

Modeling an extreme precipitation event over the southwest coast of Black Sea : impact of SSTs and cumulus parameterization schemes



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Motivation

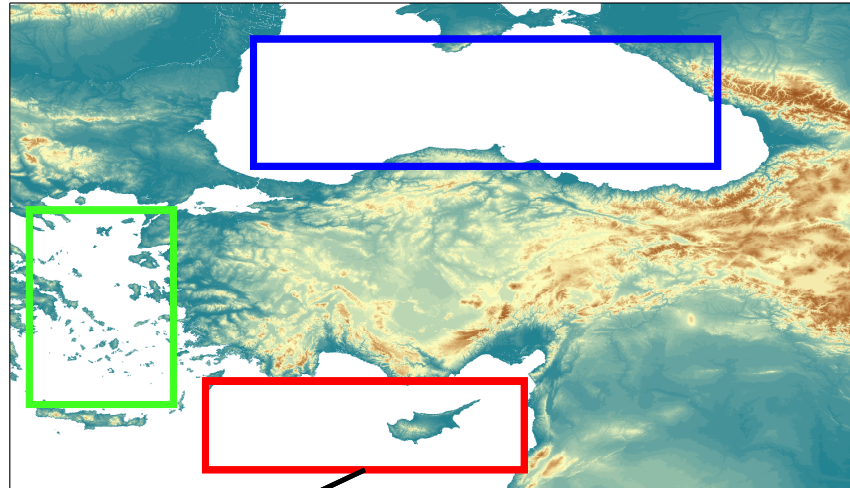
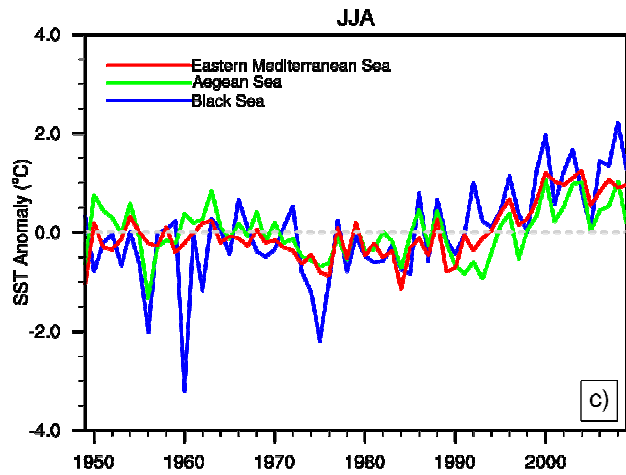
- Extreme event studies: Adaptation of climate changes
- Testing Emanuel Scheme for extreme precipitation in late summer
- Impact of SSTs



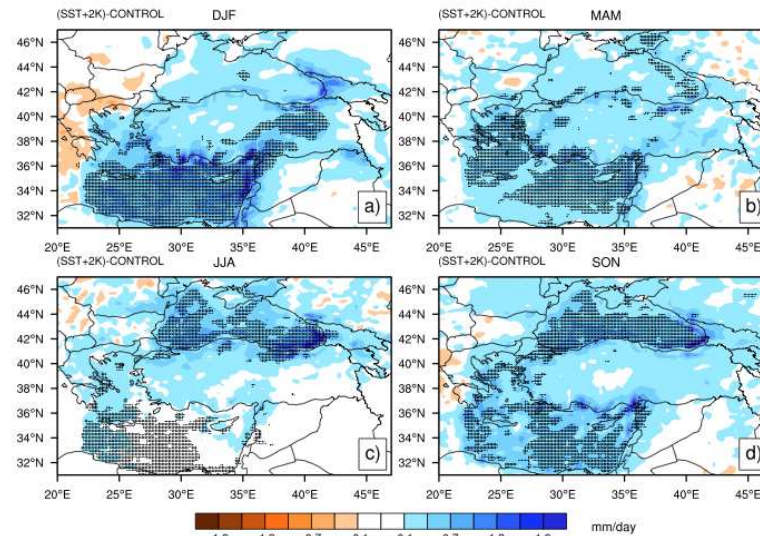
Total dead: 31 people in Istanbul and cities around (8-9 September 2009).

Motivation

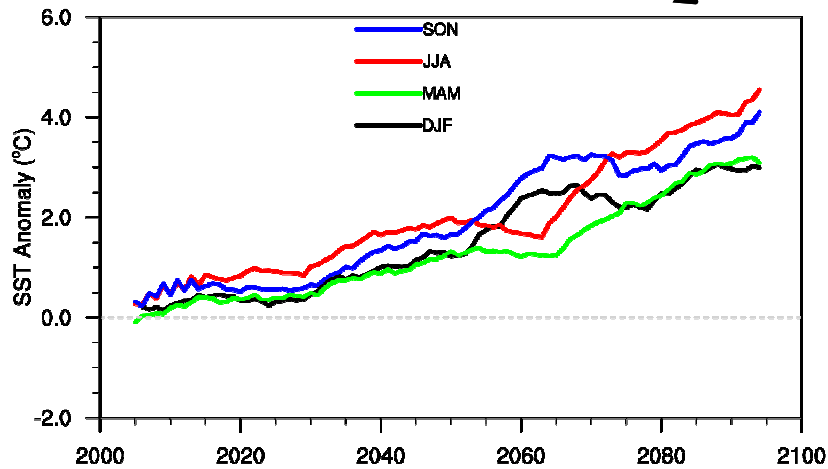
Past SST trend



Response of precipitation to +2 C warming of SSTs



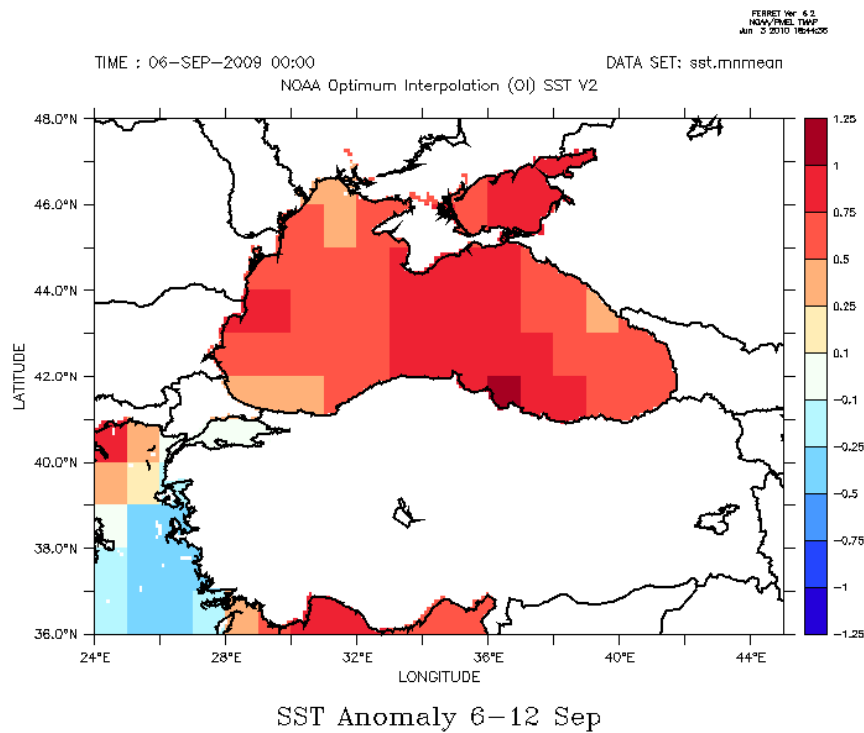
Future SST trend



Motivation

Weekly OISTT Anomaly

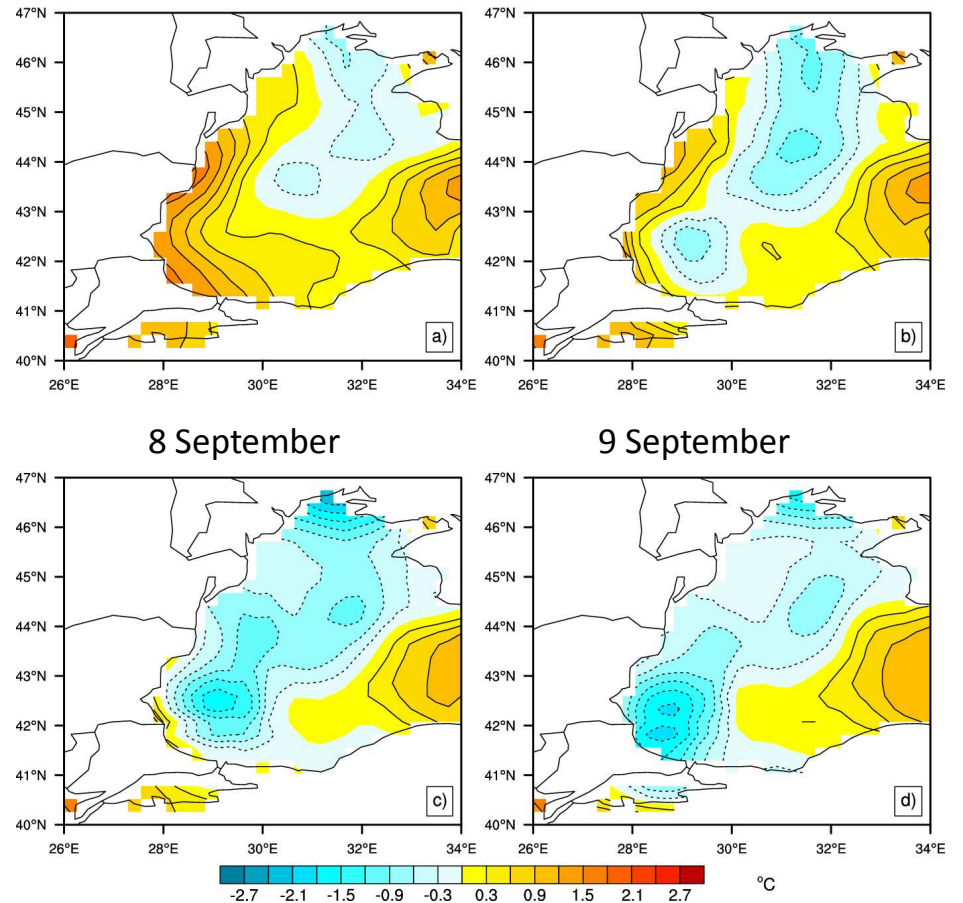
6-12 September



Daily OISTT Anomaly

6 September

7 September

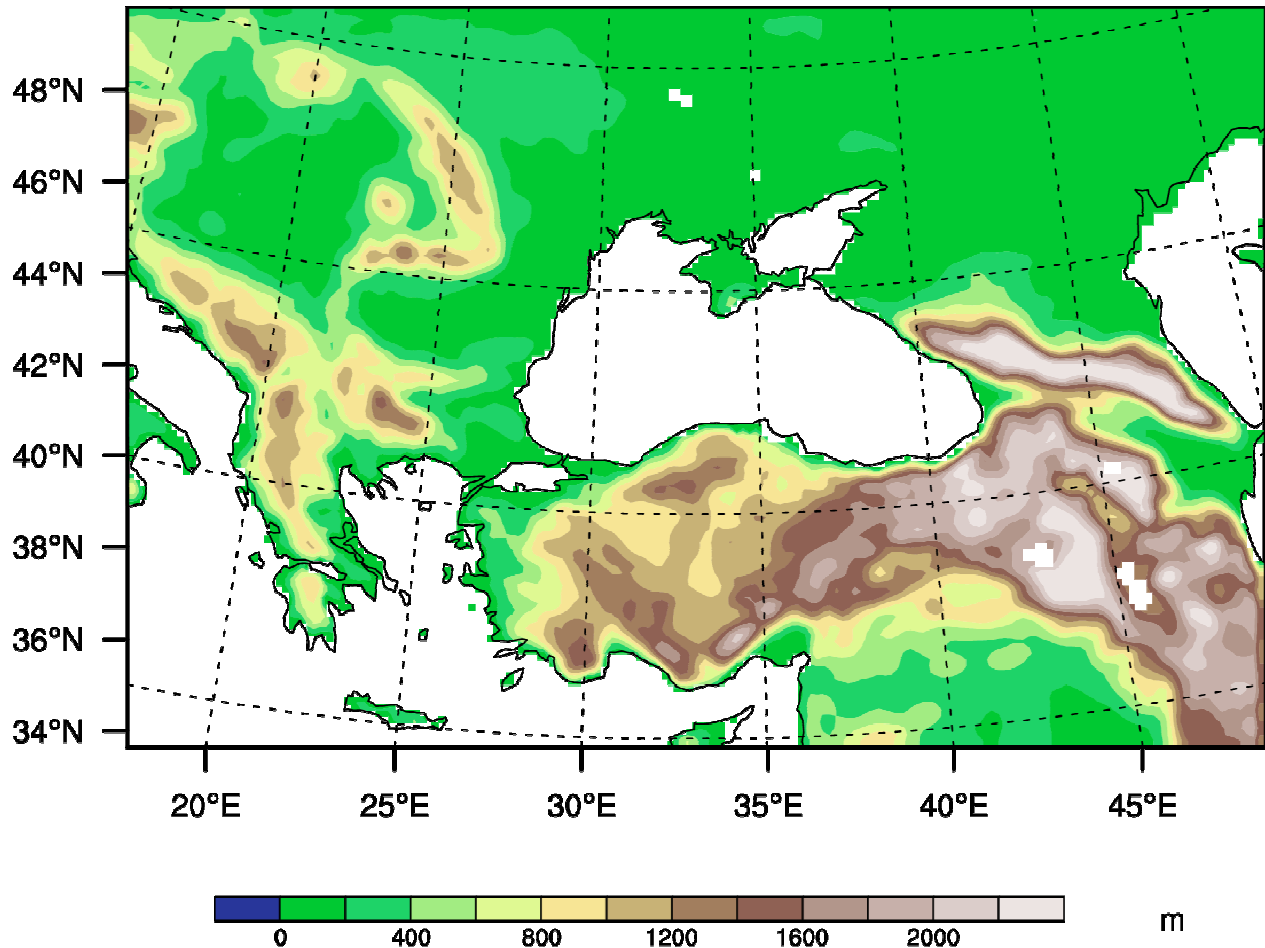


Simulation Design

- **Driving field:** ERA-Interim (1.5x1.5 degree)
- **SST:** OISST weekly, ERSST daily
- **Resolution:** 15 km
- **Domain Size:** 180x120
- **Period:** 01-12 Sep.09

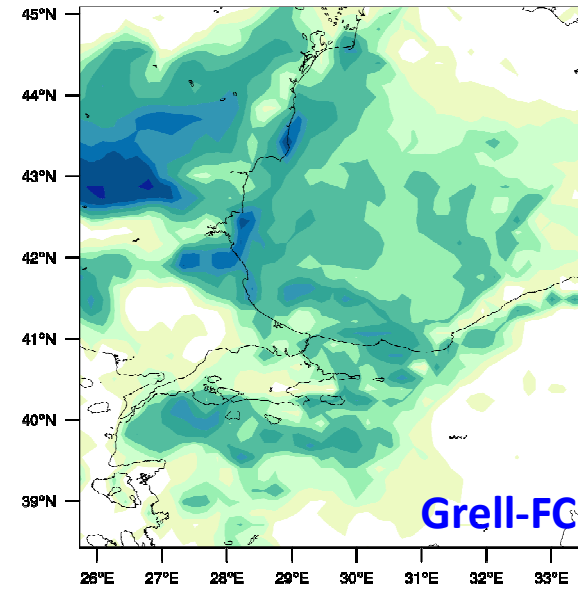
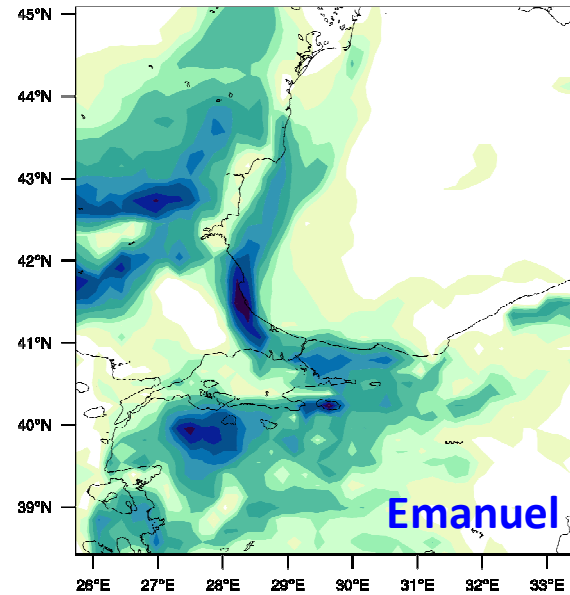
Simulations:

1. Grell-FC with Diurnal Scheme (ERA+OISST)
2. Emanuel with Diurnal Scheme (ERA+OISST)
3. Grell-FC with Diurnal Scheme (ERA+ERSST)
4. Emanuel with Diurnal Scheme (ERA+ERSST)

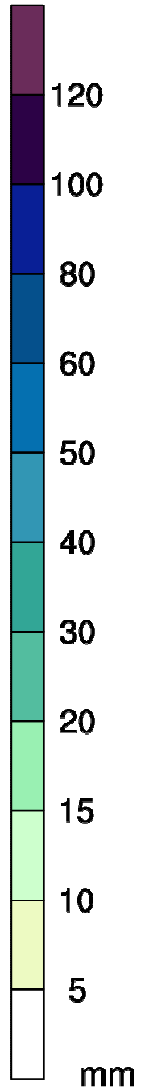
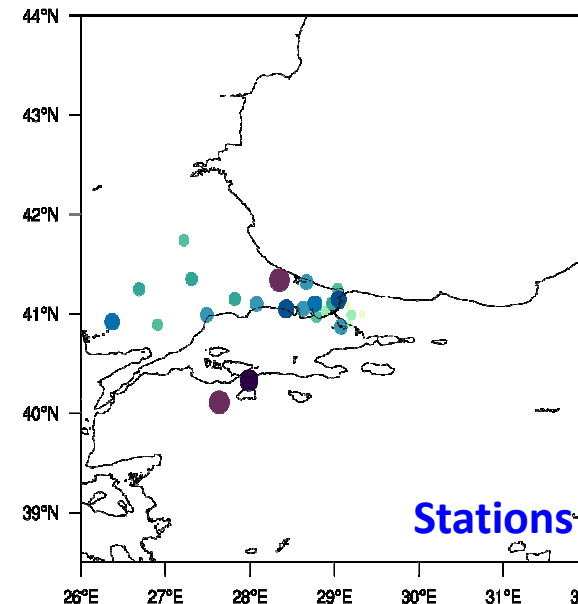
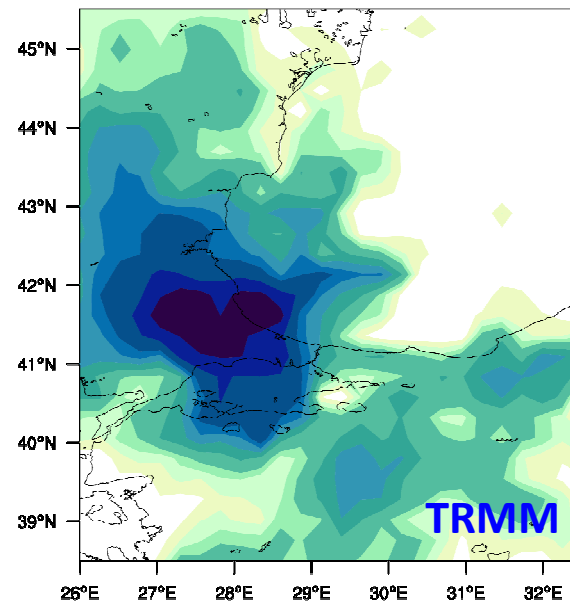


Results: Total Precipitation (7-9 September)

ERA Interim
(Weekly SST)

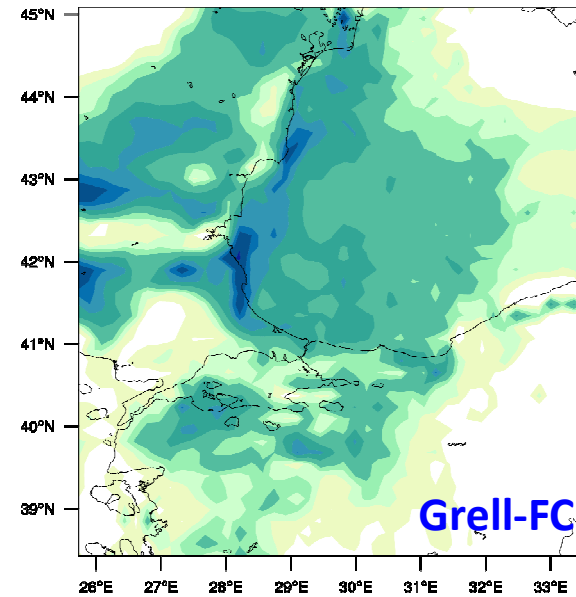
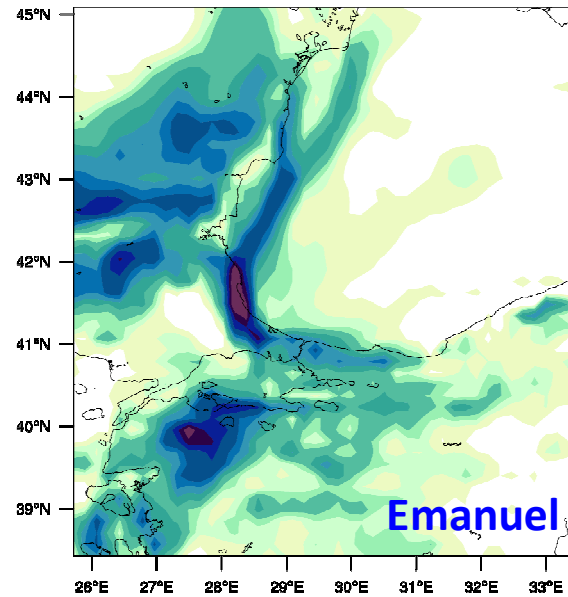


Observation

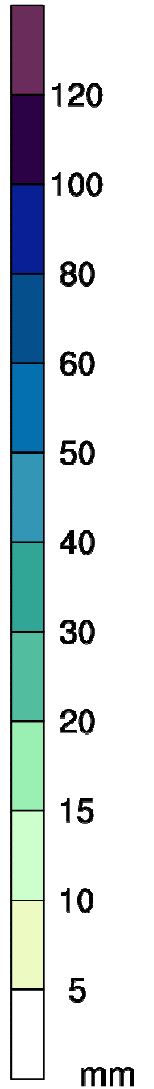
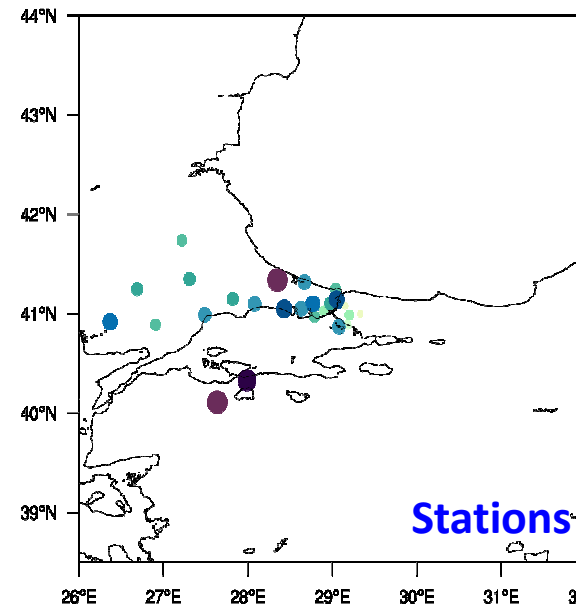
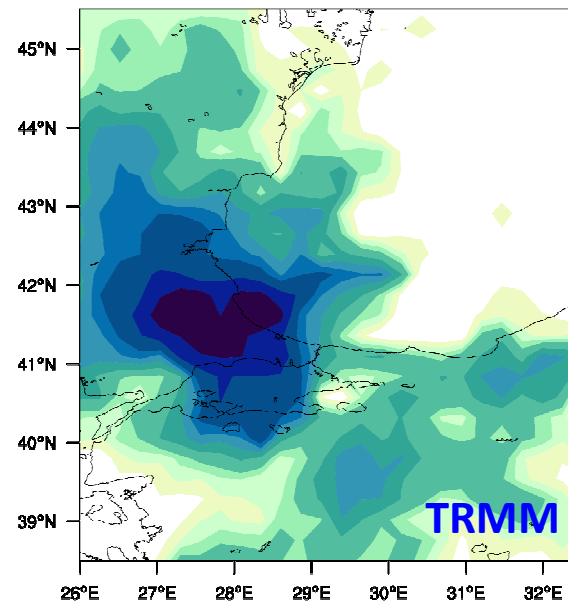


Results: Total Precipitation (7-9 September)

ERA Interim
(Daily SST)

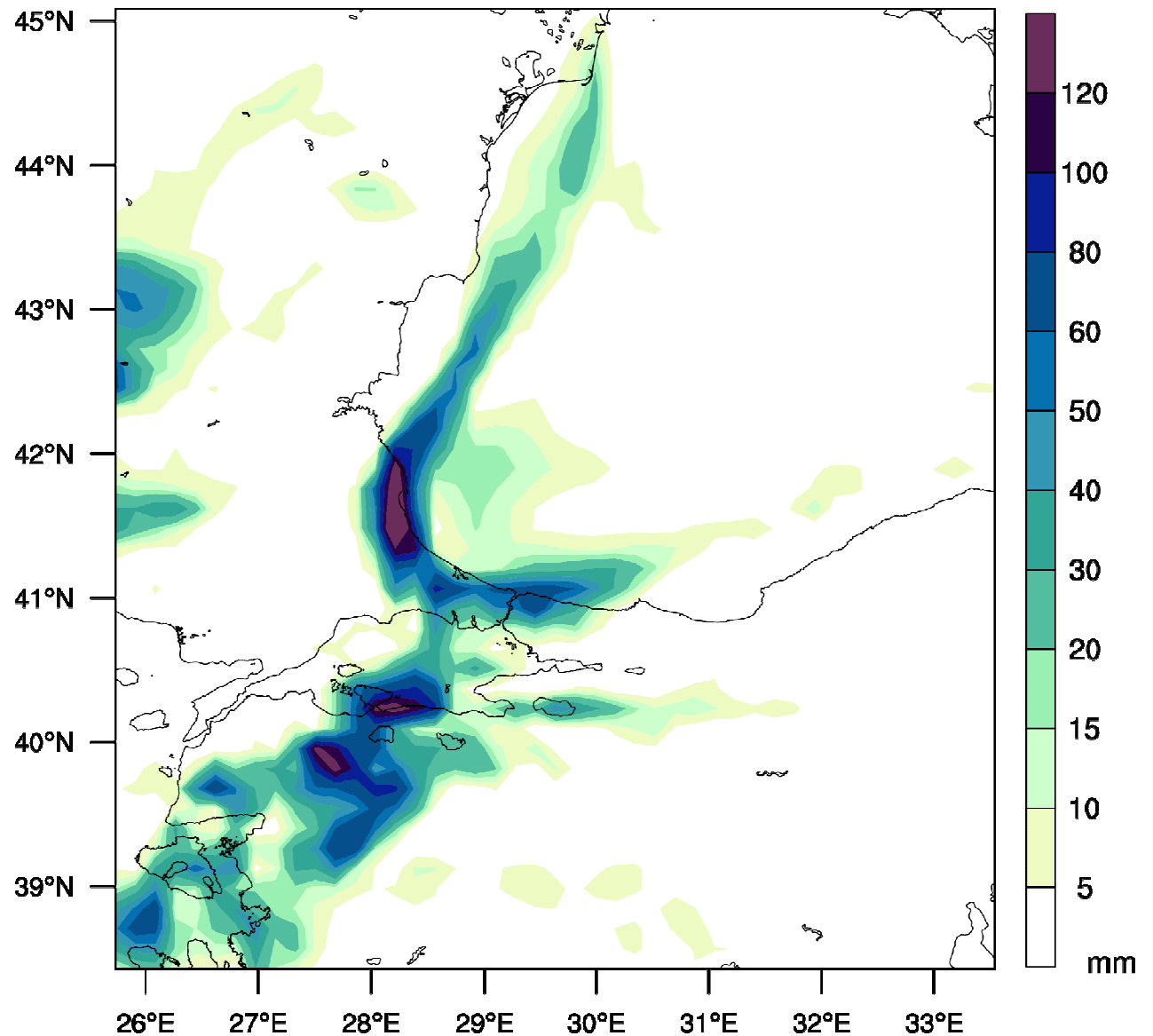


Observation

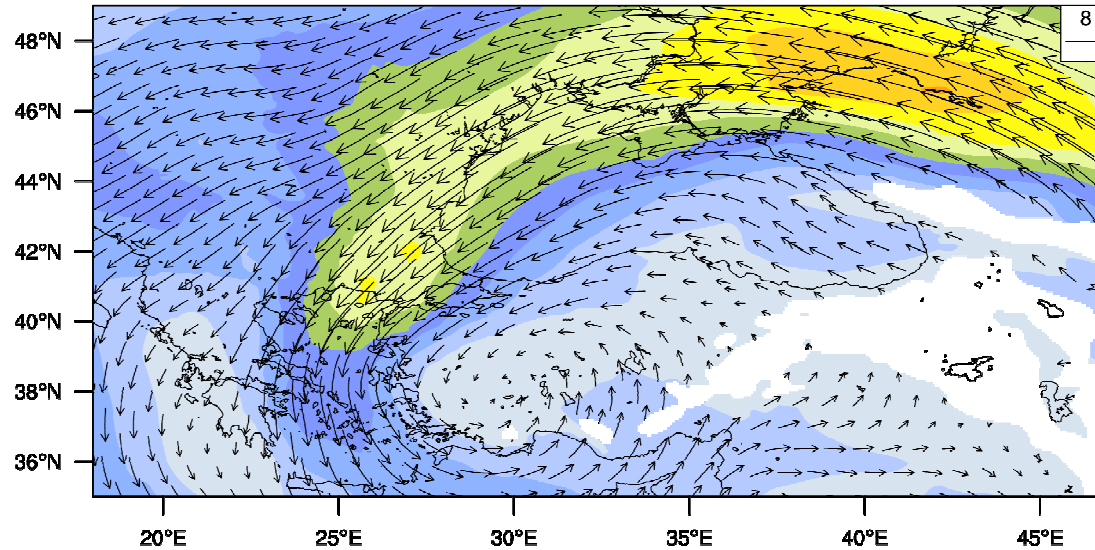


Results: Total Precipitation (8 September 06-12 am)

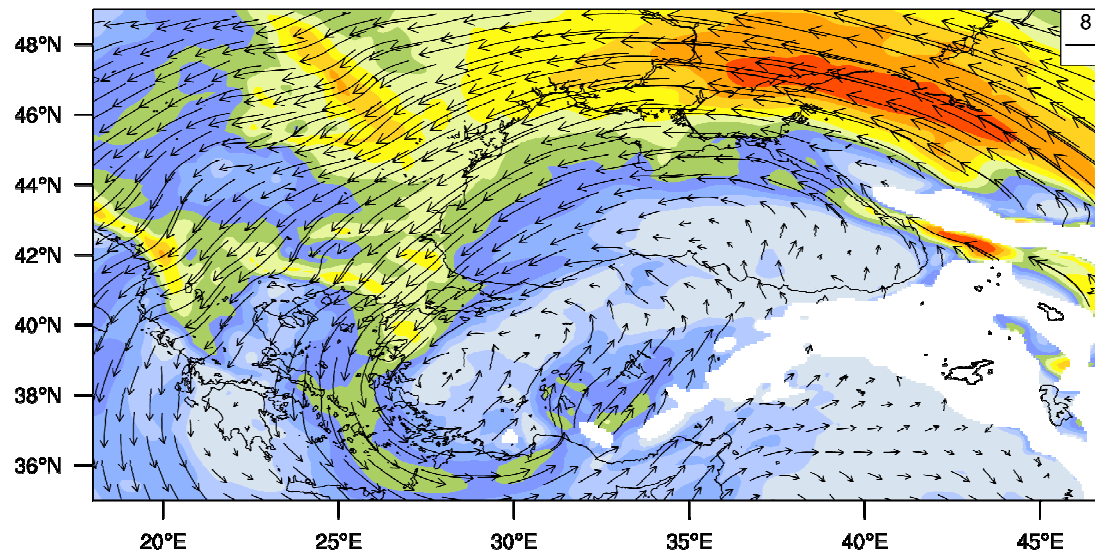
ERA Interim (Daily
SST) Emanuel
Scheme



Results: Upper level (8 September 850 mb wind vector&wind speed)



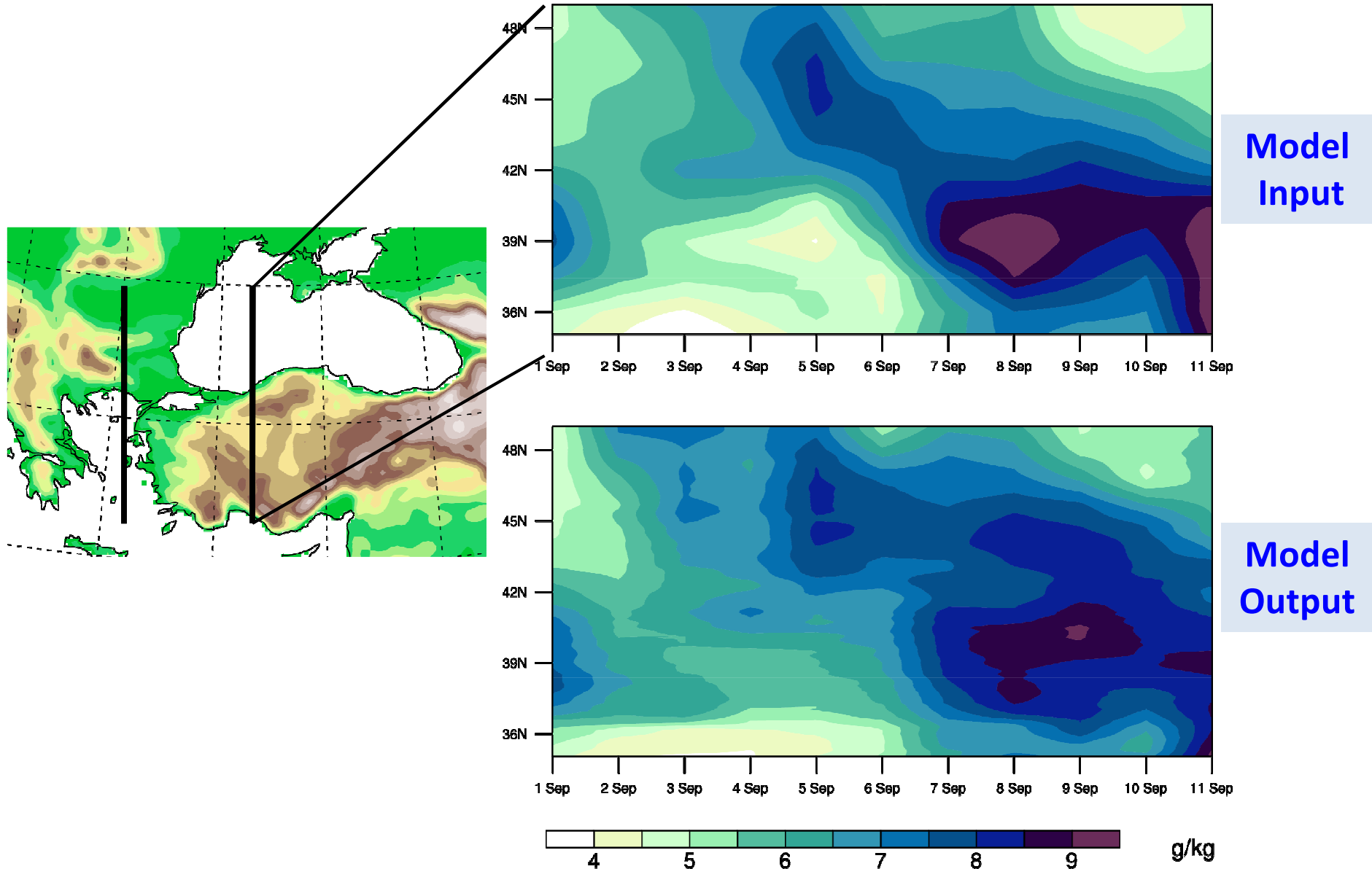
Model
Input



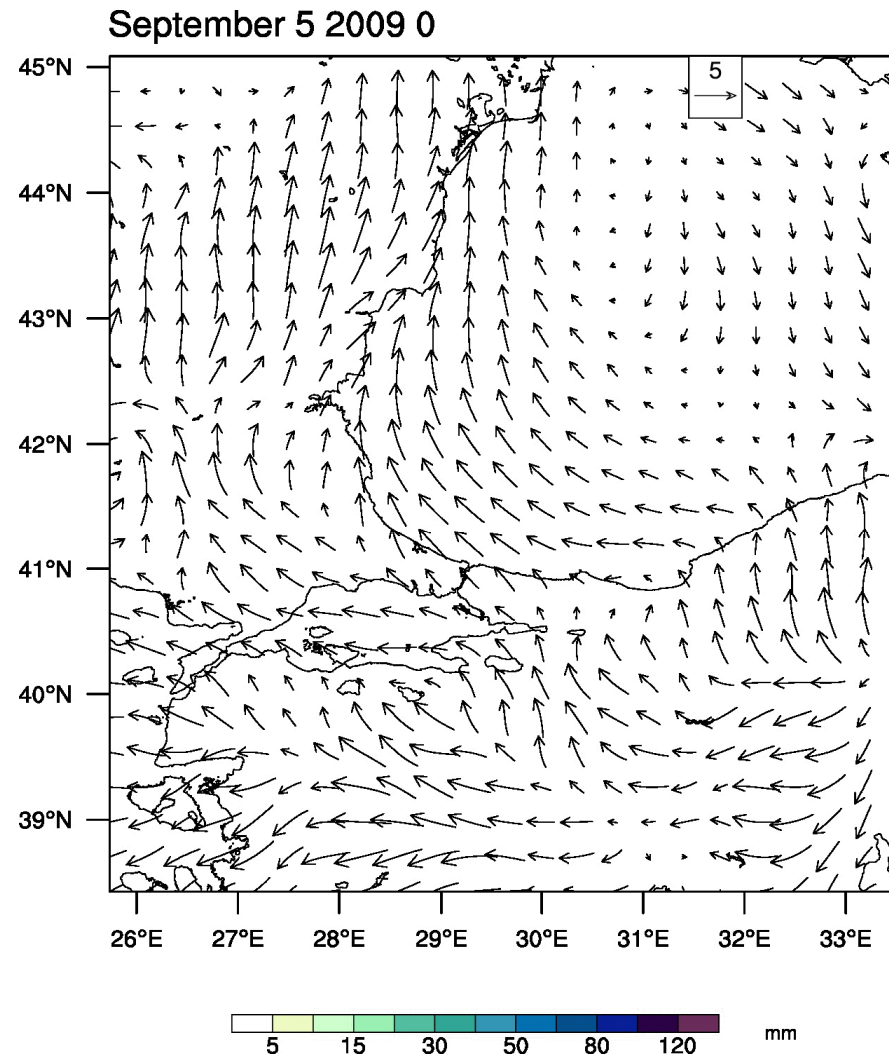
Model
Output



Results: Upper level (850 mb specific moisture)



Results



Discussions and Outlook

- Better results for Emanuel Scheme with high temporal resolution of SST, but

what about the sensitivity to domain size:

-> Nested domains?

- Impacts of warmer SST within the context of the climate change:

-> Warmer SST leads to increase in heat flux by enhancing the instability. On the other hand large reductions in precipitation over Eastern Mediterranean are projected (Giorgi and Lionello 2008). Suppressing by the strengthening of the anticyclonic circulation and less large scale precipitation but more severe local precipitation events?

“Thank you”