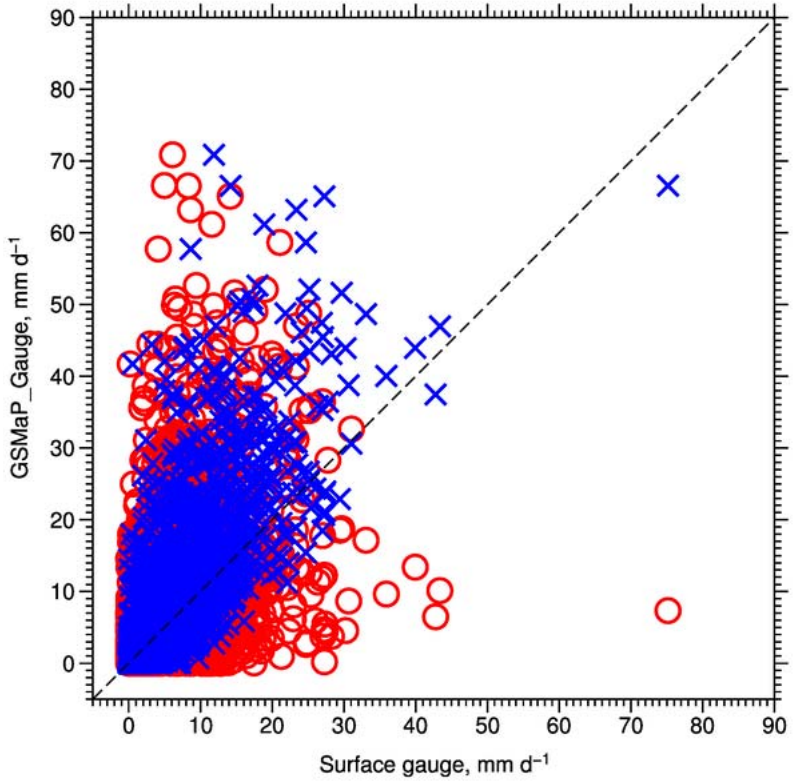


Summary

- **GSMaP_MVK**
  - **Year-to-year variation:**
    - **Good agreement with surface observations**
  - **Seasonal variation & daily:**
    - **Basically good, slightly over (under) estimation for wet (dry) season**
- **GSMaP_Gauge**
  - **Year-to-year & seasonal variations:**
    - **Over-estimation & different pattern**
  - **Daily:**
    - **Over-estimation & larger variance**

Future work

- **MVK & Gauge: further analysis**
- **NRT, NRT_Gauge & more?**
  - **Strong needs in hydrology**
  - **Prediction in poorly- or un-gauged basins**
- **Hydrological validation**
  - **Basin water budget analysis**
  - **Comparison with river discharge through hydrological simulation**

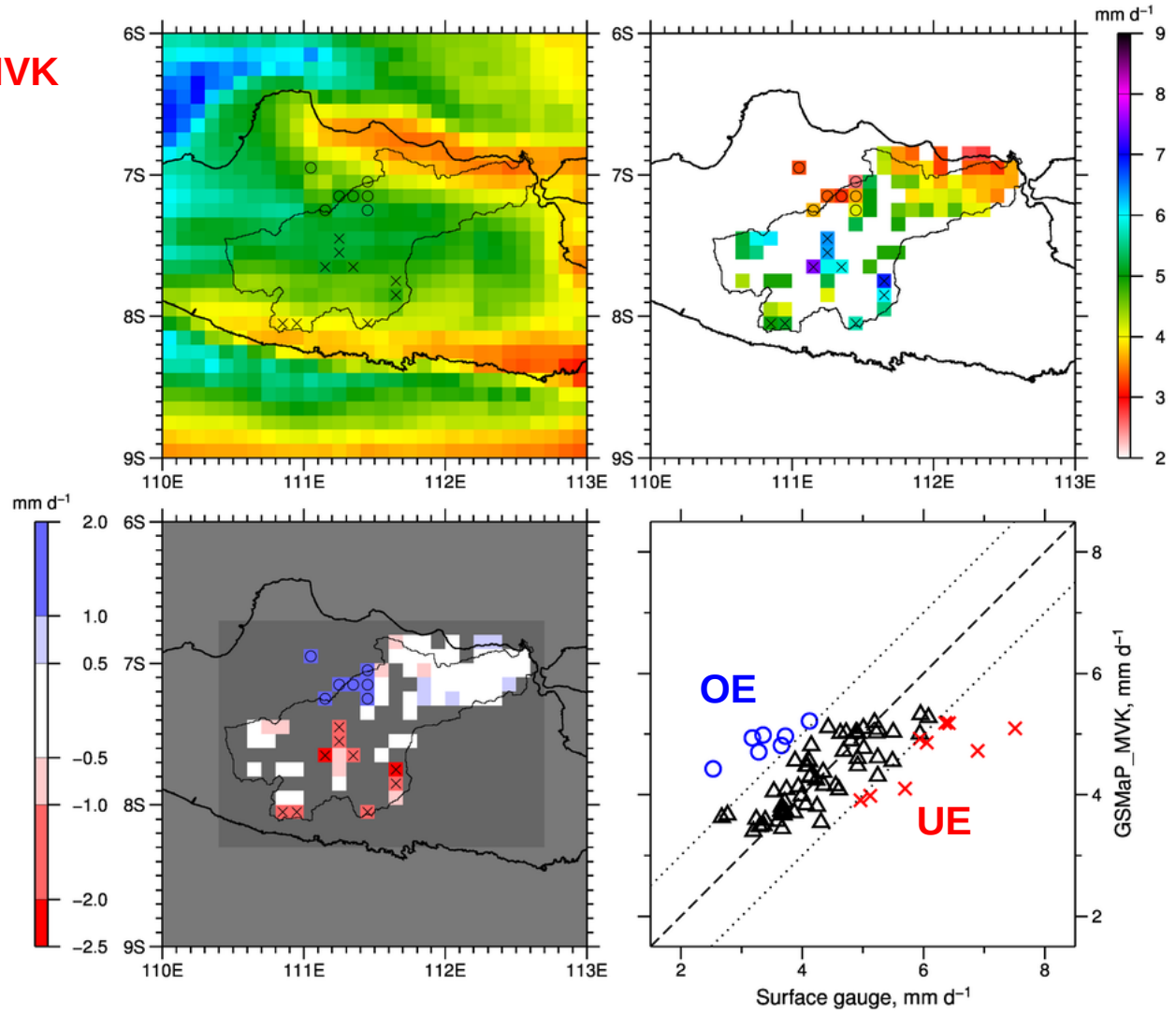
Mean daily rainfall

2002–2009

GSMaP_MVK

Surface gauge

MVK minus Surface



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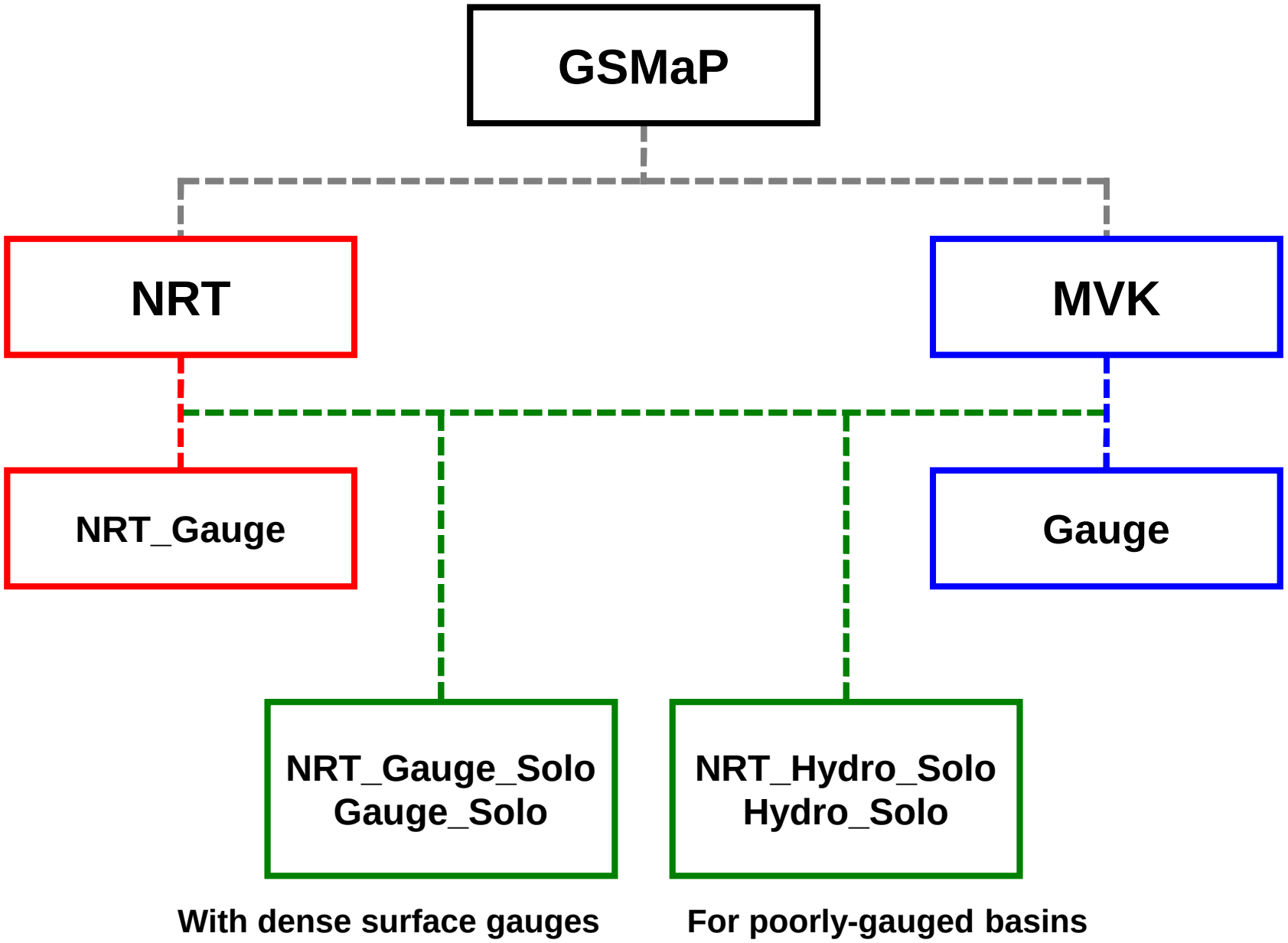
GSMaP
NRT
MVK
NRT_Gauge
Gauge
NRT_Gauge_Solo
Gauge_Solo
NRT_Hydro_Solo
Hydro_Solo
With dense surface gauges
For poorly-gauged basins