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# *Modeling of the 26 August 2011 Extreme Precipitation Event over Tokyo*

Photo by Stéphane Belair



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Lubos Spacek, and  
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/ Japan Meteorological Agency*

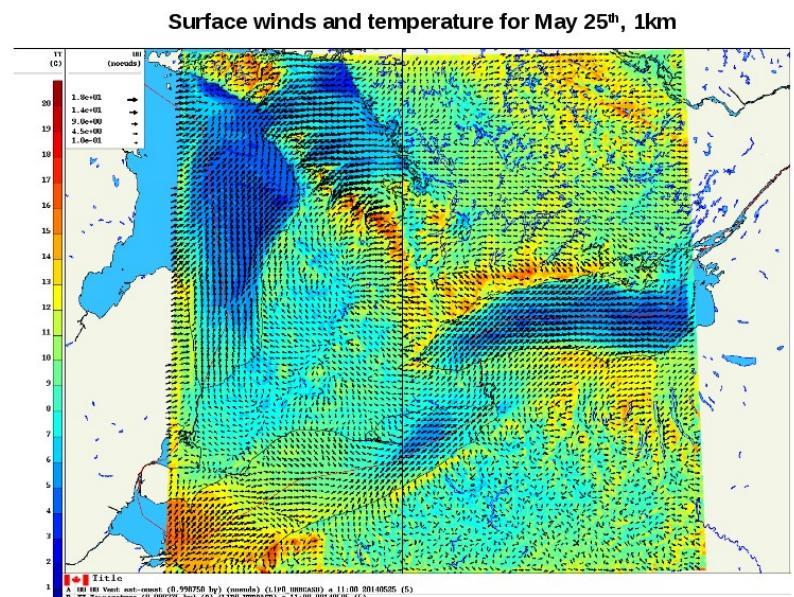
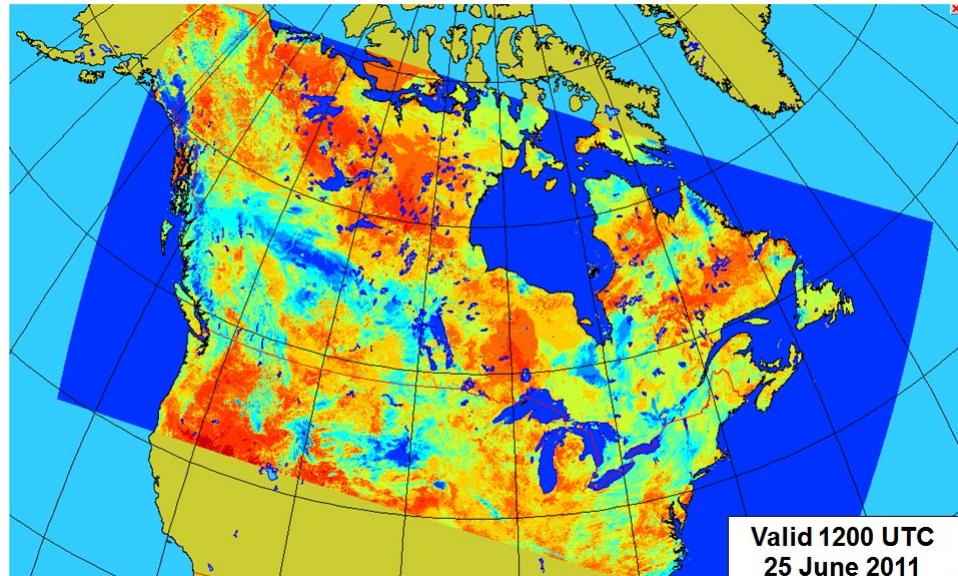
*ICUC-9 in Toulouse, France, 21 July  
2015*

# OBJECTIVES and MOTIVATION

*Km-scale atmospheric systems now run at MSC-Operations*

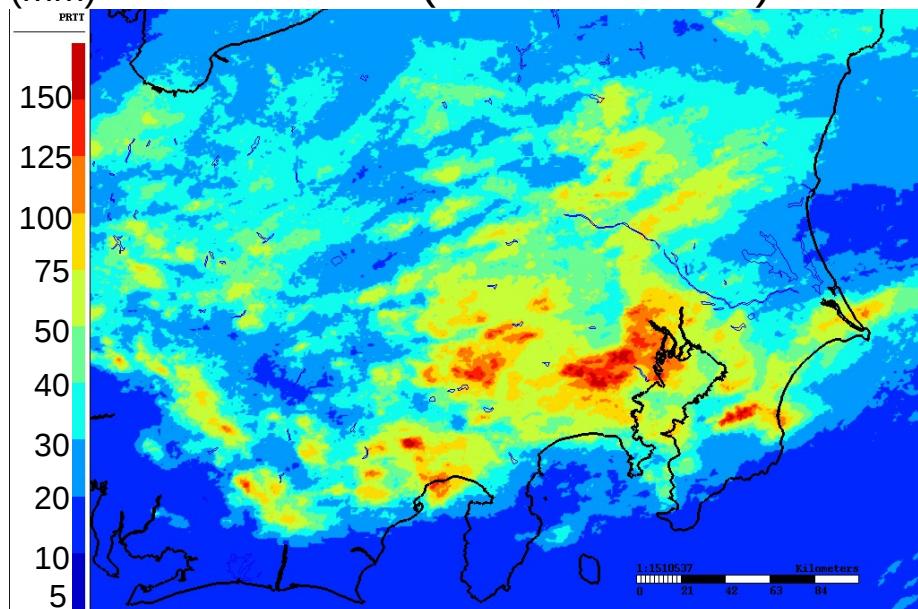
*New generation of subkm-scale URBAN models run in experimental mode*

*Currently being tested with Pan Am 2015 (Toronto), TOMACS (Tokyo), and WorldClass (BC Coast) projects*

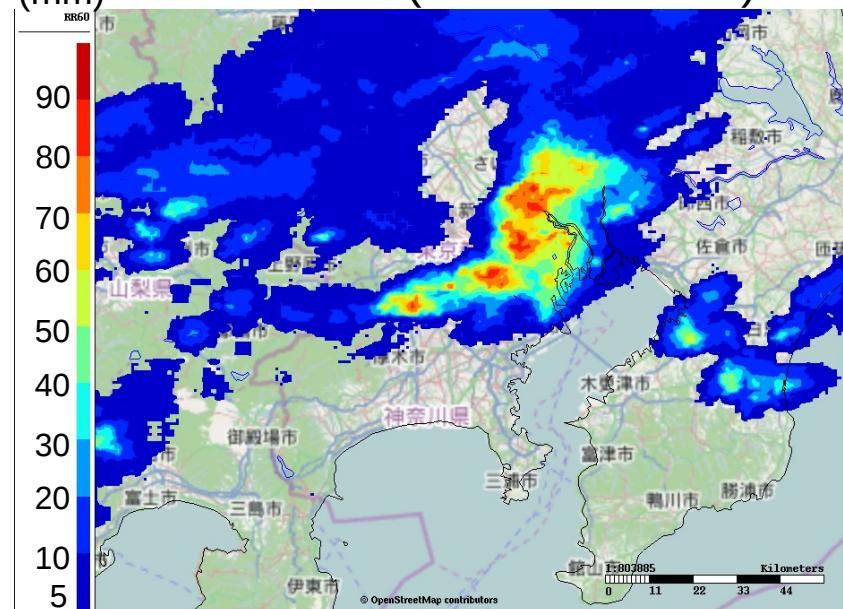


# 26 AUGUST 2011 CASE STUDY (TOMACS)

(mm) OBS: PR (12UTC-00UTC)



(mm) OBS: PR (07UTC-06UTC)



**TOMACS**... A field campaign in the Tokyo metropolitan area with dense observation network was conducted by MRI, NIED and 12 research groups for the summers of 2011-2013.



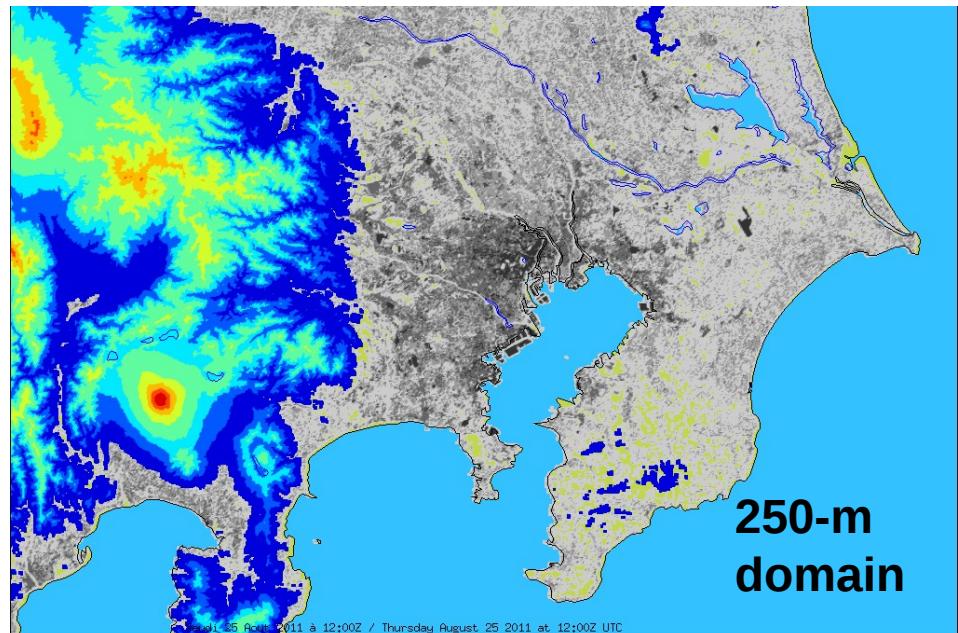
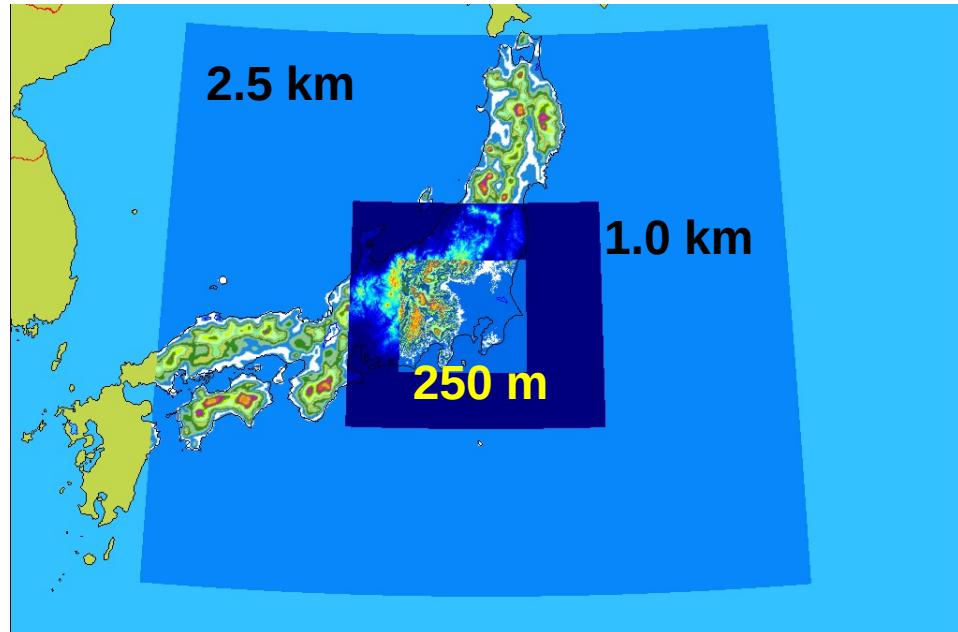
# MODELING SYSTEM and EXPERIMENTAL SETUP

*Based on the Global Environmental Multi-scale (GEM) model*

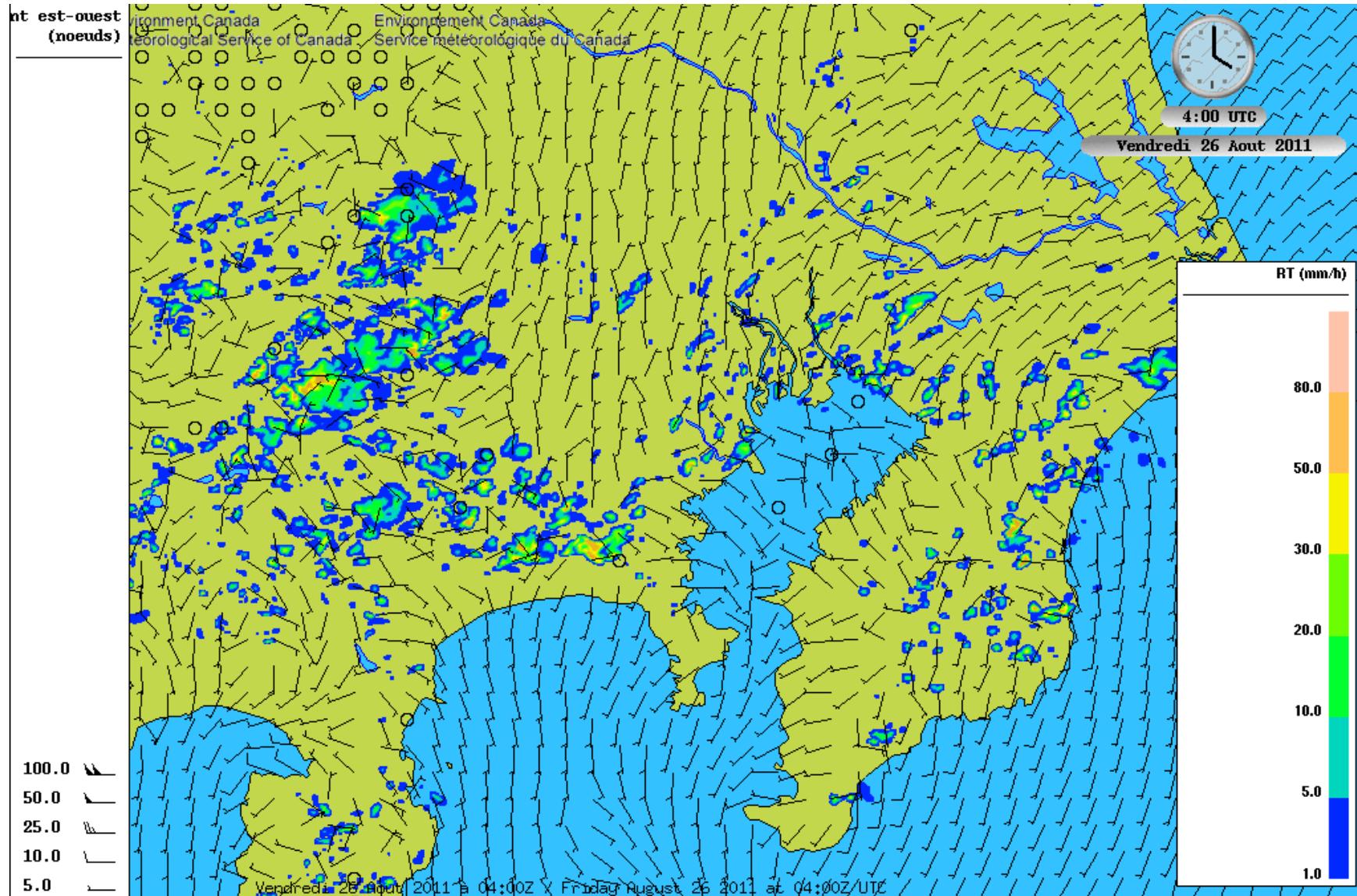
*Domains with 2.5-km, 1.0-km, and 250-m grid spacing*

*No deep convection scheme; shallow convection with Kuo  
Transient, Microphysics based on two-moment Milbrandt-Yau  
scheme*

*Urban surfaces with the Town Energy Balance (TEB) scheme  
Initial conditions from global deterministic assimilation system (25 km)*

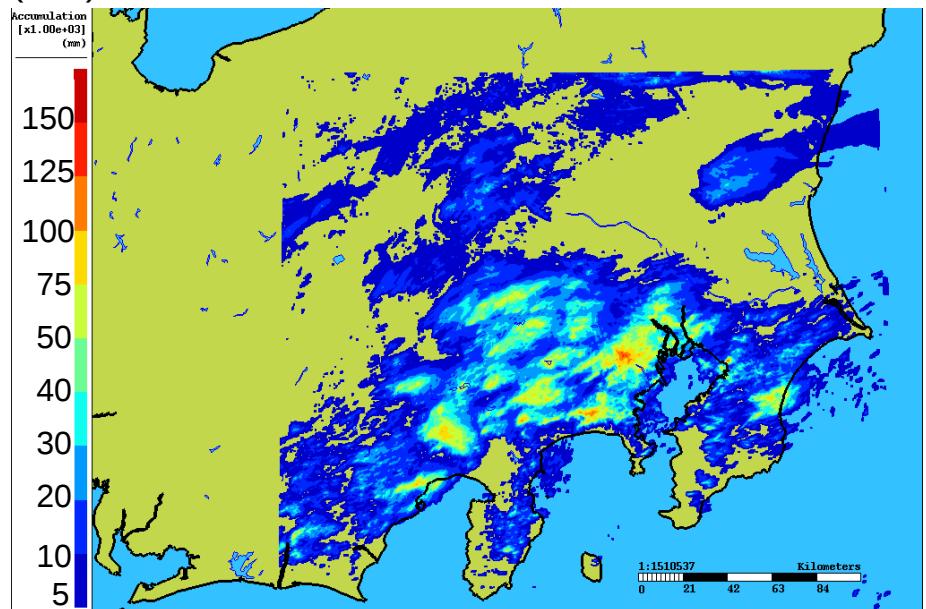


# WHAT HAPPENED... ANIMATION

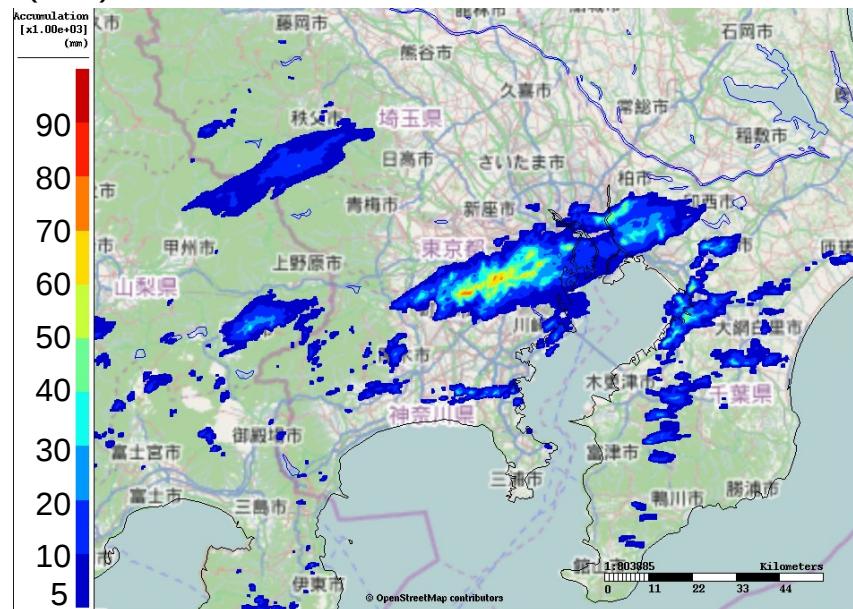


# PREDICTED PRECIPITATION (250m GEM)

(mm) 0.25km: PR (12UTC-00UTC)



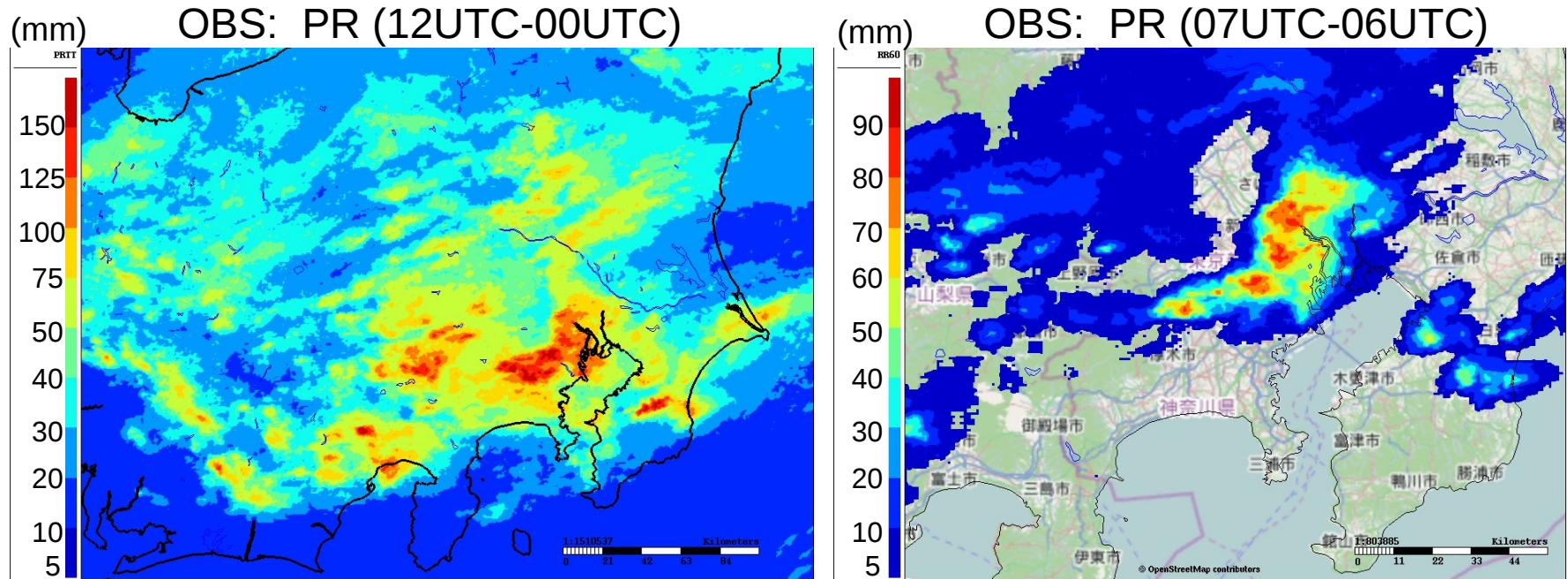
(mm) 0.25km: PR (07UTC-06UTC)



*12-hour precipitation  
accumulations from GEM (12-24-  
hour forecast)*

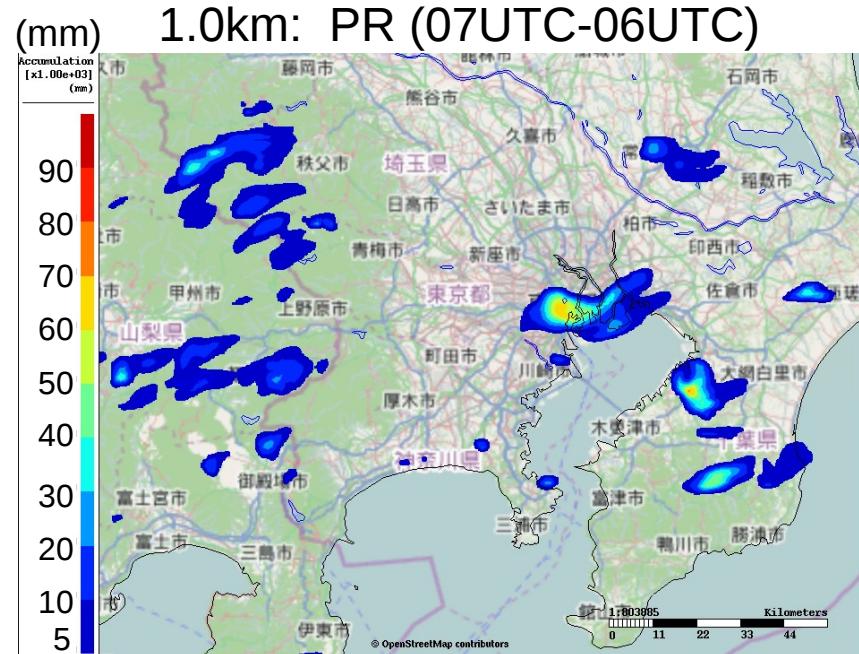
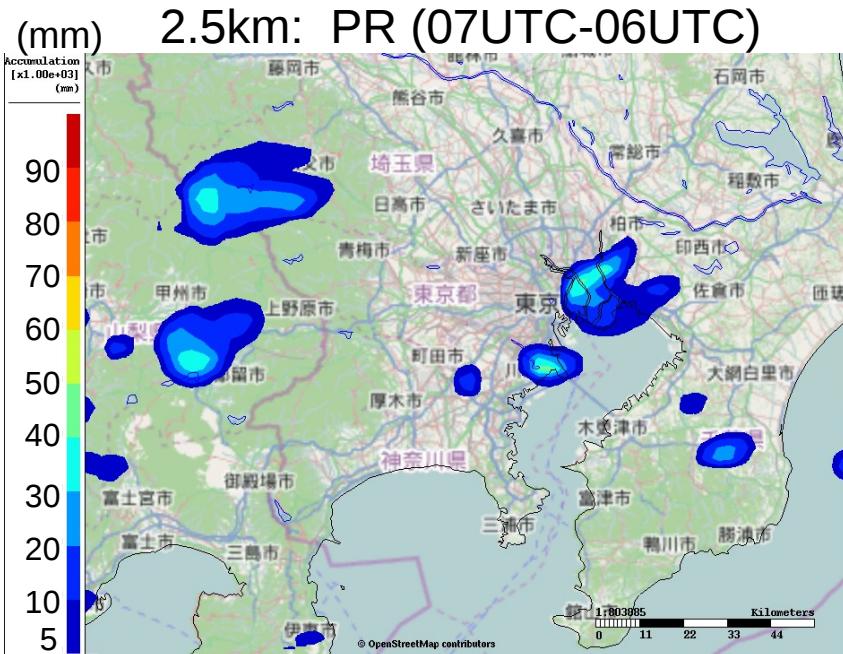
*Hourly precipitation accumulations  
from GEM (18-19-hour forecast)*

# 26 AUGUST 2011 CASE STUDY



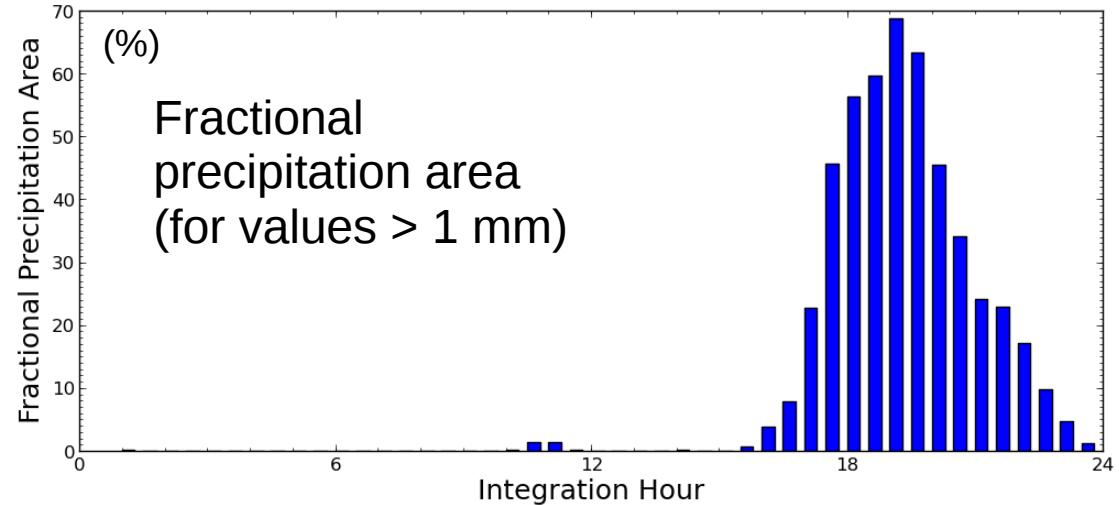
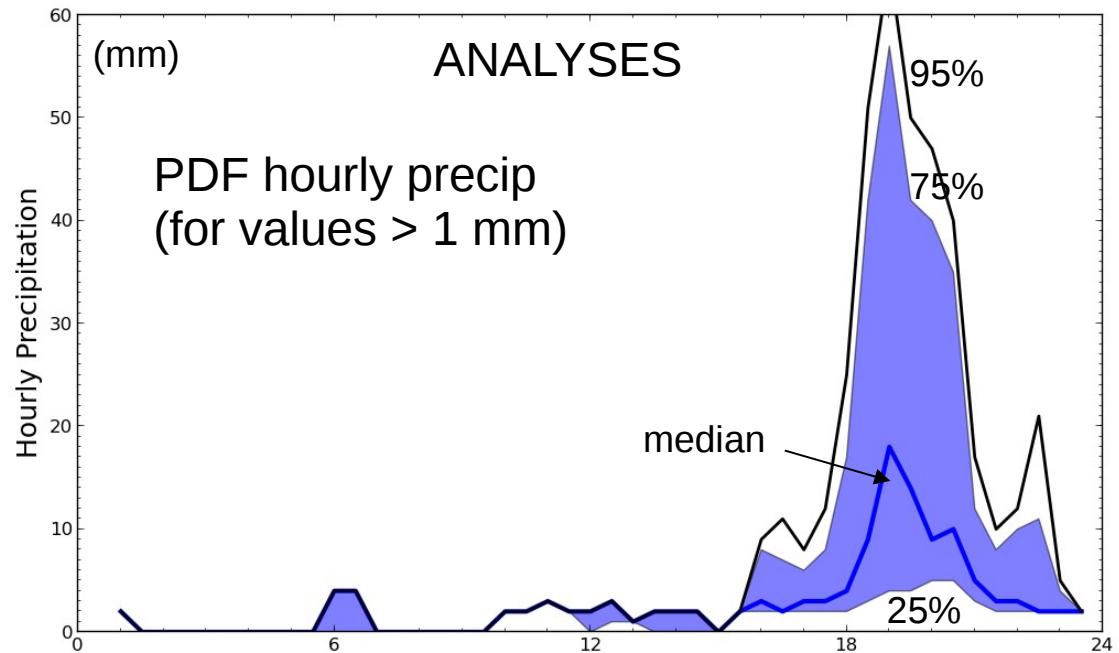
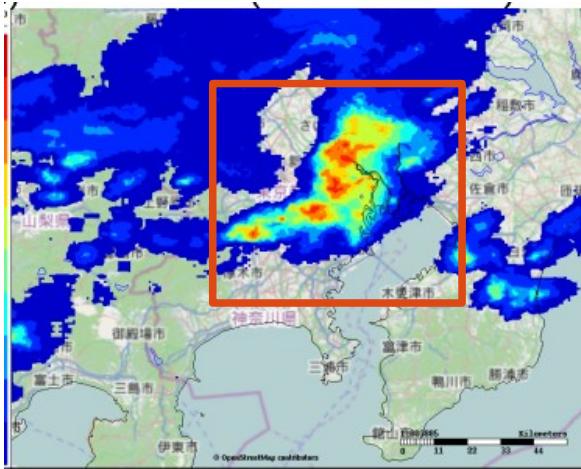
**REMINDER... REMINDER... REMINDER  
JMA's radar / rain gauges analyses**

# EFFECT of HORIZONTAL RESOLUTION (1km and 2.5km)

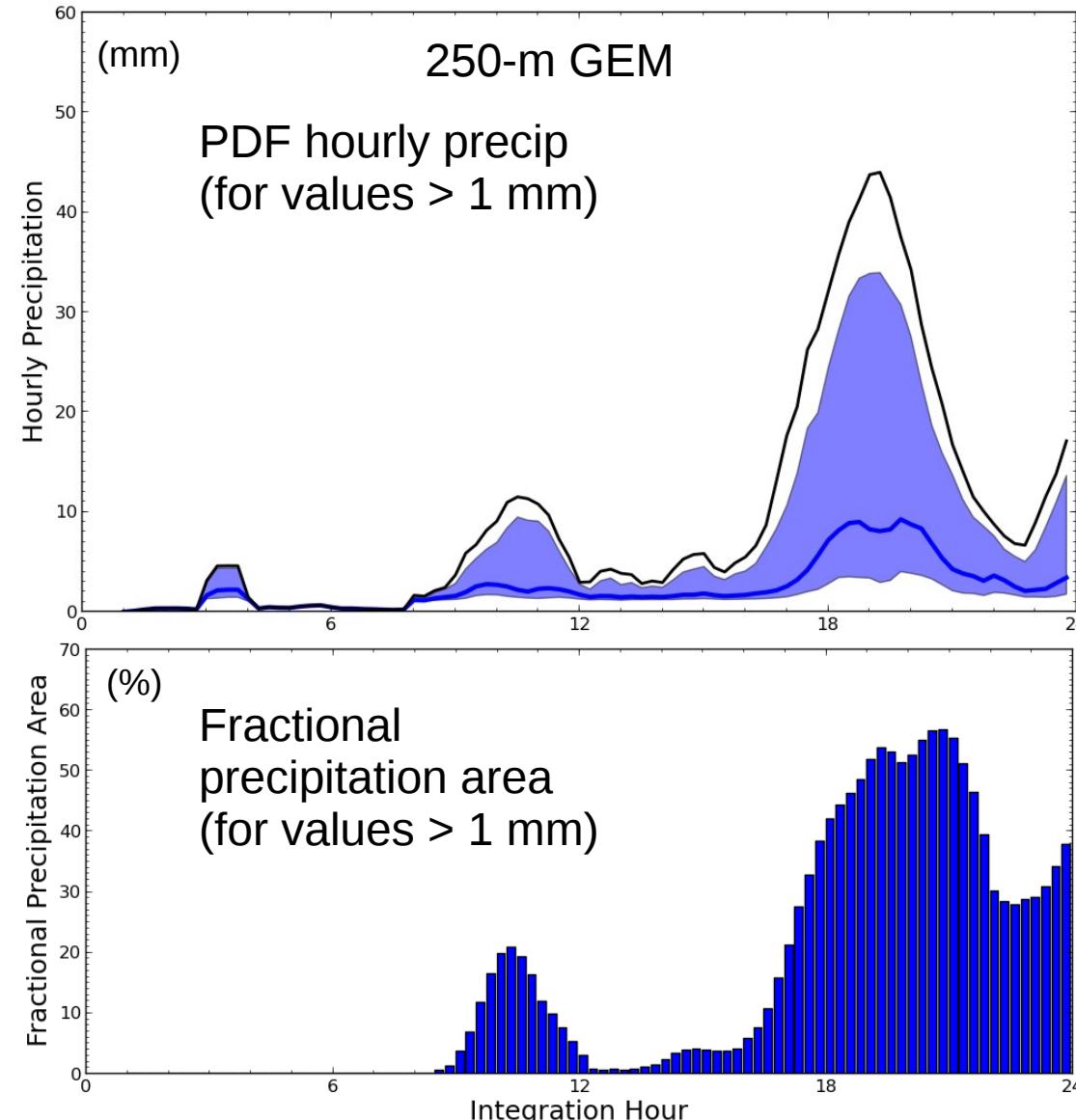


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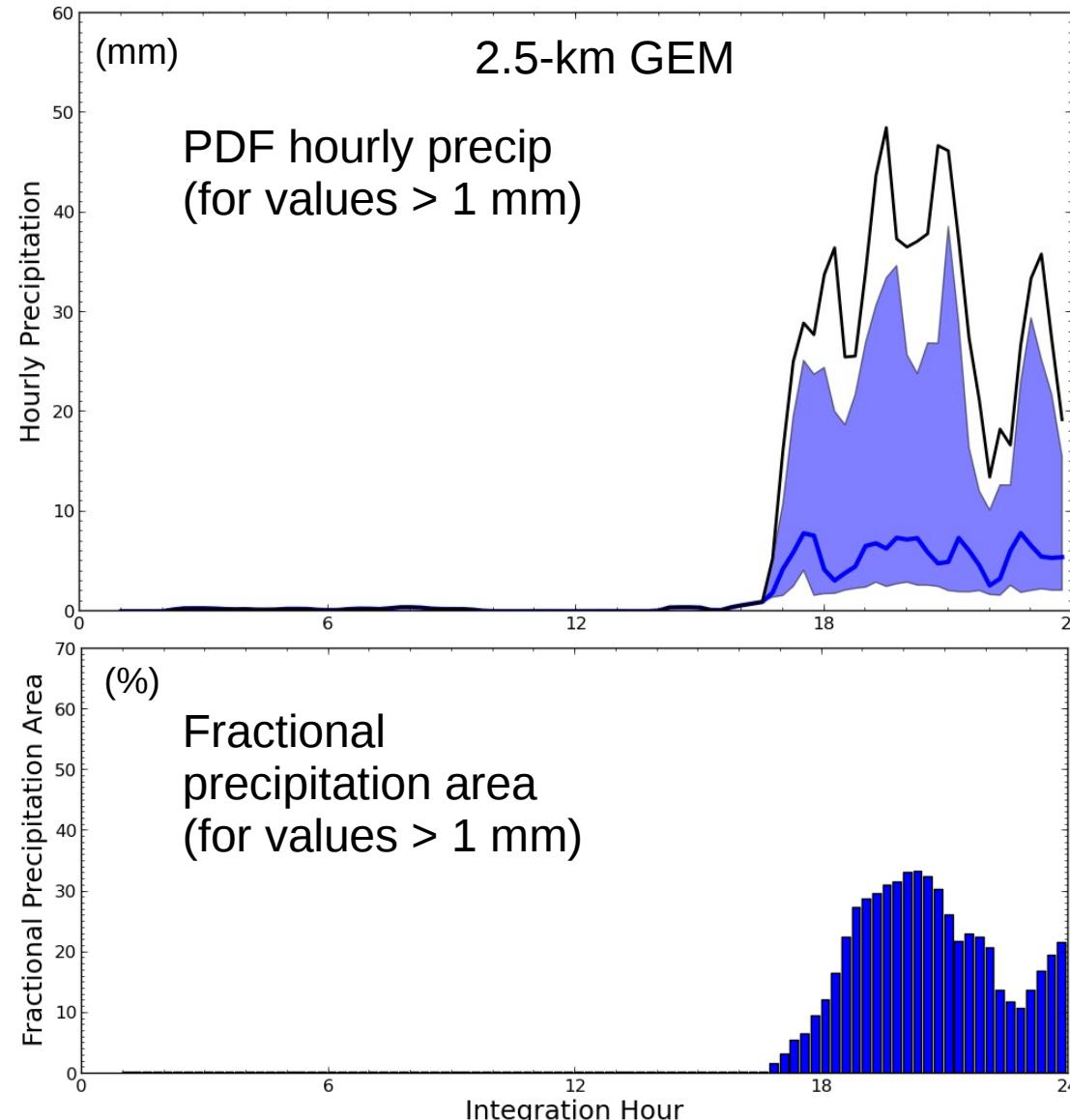
# TIMESERIES - JMA's ANALYSES



# **TIMESERIES - 250m GEM**



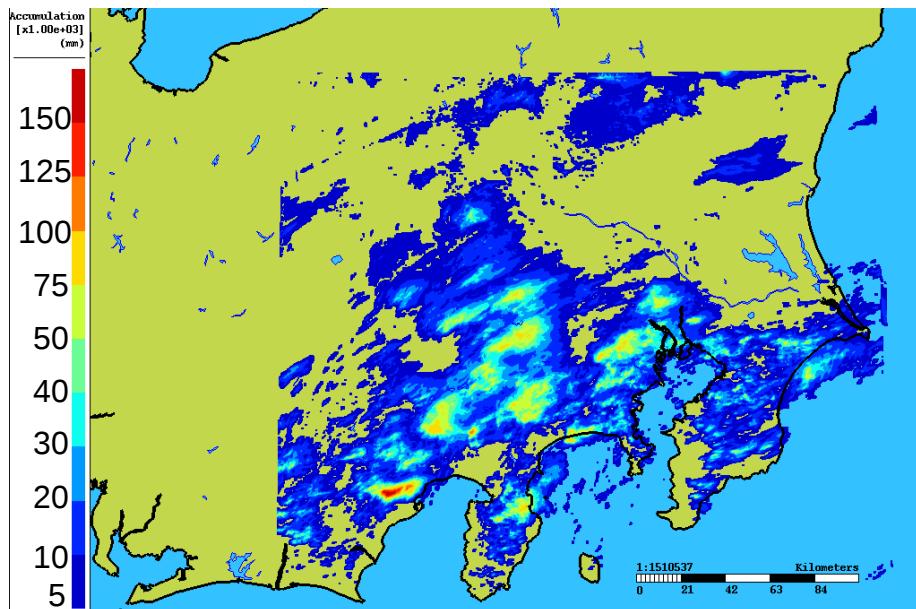
# **TIMESERIES - 2.5-km GEM**



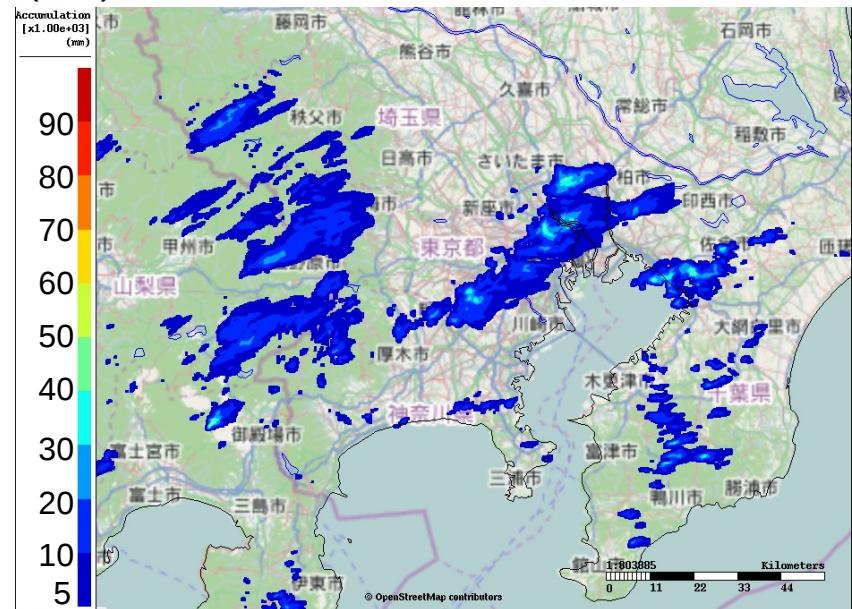
# EFFECT of URBAN AREAS (250m GEM)

## No TEB

(mm) 0.25km: PR (12UTC-00UTC)



(mm) 0.25km: PR (07UTC-06UTC)



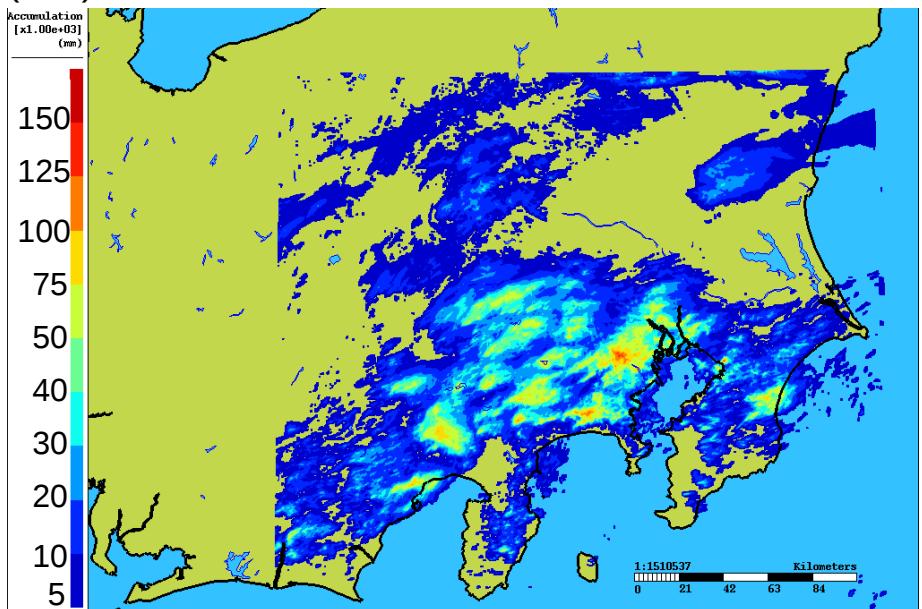
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*Hourly precipitation accumulations  
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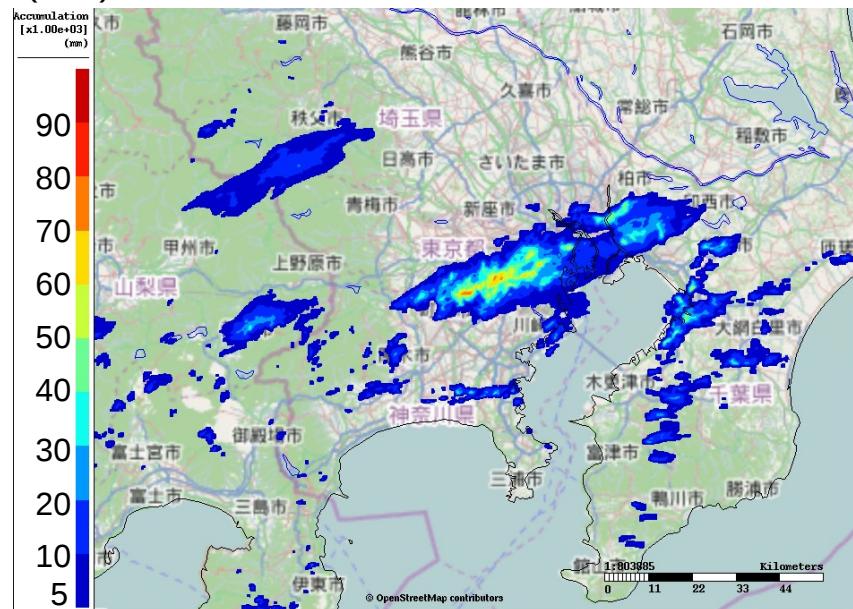
# PREDICTED PRECIPITATION (250m GEM)

## With TEB

(mm) 0.25km: PR (12UTC-00UTC)

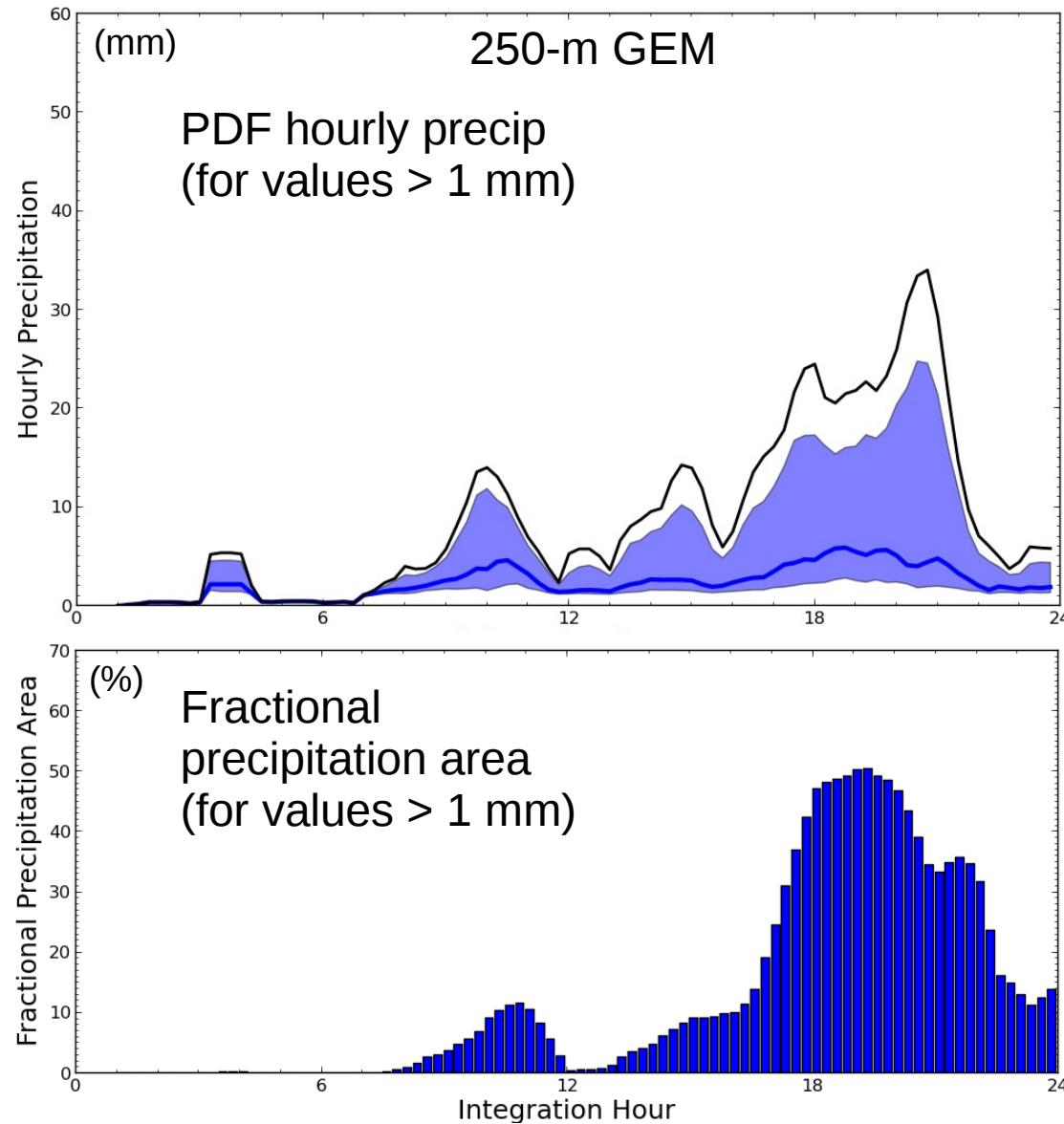


(mm) 0.25km: PR (07UTC-06UTC)

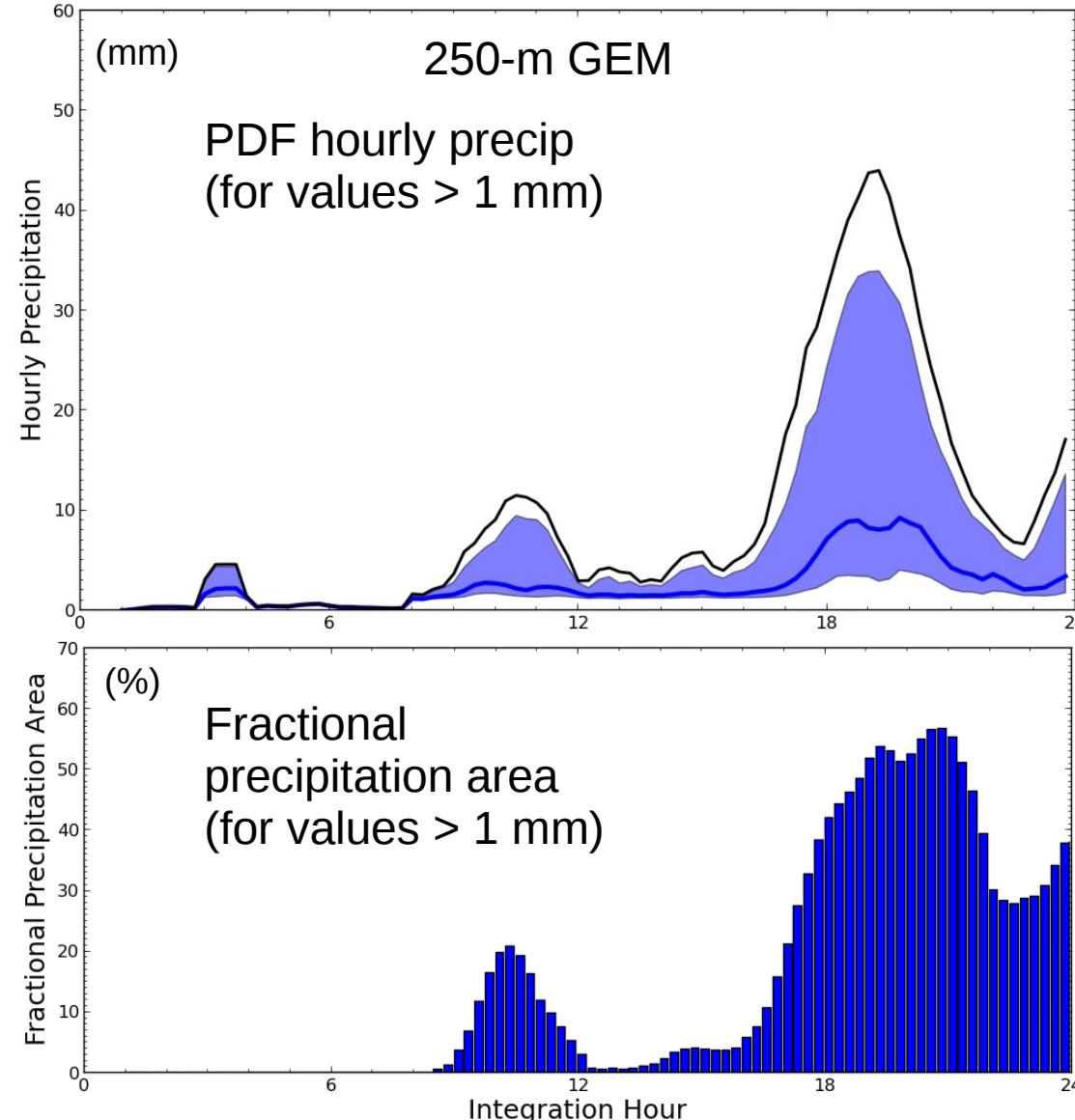


**REMINDER... REMINDER... REMINDER**

# EFFET of URBAN AREAS-TIMESERIES (250m)



# **TIMESERIES - 250m GEM (with TEB)**



**REMINDER... REMINDER... REMINDER**

# FINAL WORDS...

*This presentation... impact and role of horizontal resolution and of urban surfaces.*

*Upcoming... use the 250-m simulations to examine thermal and dynamic effects of the Tokyo urban area on this flash flood event.*

*Considering the possibility of running other TOMACS cases*

*This system will serve as the basis for upcoming sub-km urban modeling system to be implemented experimentally over Canada (Vancouver, Montreal, Toronto)*

# TOMACS

A field campaign in the Tokyo metropolitan area with a dense observation network was conducted by MRI, NIED and 12 research groups for the summers of 2011-2013.

