



CapTainRain

Capture and Retain
Heavy Rainfalls in Jordan

Workpackage 2

When and why does heavy rainfall occur?

A retrospective analysis on climatic drivers and future scenarios on heavy rainfall

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Climate Resilience / Hydro-Climatic Risks

What is it about and why is it important?



Local heavy rainfall events ...

- ... can trigger severe flash floods in urban areas or wadi systems *worldwide*
- ... recently occurred in the eastern Mediterranean (Greece 2023, Lybia 2023)
- ... will *thermo-dynamically* intensified by global warming
- ... are *dynamically* associated with characteristic large-scale weather patterns
- ... require enhanced data and forecast model driven early warning systems
- ... prediction is limited, due to the spatial and temporal scale of the phenomena

Key findings

⇒ **opposite trend directions of mean and extreme precipitation**

decreasing/increasing

⇒ **dynamical drivers for extreme rainfall in Jordan are instabilities over the eastern Mediterranean often associated with a transport of cold air masses from north to south**

such weather patterns determine the frequency of events

⇒ **short-term events (convective storms) shorter than 6-hr show a consistent future increase (ca.15%) in the context of global warming**

according to thermodynamic changes (+7% by +1K)

⇒ **less frequent, but if then possibly more intensive**

catastrophic events cannot be excluded under the present pathway of global warming

Main products



Heavy rainfall in Jordan:

- ⇒ Large-Scale Context
- ⇒ Very Early Warning
- ⇒ Long-Term Trends
- ⇒ Future Scenarios
- ⇒ Climate Service Portal

Climate Service Portal for Jordan:

www.climateimpactsonline.com hosted and maintained by PIK

KLIMAFOLGEN ONLINE

English Deutsch Español

Welcome to Climate Impacts Online

The portal ClimateImpactsOnline illustrates the possible impacts of climate change on various countries in different world regions on sectors like agriculture, forestry, tourism and health. Please choose a country below and explore the portal!

Tanzania
Illustrates climate change in two sectors in a tropical climate.

Peru
Illustrates climate change in two sectors over multiple climate zones.

India
Illustrates climate change in two sectors over multiple climate zones.

Germany
Illustrates climate change in multiple sectors in a temperate climate.

Central Asia
Illustrates climate change in two sectors over multiple climate zones.

Sahel region
Illustrates climate change in two sectors from a tropical to a desert climate.

Amazon
Illustrates climate change in three sectors in a humid tropical climate.

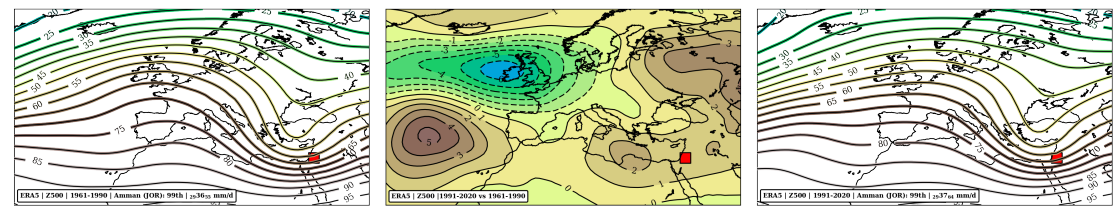
Ethiopia
Illustrates climate change in four sectors in a humid tropical climate.

Jordan
Illustrates climate change in one sector over multiple climate zones.

News: Rice/Wheat specific agriculture parameters now online! +***+ December 2022. New Parameters in Central Asia: Ice Days, Frost Days, H

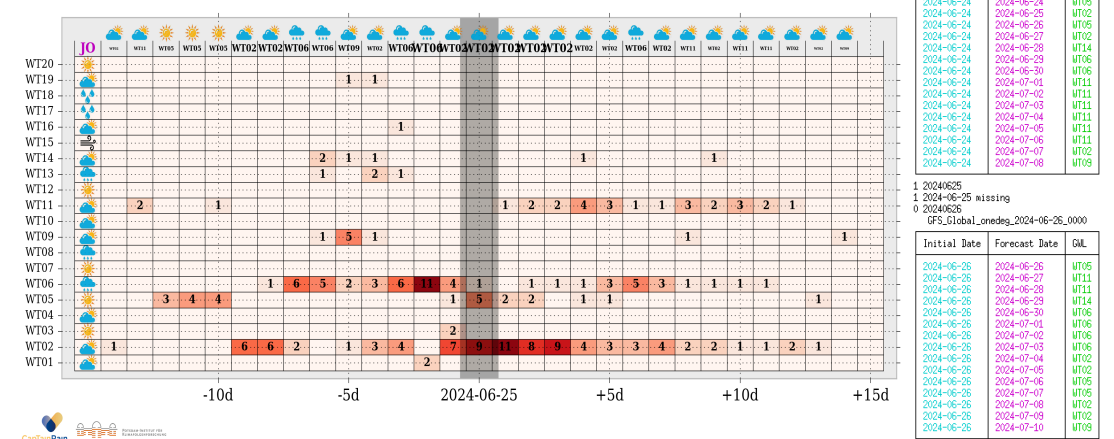
Main products

Large-Scale Context:
detection of critical weather patterns

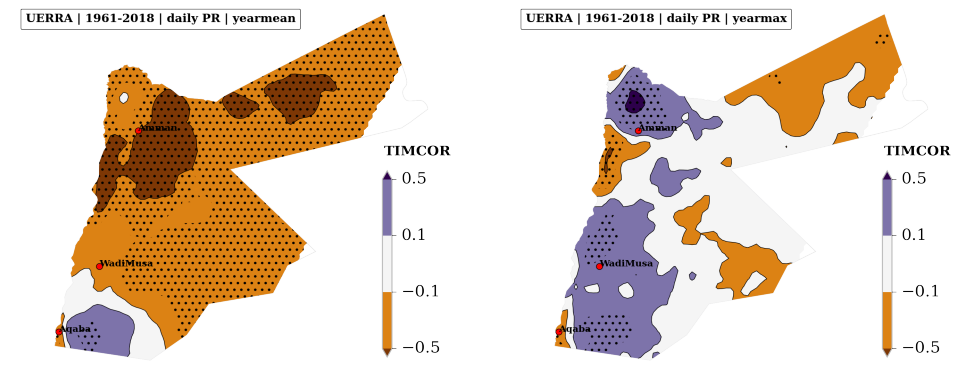


Very Early Warning:
hybrid monitoring of predicted weather patterns

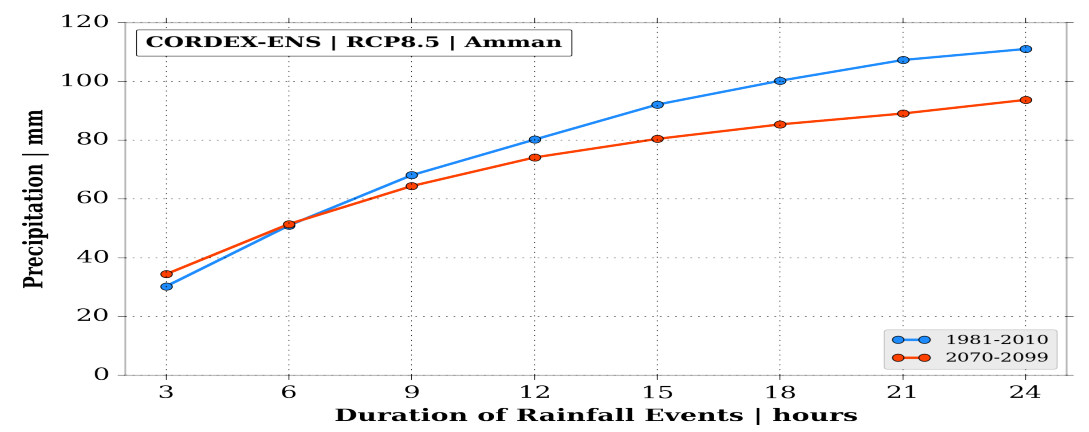
GFS 00 Forecast | Eastern Mediterranean Weather-Types Sequences
© P. Hoffmann (PK)



Long-Term Trends:
temporal correlation of means and extremes

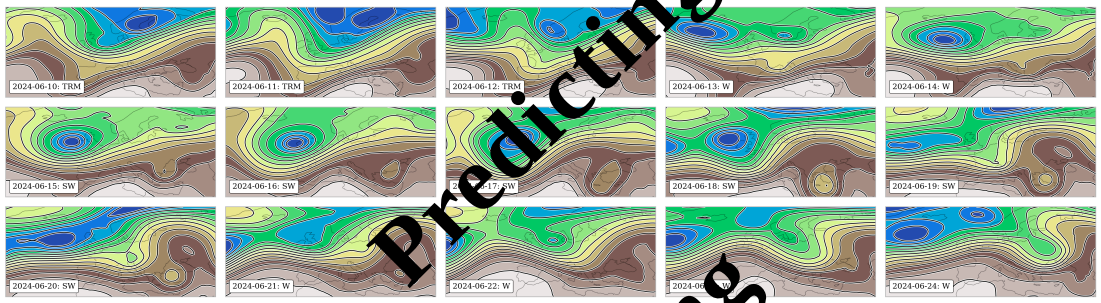
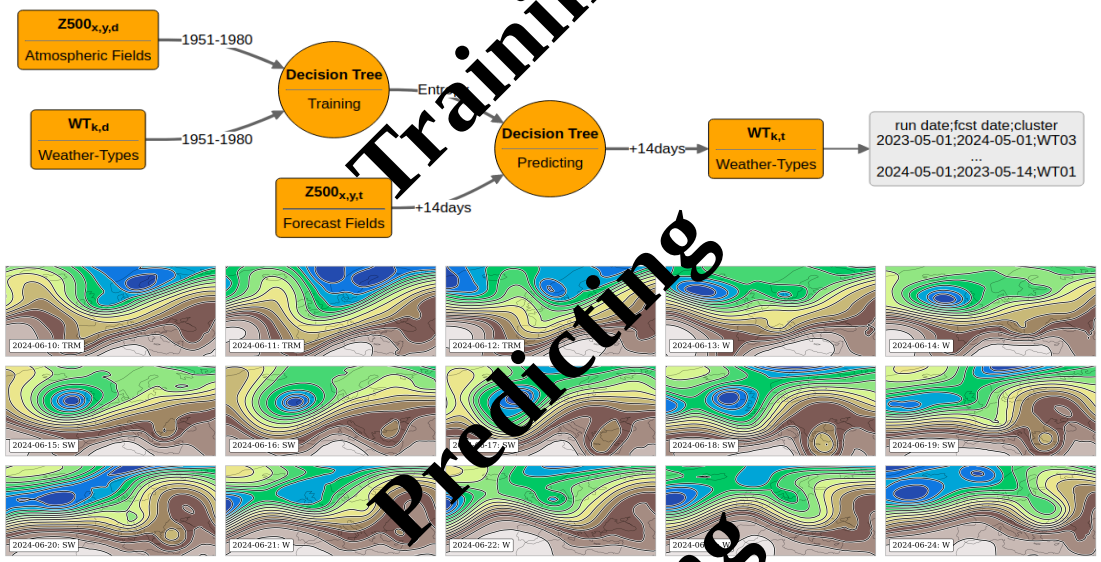


Future Rainfall Scenarios:
analysis of return levels for short-term events

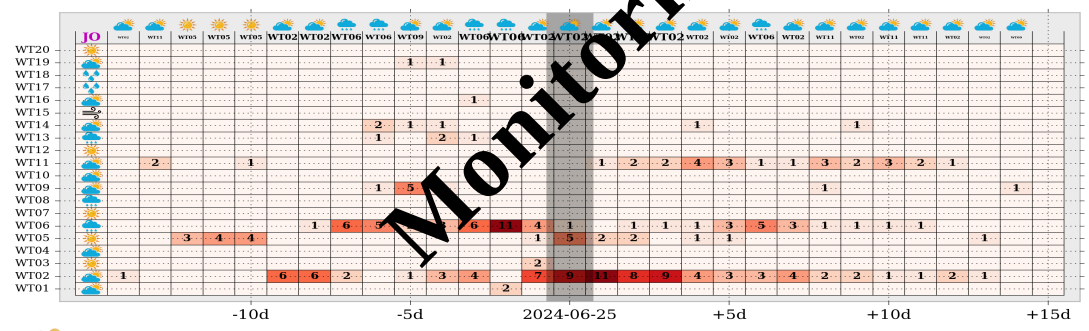


Very Early Warning:

hybrid monitoring of predicted weather patterns



GFS 00 Forecast | Eastern Mediterranean Weather-Types Sequence
© P. Hoffmann (PIK)



GFS_Global_onedeg_2024-06-24_0000

Initial Date	Forecast Date	GWL
2024-06-24	2024-06-24	WT05
2024-06-24	2024-06-25	WT02
2024-06-24	2024-06-26	WT05
2024-06-24	2024-06-27	WT02
2024-06-24	2024-06-28	WT14
2024-06-24	2024-06-29	WT06
2024-06-24	2024-06-30	WT06
2024-06-24	2024-07-01	WT11
2024-06-24	2024-07-02	WT11
2024-06-24	2024-07-03	WT11
2024-06-24	2024-07-04	WT11
2024-06-24	2024-07-05	WT11
2024-06-24	2024-07-06	WT11
2024-06-24	2024-07-07	WT02
2024-06-24	2024-07-08	WT09

1 20240625
1 2024-06-25 missing
0 20240626

GFS_Global_onedeg_2024-06-26_0000

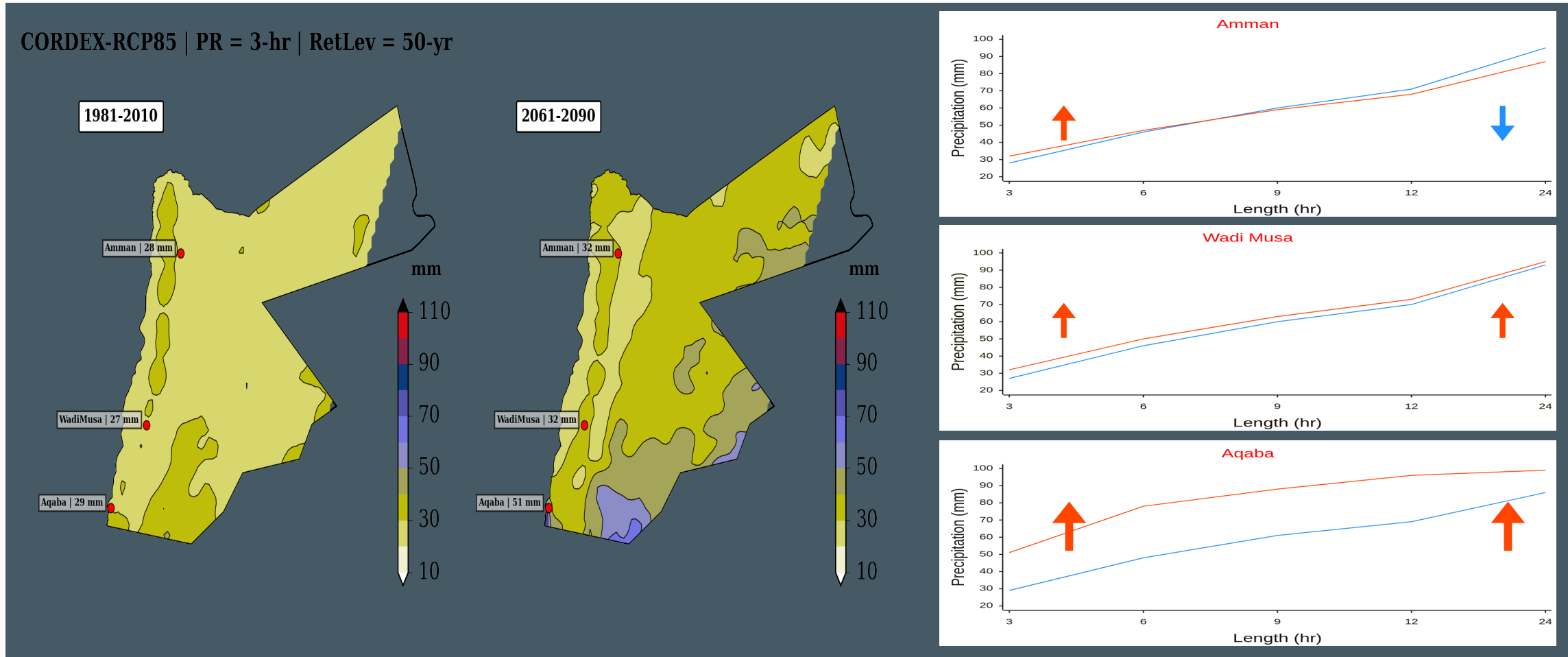
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2024-06-26	2024-06-27	WT11
2024-06-26	2024-06-28	WT11
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2024-06-26	2024-07-06	WT05
2024-06-26	2024-07-07	WT05
2024-06-26	2024-07-08	WT02
2024-06-26	2024-07-09	WT02
2024-06-26	2024-07-10	WT09

Training
 Predicting
 Monitoring

Reporting

Heavy Rainfall Maps:

given in a climatic context using regional climate model ensembles



Outlook

- ⇒ climate impact studies on the local level are challenging
- ⇒ confrontation with data scarcity
- ⇒ more pragmatic and generalized approaches are required
- ⇒ decoupling of dynamical and thermodynamical factors
- ⇒ Jordan/Germany: common focus on weather systems from the Mediterranean
- ⇒ after the flood is before the flood

KIT Wettergefahren-Frühwarnung
Institut für Meteorologie und Klimaforschung

EDIM

Tue, Jun 25, 2024, 11:45:48 UTC +2:00

Home Archive Warnings/Advices Major Events Weather Records Weather/Climate Links

Events: Heavy rain ⓘ

Date	Type of Event	A F	Name of Event	Affected Area	Top Recordings
Please note: As of November 2018, reports are available in English language only !					
Mon, 10.06.2024	Heavy rains, river flooding	△ E	Orinoco	Southern Germany	More than 220 mm/72 h in the Allgäu region
Mon, 27.05.2024	Heavy rains, river flooding	△ E	Katinka	Western Germany	Up to 119.6 mm/48 h at Schweix, RP
Wed, 20.09.2023	Heavy rain, Flooding	△ E	Daniel	Greece, Libya	Precipitation totals of up to 1096 mm at Zagora, GR
Sat, 02.09.2023	Heavy precipitation, Flooding	△ E	Erwin	Central Europe	48 h precipitation totals of up to 368 mm at Biasca, CH
Sun, 13.08.2023	Heavy rain, Flooding	△ E	Peter	Europe, Slovenia	48 h precipitation totals up to 275 mm at Loibl Pass, Si
Mon, 22.05.2023	Heavy rain	△ E	Minerva	Emilia-Romagna, Italy	Precipitation totals > 200 mm/48 h, at least 14 deaths
Mon, 19.07.2021	Flooding	△ E	Bernd	Central Europe	144.8 mm / 24h in Kall-Sistig (NRW)



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Dankeschön!

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Feedback? Questions?



WikiLink