

Is intense coastal rainfall in the Netherlands better simulated at a finer grid scale?

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Introduction

- Lenderink et al (2009) showed that the influence of a warm North Sea can be significant, even leading to an increase in coastal precipitation of 15 % per degree warming of the North Sea Recent
- These results were obtained with a model of intermediate resolution (in both time and space)
- Precipitating processes are parameterized

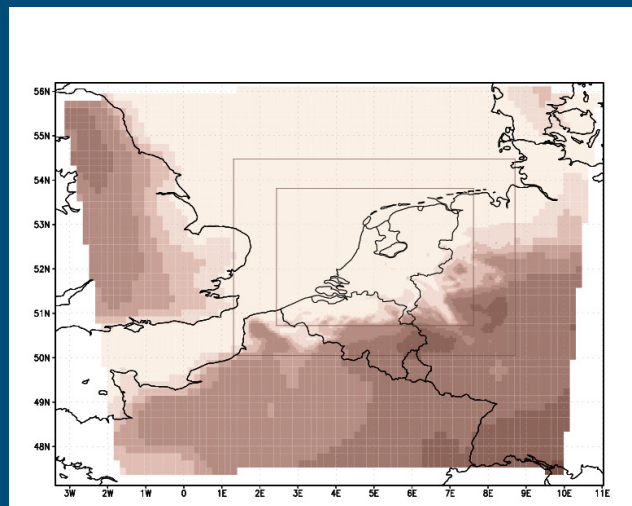


Introduction

- Summertime precipitation is characterized by convective showers which are difficult to capture at this resolution.
- Regional atmospheric models, which use the non-hydrostatic approach, have the ability to simulate precipitation on a resolution as small as 1 km.
- This study uses RAMS v6.1 (Regional Atmospheric Modelling System, CSU/ATMET)



Topography FutureWeather domain



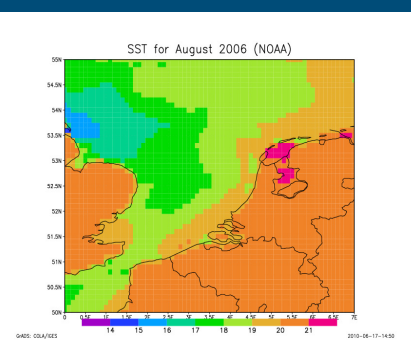
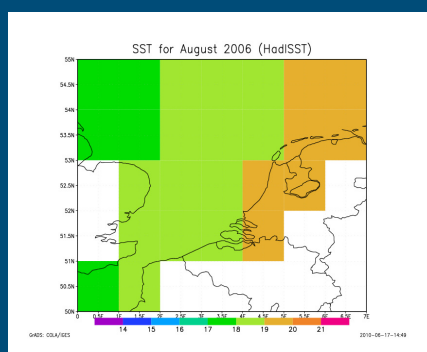
RAMS configuration

In this study RAMS version 6.1a3 was used in a nested grid configuration

Model options used:

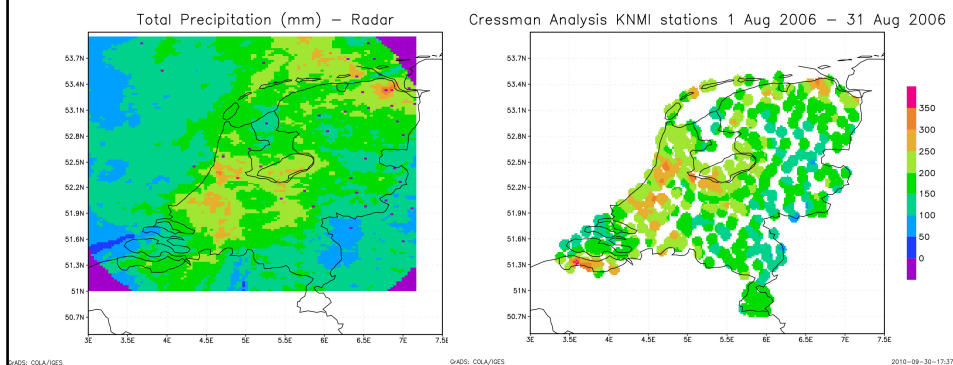
grids	1	2	3
$\delta x, \delta y$	18 km (50x54)	6 km (60x62)	2 km (149x149)
δt	20 sec	20 sec	6.667 sec
δz		25 - 1000 m (35)	
radiation		Harrington (1996)	
land surface		LEAFv3	
diffusion		MRF	
forcing		ECMWF (atmosphere)/NOAA/KNMI (SST)	
forcing time scale		lateral 1800 s	
convection		Full microphysics package (Flatau, 1989)	
period		August 2006	

Boundary conditions - SST

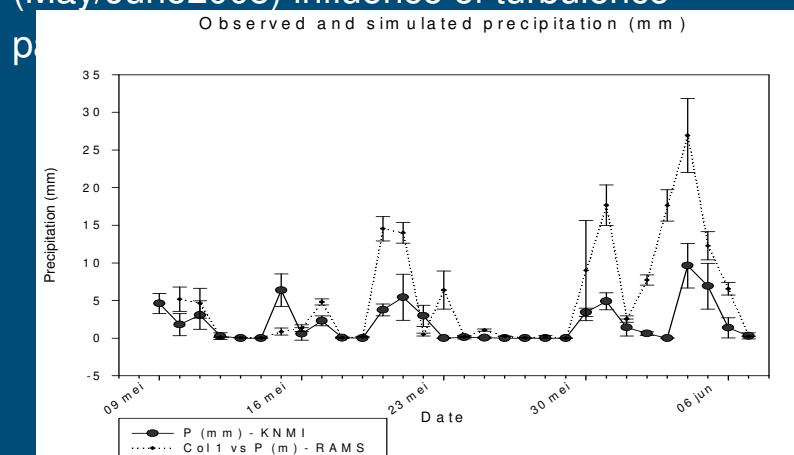


daily

Observations

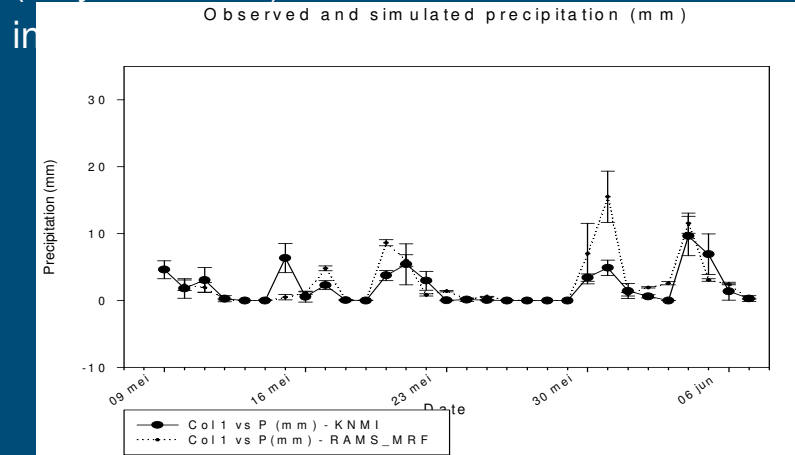


Validation spring/summer simulation (May/June 2005) influence of turbulence



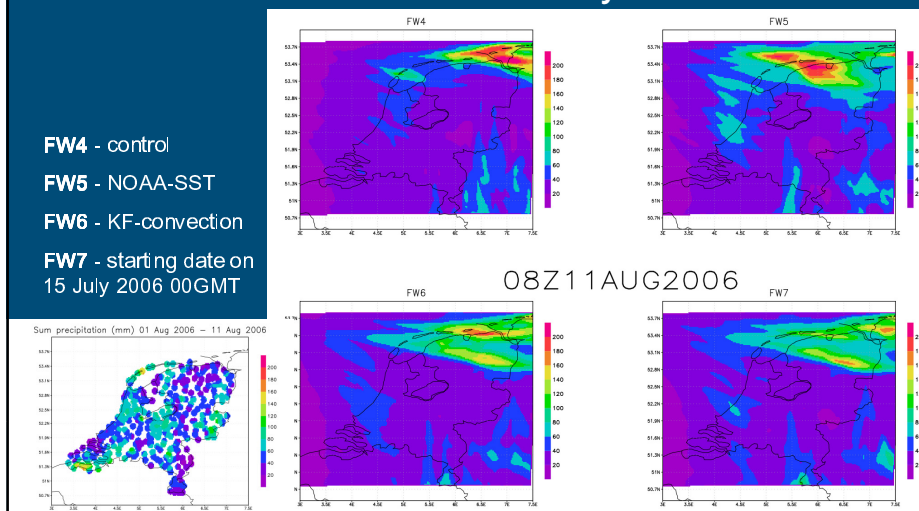
Validation spring/summer simulation

(May/June 2005)



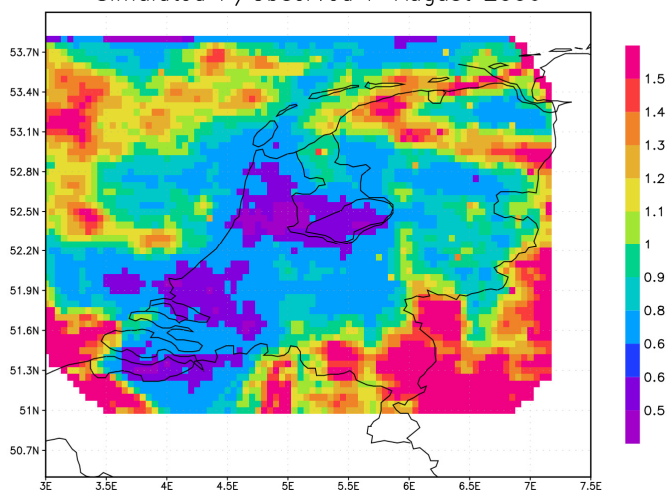
Results – validation/sensitivity

FW4 - control
FW5 - NOAA-SST
FW6 - KF-convection
FW7 - starting date on
15 July 2006 00GMT



Spatial validation monthly sum Precipitation (mm)

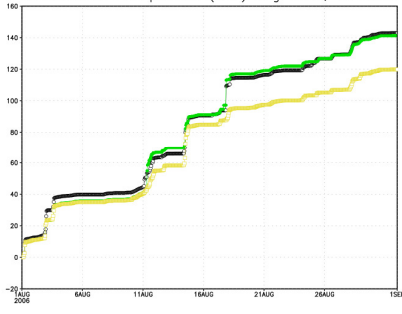
Simulated P/Observed P August 2006



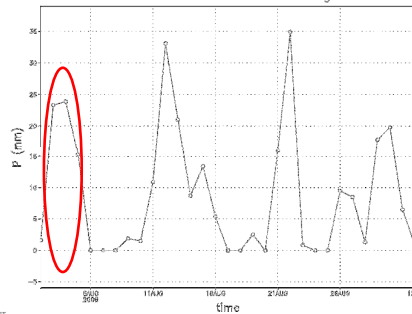
GRADS: COLA/IGES
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Observations station level

Accumulated Precipitation (mm) Aug 2006, Zaandam



Rainfall observations Zaandam Aug 2006



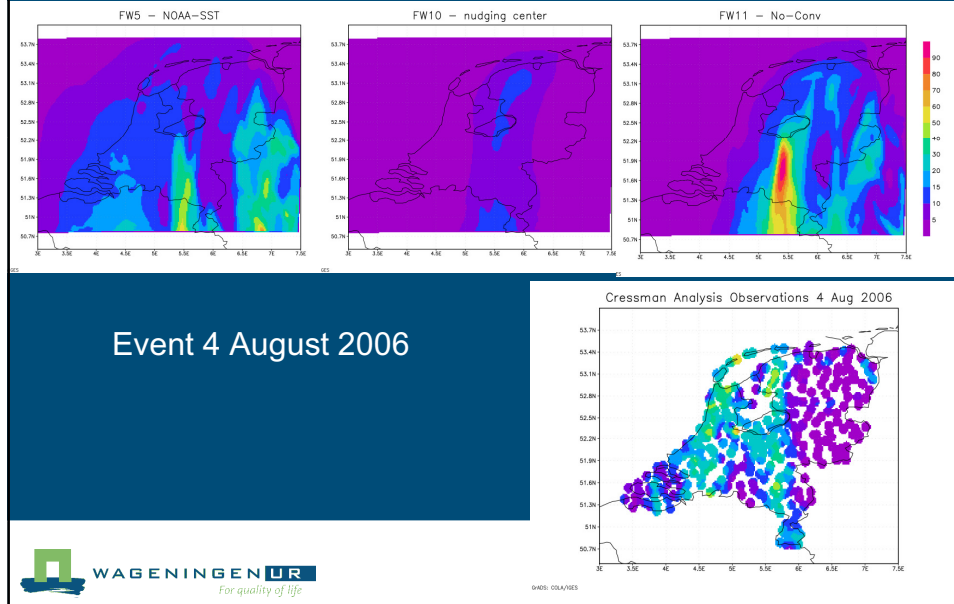
CTRL

NOAA

CONV

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Effect of parameterisation on precipitation



Conclusions

- To obtain good results the need of high quality boundary conditions is apparent (e.g. gradient of SST near the Dutch coast)
- Choice of boundary layer scheme has a strong influence on the performance of the model
- What is the role of soil moisture (initialization)?
- Is intense coastal rainfall better simulated at finer grid scale?
No uniform YES or NO

Thanks for your attention?

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