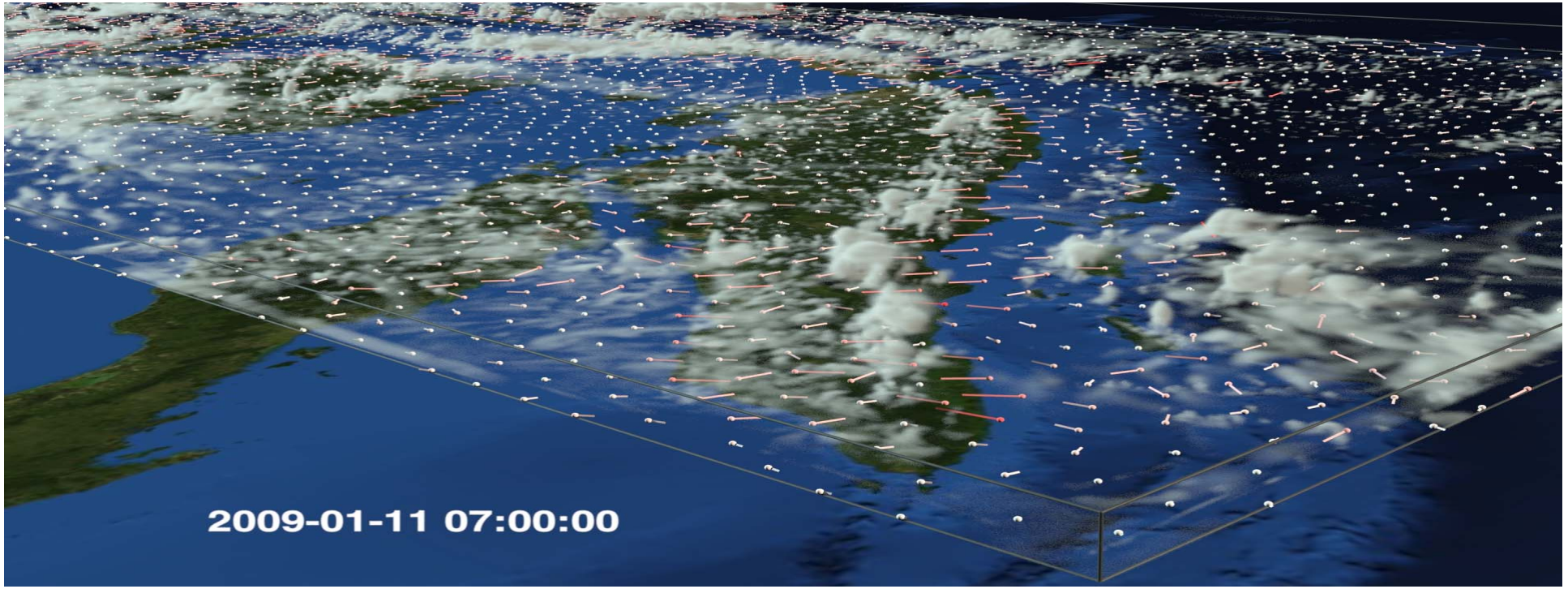
Australian Modelling Plans for YMC



Todd Lane

Univ. of Melbourne & ARC Centre of Excellence for Climate System Science (ARCCSS). ***Claire Vincent*** *(U. Melb., ARCCSS),* ***Matt Wheeler*** *(BoM),* ***Alain Protat*** *(BoM),* ***Christian Jakob*** *(Monash),* ***Charmaine Franklin*** *(BoM) +other members of the Australian YMC team*

THE UNIVERSITY OF MELBOURNE

ARC CENTRE OF EXCELLENCE FOR CLIMATE SYSTEM SCIENCE

YMC Meeting,
Malaysia, 14016 March 2017

Recent progress

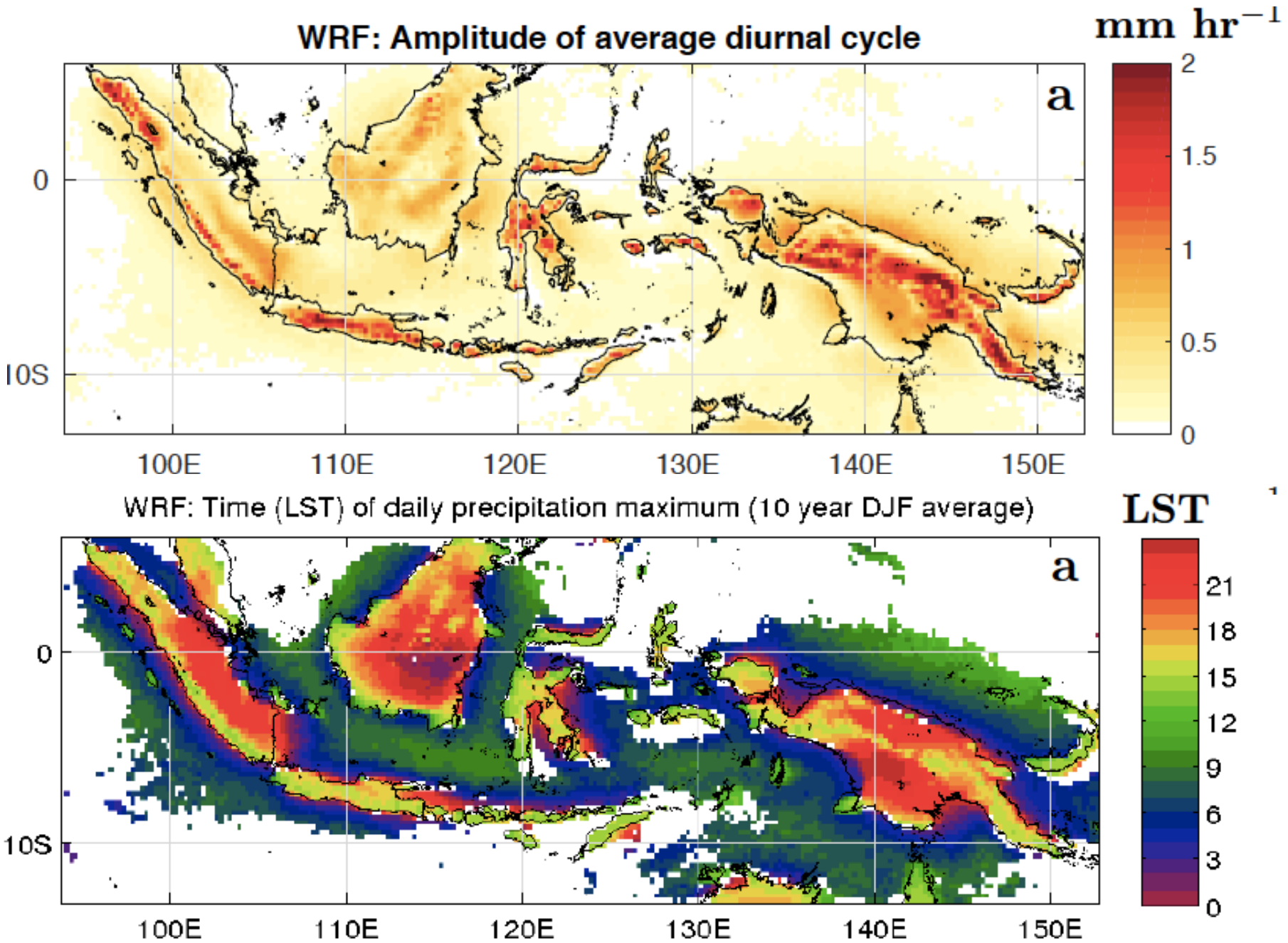
Papers focusing on simulation of events over New Guinea:

Hassim, M.E.E., T.P. Lane, and W.W. Grabowski, 2016: The diurnal cycle of rainfall over New Guinea in convection-permitting WRF simulations. *Atmos. Chem. Phys.*, **16**, 161-175, doi:10.5194/acp-16-161-2016.

Vincent, C.L., and T.P. Lane, 2016: Evolution of the diurnal precipitation cycle with the passage of a Madden-Julian Oscillation event through the Maritime Continent. *Monthly Weather Review*, **144**, 1983-2005.

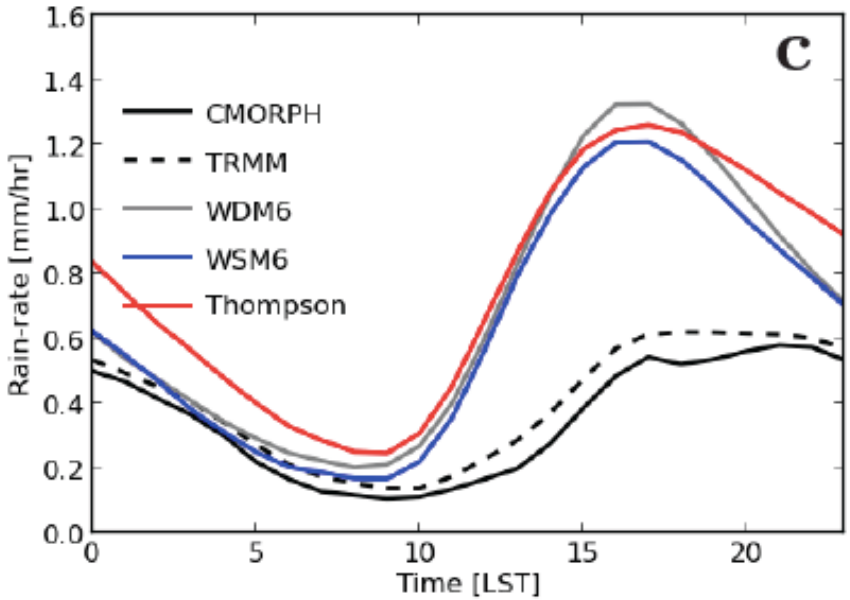
Paper focusing on 10-year 4 km resolution WRF simulation over most of Maritime Continent:

Vincent, C.L., and T.P. Lane, 2017: A 10-year Austral summer climatology of observed and modeled intraseasonal, mesoscale and diurnal variations over the Maritime Continent. *J. Climate,* in press.
(dataset is freely available)

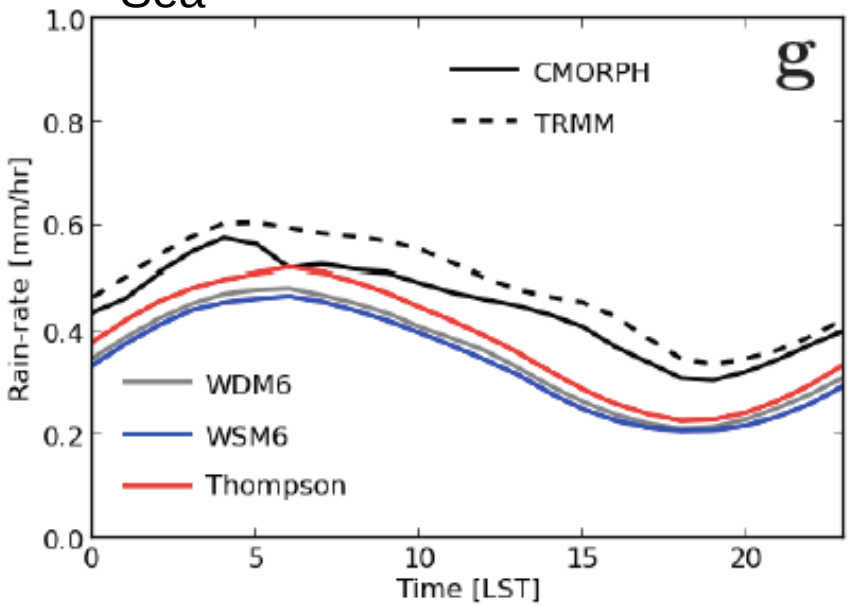


Vincent & Lane (2017)

Land



Sea



4 km WRF simulations:

- Overemphasize rainfall over land
- Rainfall peaks too early (over land)
- Underemphasizes oceanic rainfall
- Produced too much convective and not enough stratiform rain

Vincent & Lane (2017)

Modelling Focus & Motivation

•**Support post-analysis of YMC intensive Australian RV Investigator Campaign** (operational (global) forecasts from BoM will be used to support campaign in real-time)

•**Model evaluation studies over entire intensive campaign(s)**

•**Combined modelling / observational process studies of specific events (with focus on Sumatra)**

- Document initiation and evolution of convective systems and better understand **systematic model errors and biases**
- Validation of simulated offshore gravity wave structures (including amplitude and vertical structure) using radiosondes.
- Use simulated events to help evaluate and improve radar detection algorithms

•**Two approaches:**

- ~1.5 – 4 km resolution simulations over > 60 day period covering Java and Sumatra. (Perhaps able to do summer 2017/18 & 2018/19)
- < 1 km resolution simulations for specific events.

Convection-permitting simulations (1.5-4 km grid spacing) > 60 days

Following methods outlined in: Vincent and Lane (J Clim 2017)

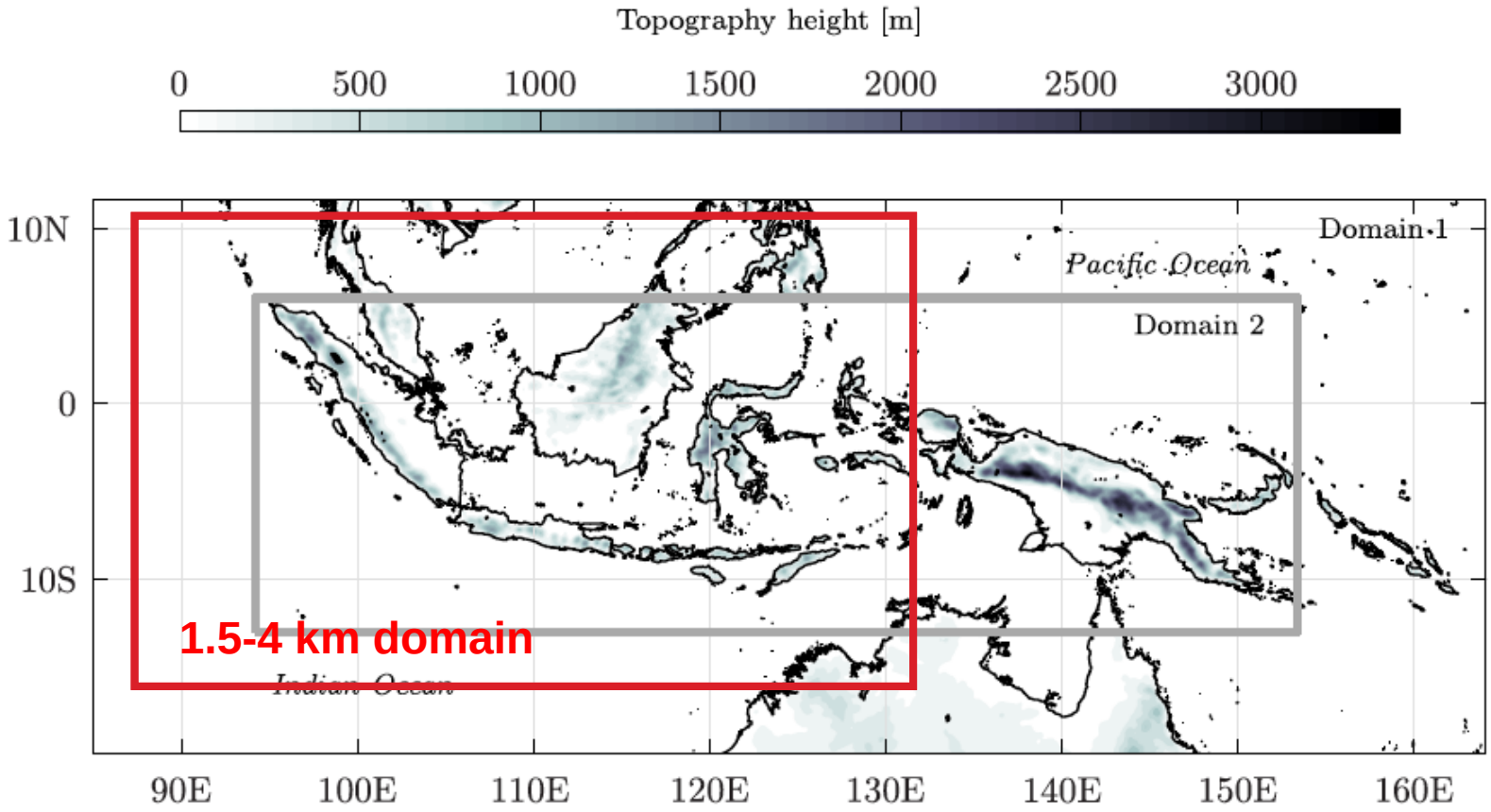
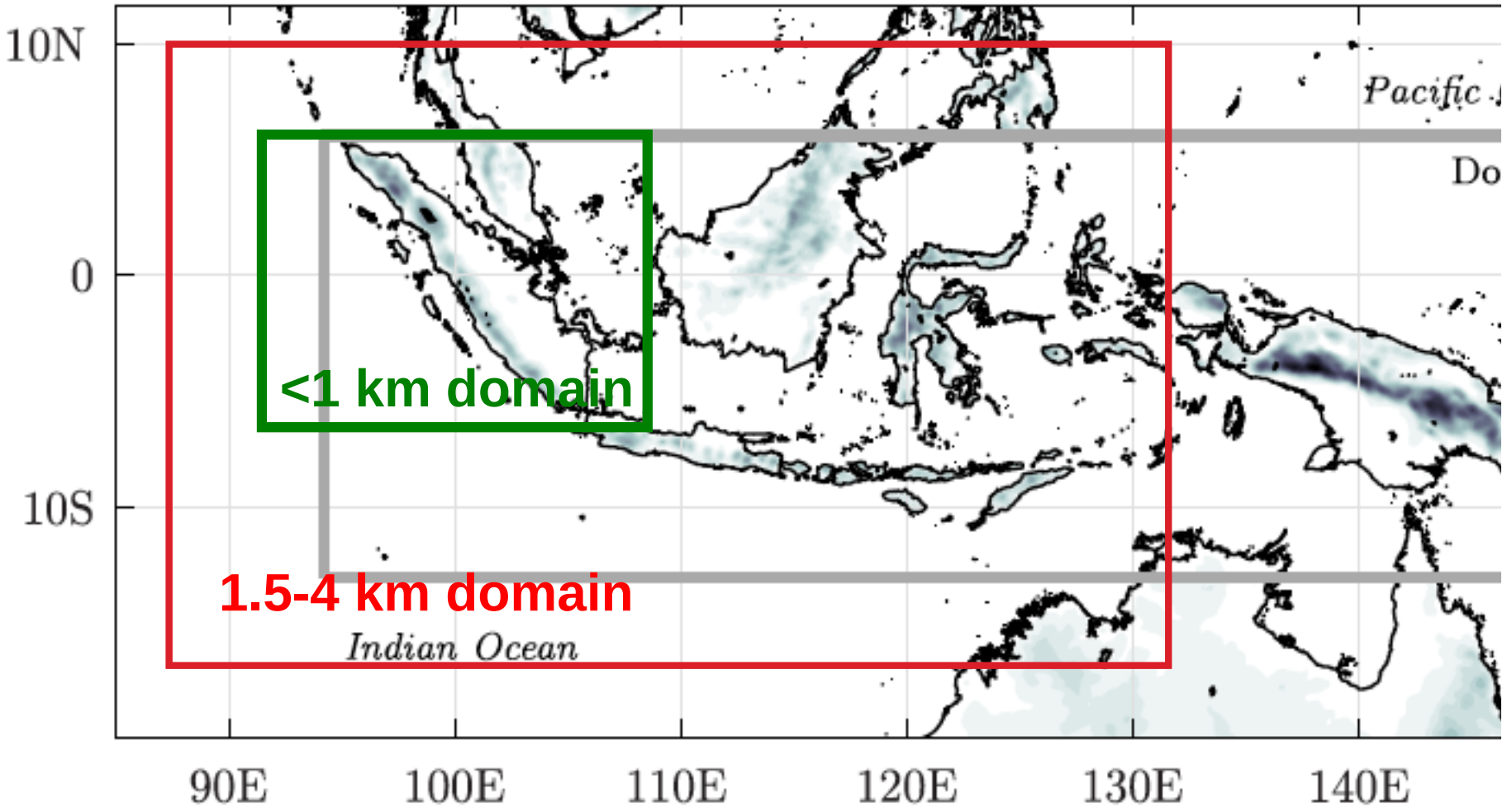
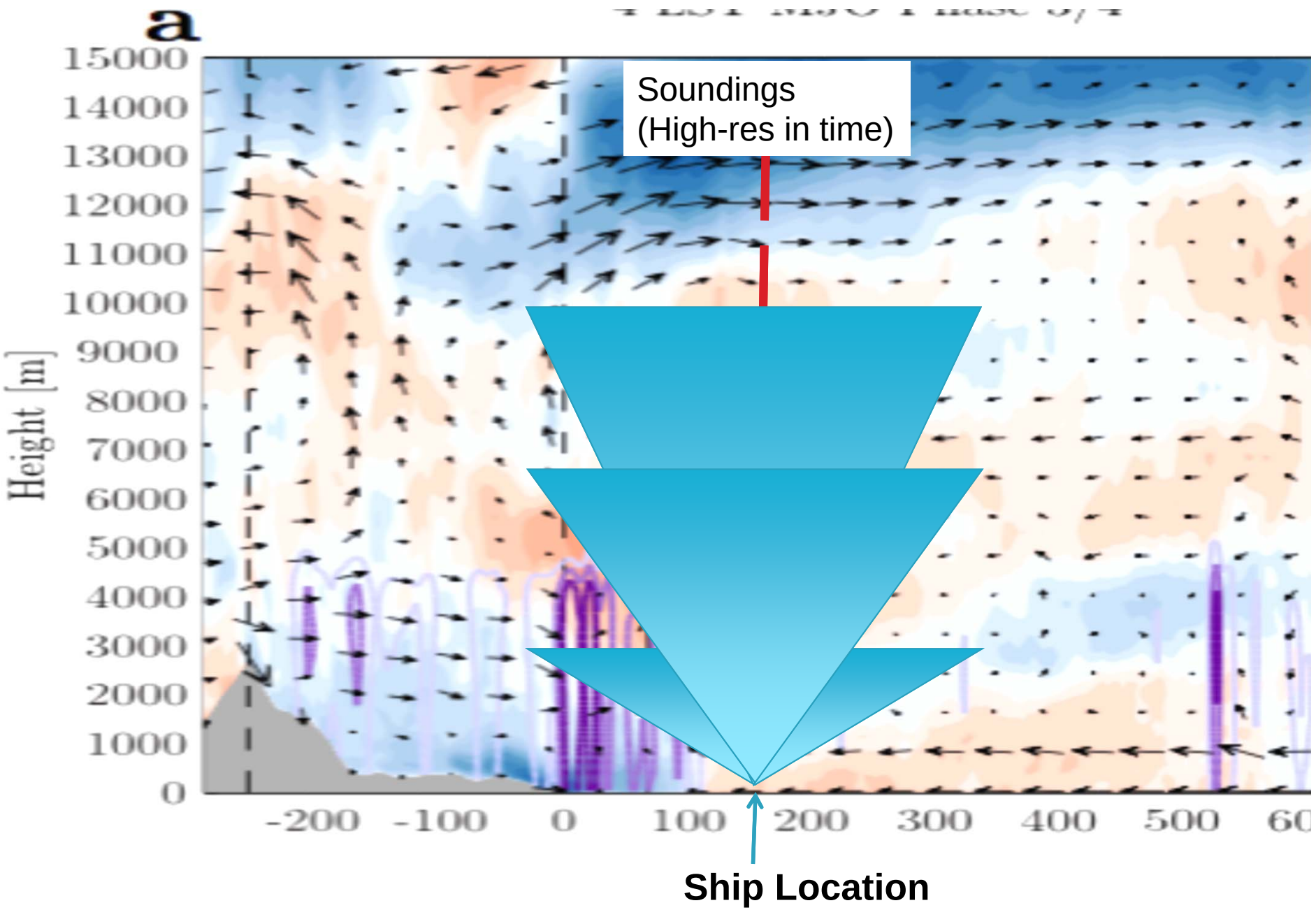


FIG. 1. Model domains. Domain 1 has 12 km horizontal grid spacing and domain 2 has 4 km horizontal grid spacing.

Cloud-resolving simulations (<1 km grid spacing) – specific events a few days

Following methods outlined in:
Vincent and Lane, (2016, MWR); Hassim et al. (2016, ACP).





Adapted From Vincent & Lane (2016)

Summary

•Planned Individual Activity:

- **Claire Vincent (University of Melbourne) – WRF Model**
- **Charmaine Franklin (Bureau of Meteorology) – UKMO Unified Model**
- **PhD student(s) WRF & UM case studies**

•Data for long (>60 day) runs will be 'published' on publicly accessible repository.

•Many opportunities for model intercomparisons. Would welcome collaborations!