

Thematic Presentation: Meteorology

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Risk Management (ICHARM) under auspices of UNESCO,
Public Works Research Institute (PWRI)

13 December 2021



Frequency of flood/drought is increasing



2017 Northern Kyushu



Wikipedia

2018 July Western Japan



Asahi News Paper

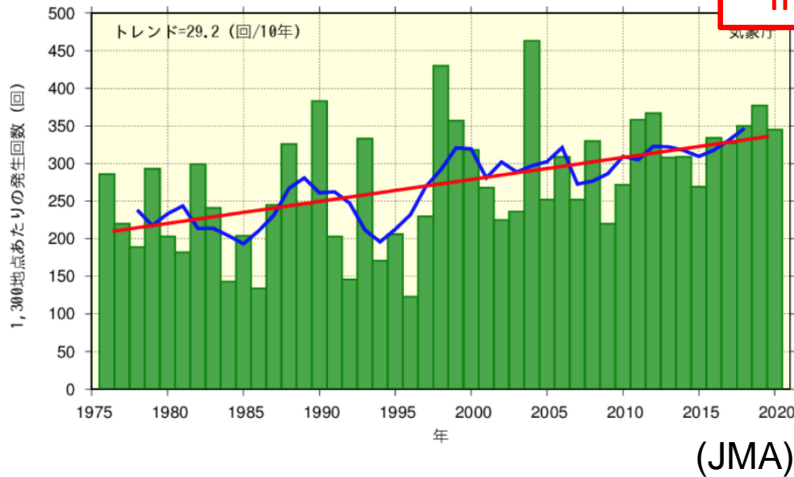
2019 Typhoon Hagibis



Reuter

Number of rainfall > 50mm/h

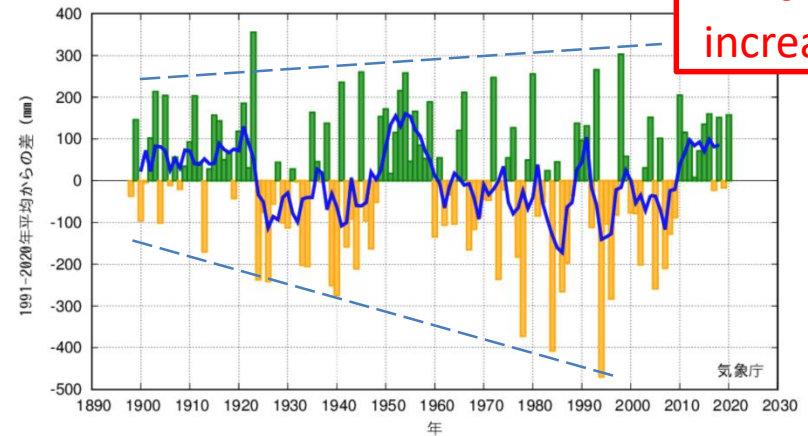
全国【アメダス】1時間降水量50mm以上の年間発生回数



Flood risk increase

Annual rainfall anomaly

日本の年降水量偏差



Drought risk increase

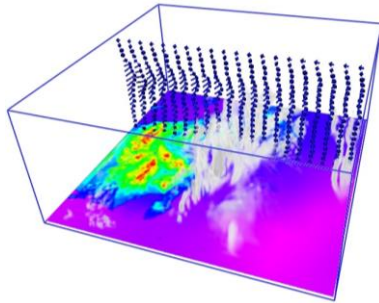
棒グラフ：各年の降水量の基準値からの偏差、太線（青）：偏差の5年移動平均値。 (JMA)
基準値は1991～2020年の30年平均値。

Global warming causes flood/drought risk increase by increasing amounts and frequency of heavy rainfall or unbalanced rainfall distribution.

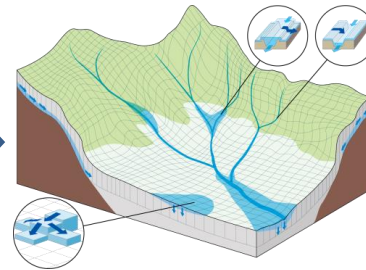
Meteorology team

Hydrology team

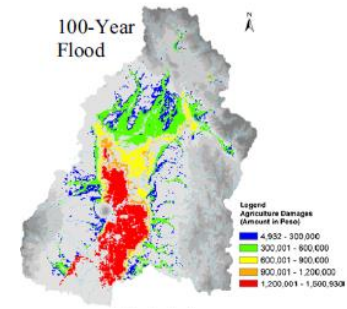
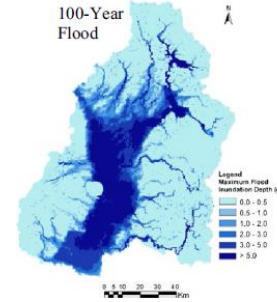
Risk analysis team



Rainfall



Riverflow, Inundation depth



Damage

Flood forecasting system

- **Regional ensemble prediction system** (Case study, Power generation dam operation)
- Realtime rainfall/flood forecasting (Sri Lanka, Iran)

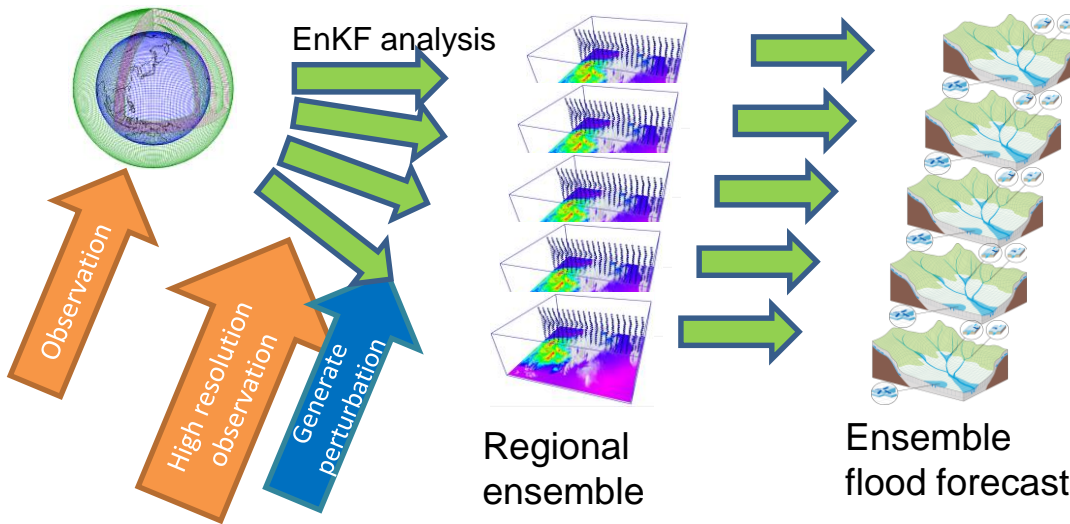
Water resource management system

- Seasonal forecast + water and energy budget hydrological model (Brazil, Tonegawa, Sri Lanka)

Climate change impact study

- **Dynamic downscaling of climate model projections** (Philippines, Indonesia)

Regional ensemble prediction system



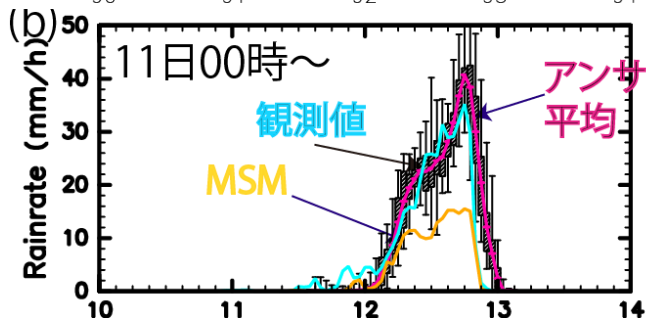
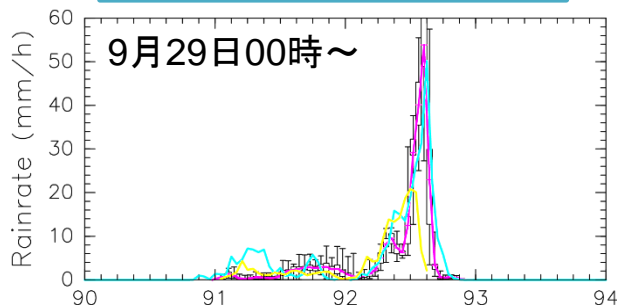
JMA

20 km GCM → 5 km regional ensemble, 21 member

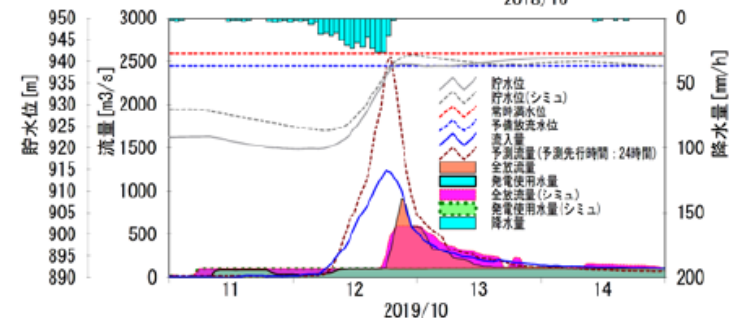
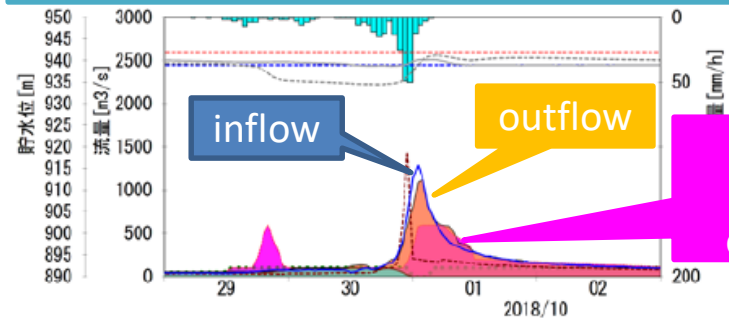
ICHARM

20 km GCM → 3 km regional ensemble, 33 member

Rainfall prediction

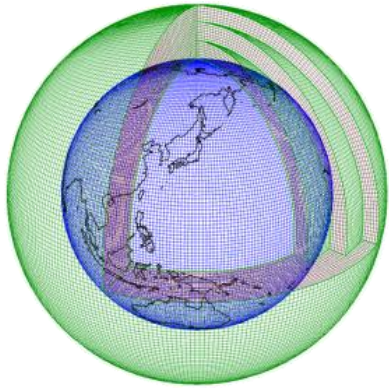


Dam inflow prediction/Operation

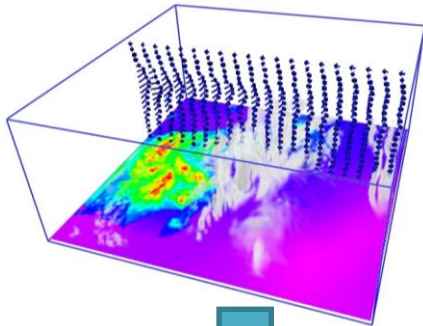


Climate Change Impact Study

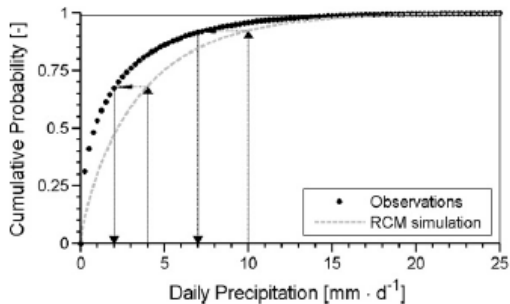
GCM



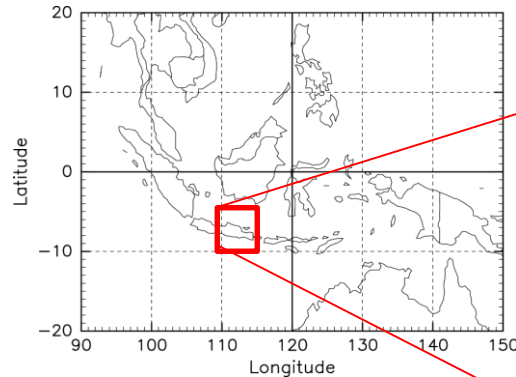
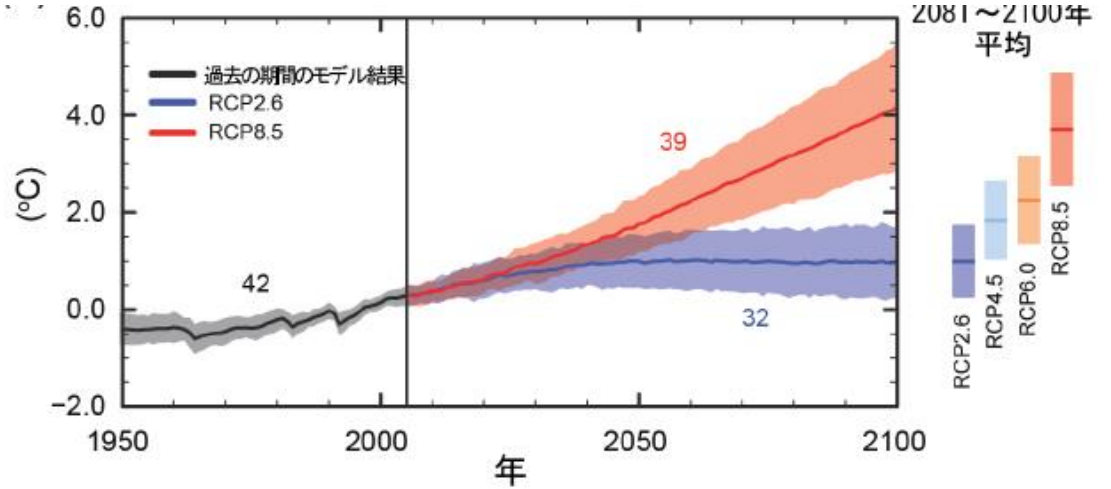
RCM



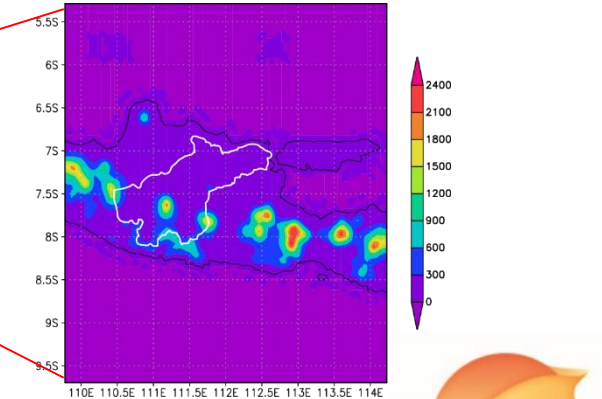
Bias corrections



Global Warming Scenarios



Solo River basin/Indonesia



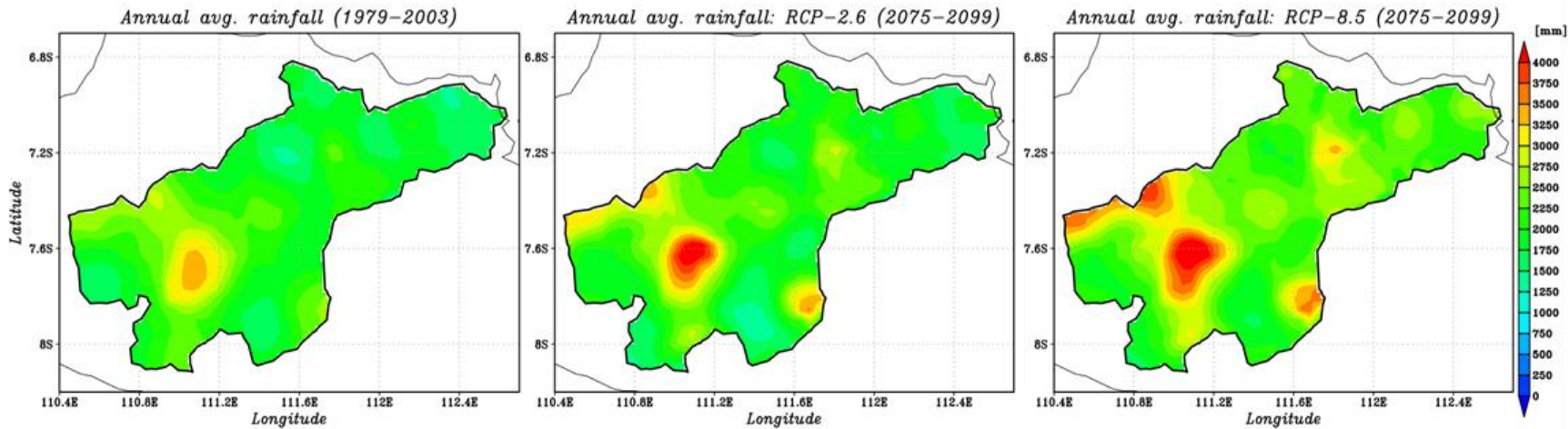
Rainfall change in Solo River basin

Past climate

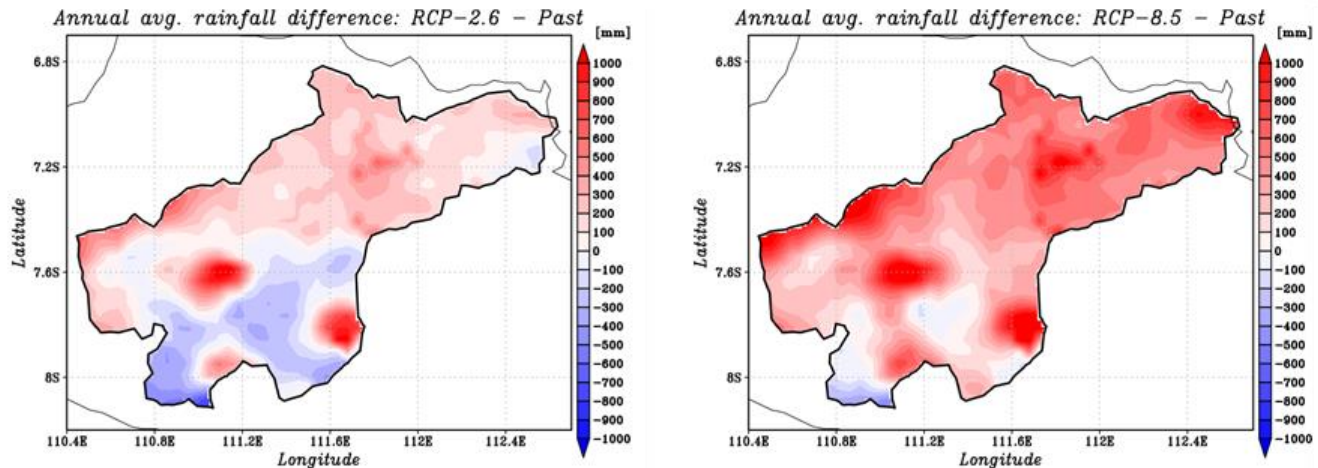
Future climate
RCP2.6

Future climate
RCP8.5

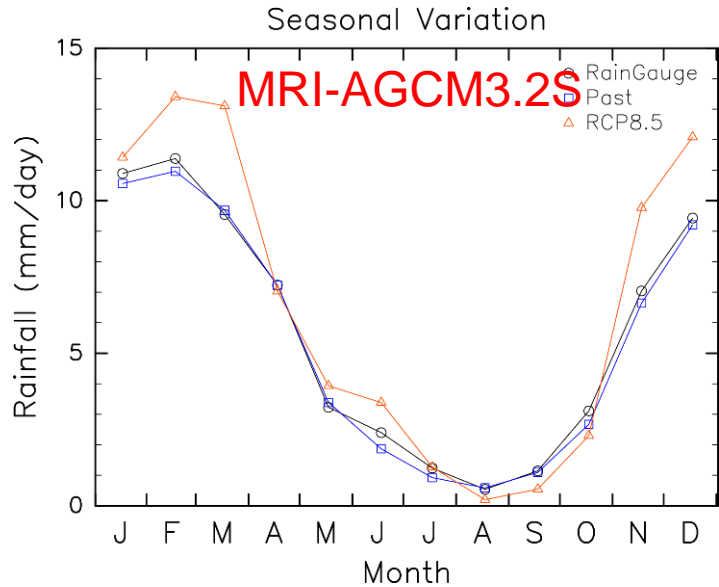
Annual
rainfall



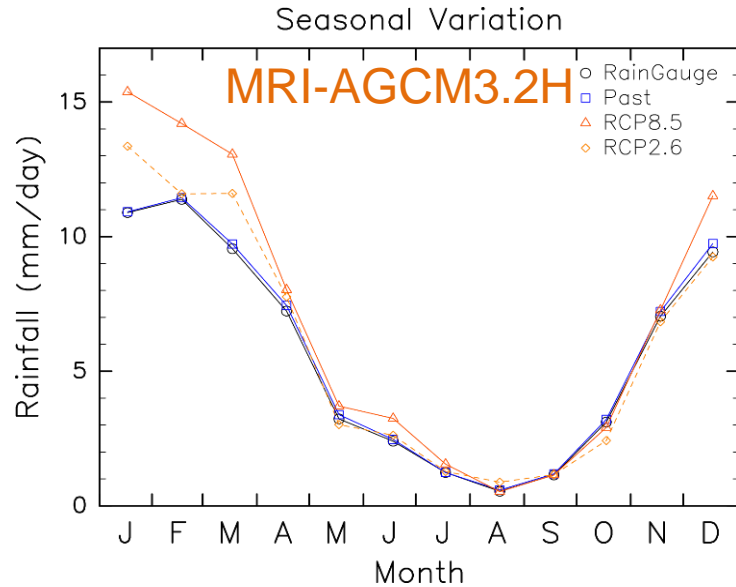
(future)-
(past)



Rainfall change in Solo River basin



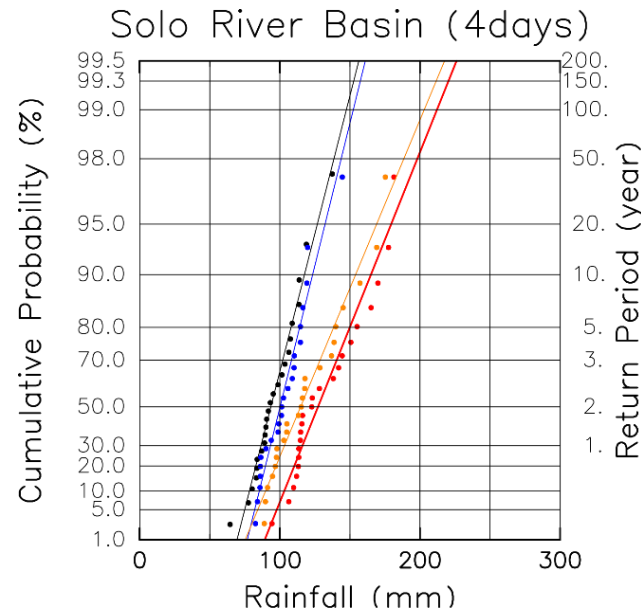
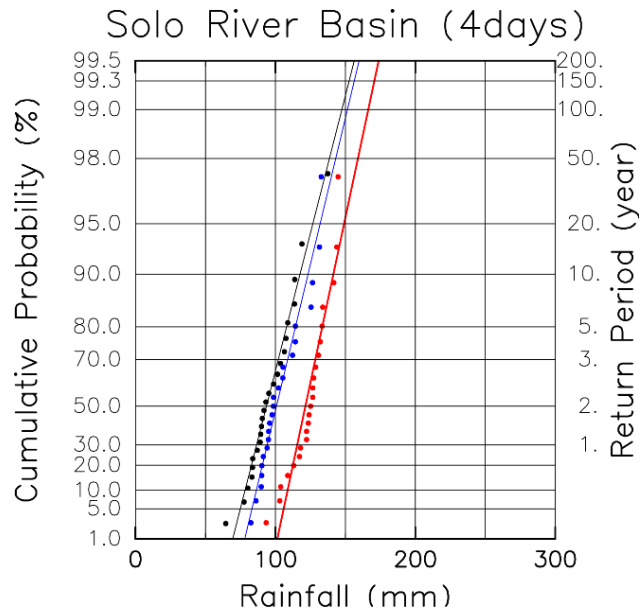
MRI-AGCM3.2S



MRI-AGCM3.2H

MRI-AGCM3.2S

MRI-AGCM3.2H



Raingauge
 Past
 RCP8.5
 RCP2.6

Thank you for your attention!

