

# A double-moment cloud microphysics in Met Office regional Numerical Weather Prediction

Paul Field, Ben Shipway, Adrian Hill, Kalli Furtado, Jonathan Wilkinson, Hamish Gordon, Annette Miltenberger, Robin Stevens, Dan Grosvenor, Kwinten Van Weverberg

## CASIM multi-moment microphysics scheme

**5**

hydrometeor species

Cloud droplets  
Rain  
**Cloud ice**  
Snow  
Graupel

**2**

prognostic moments

**Number**  
**Mass**

[Optional 3<sup>rd</sup> prognostic]

Can be coupled to aerosol to represent CCN and INP.

[UKCA, MURK, ARCL]

[RA3 config uses a prescribed in-cloud number concentration]

## Current operational (RAL2)

– RAL2T: pc2 cloud fraction and Wilson+Ballard. RAL2M: smith cloud fraction and Wilson+Ballard

↓ Change cloud fraction scheme

## Bimodal with Wilson+Ballard microphysics (WB)

↓ Change microphysics

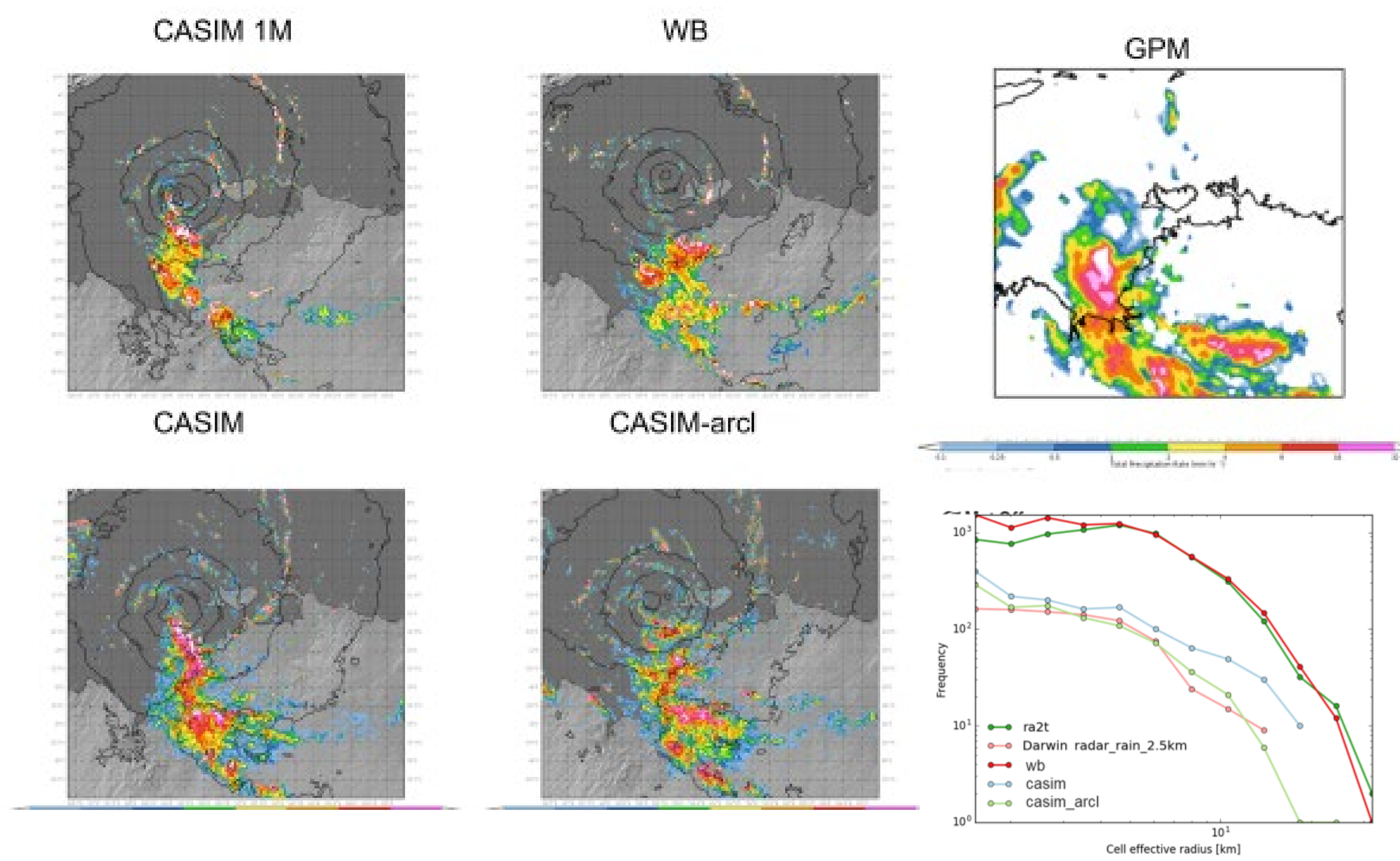
## Bimodal with casim (casim)

– set in-cloud droplet number to 150/cc but decayed upwards from 2km with e-folding of 2.5km

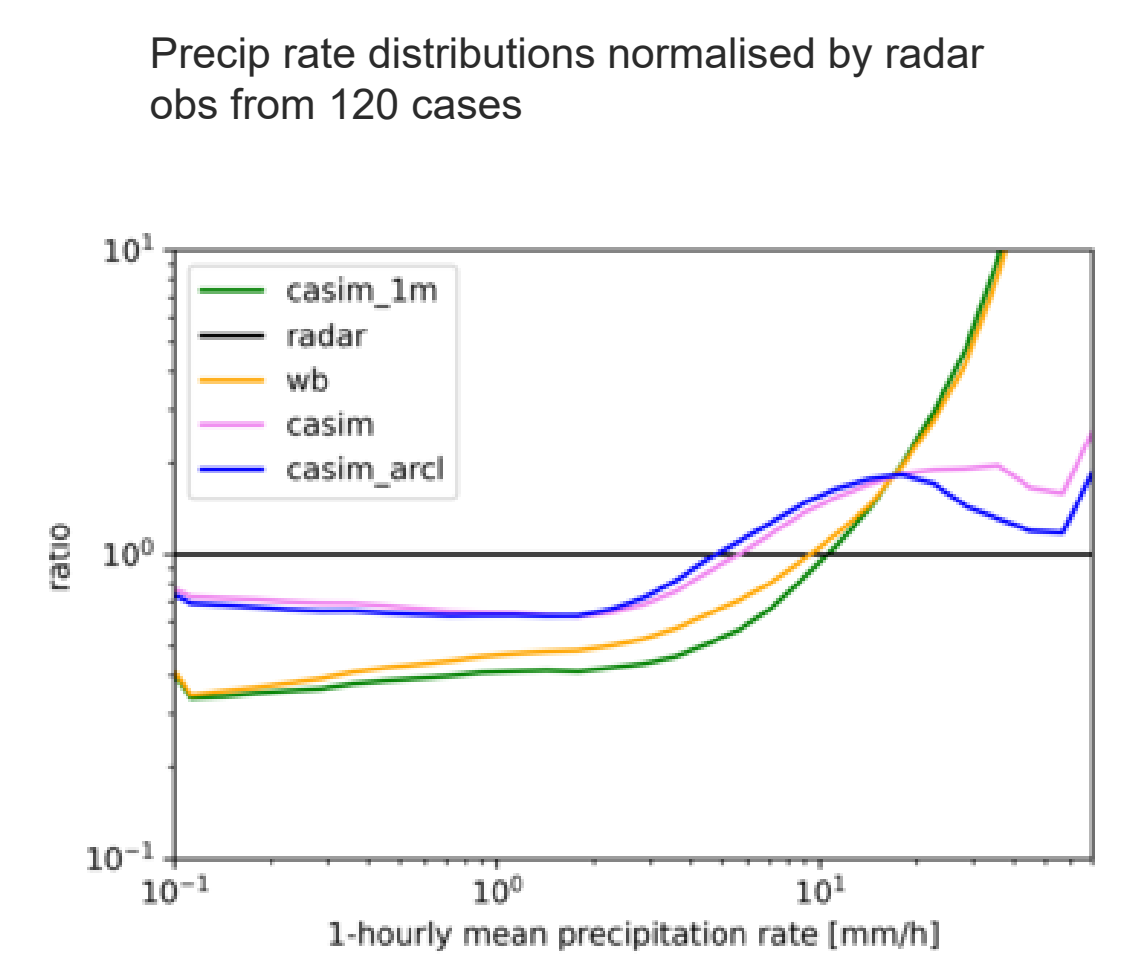
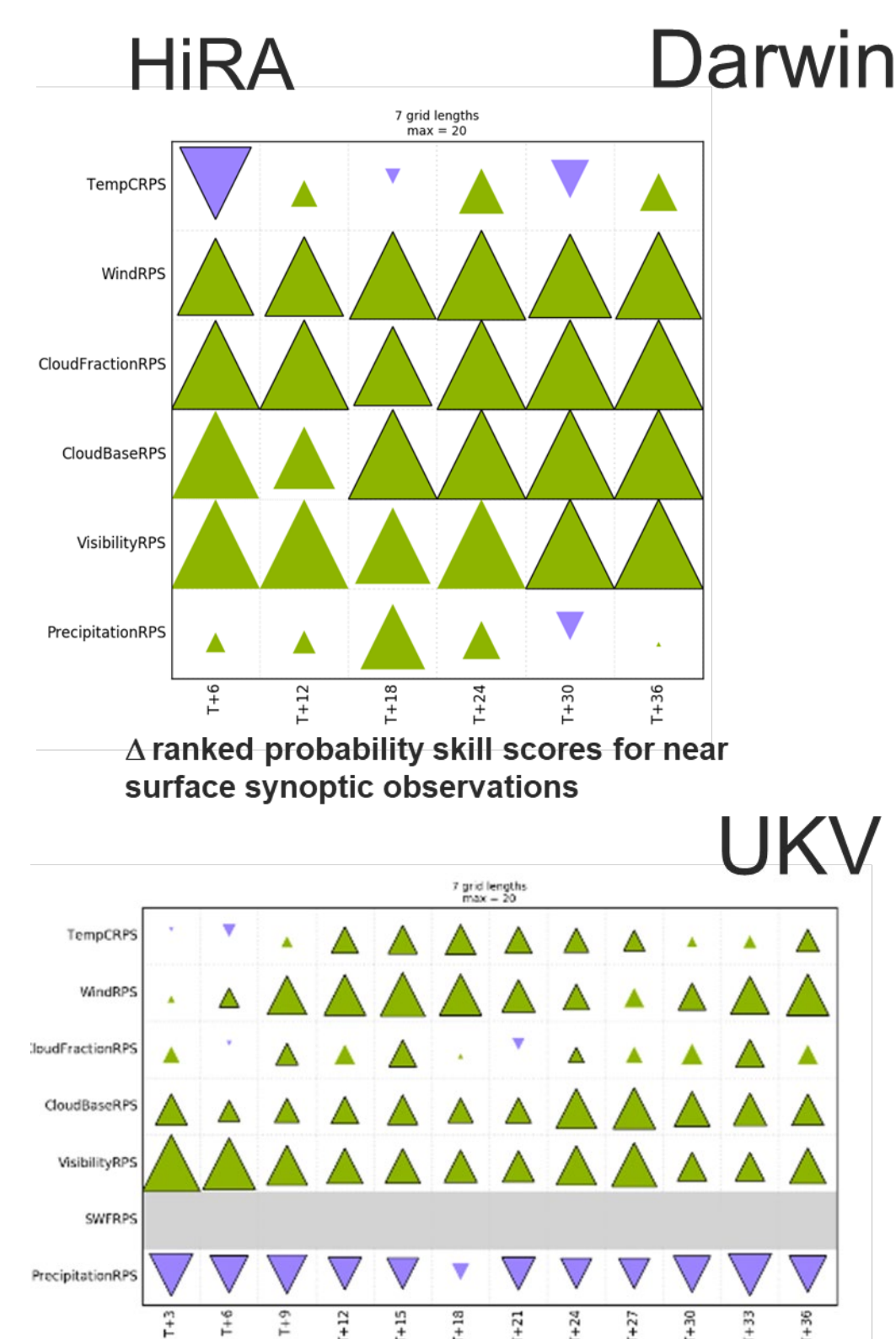
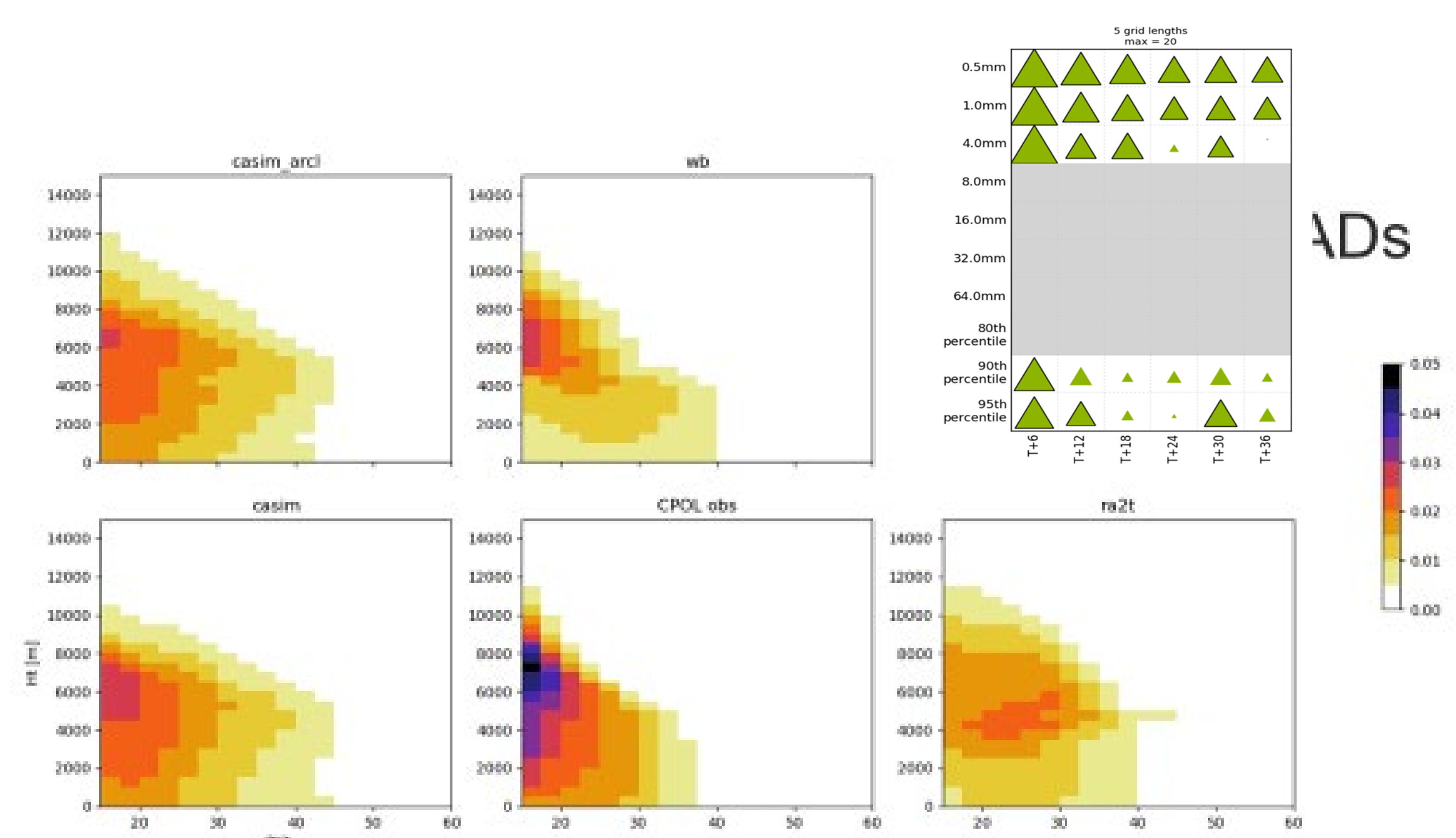
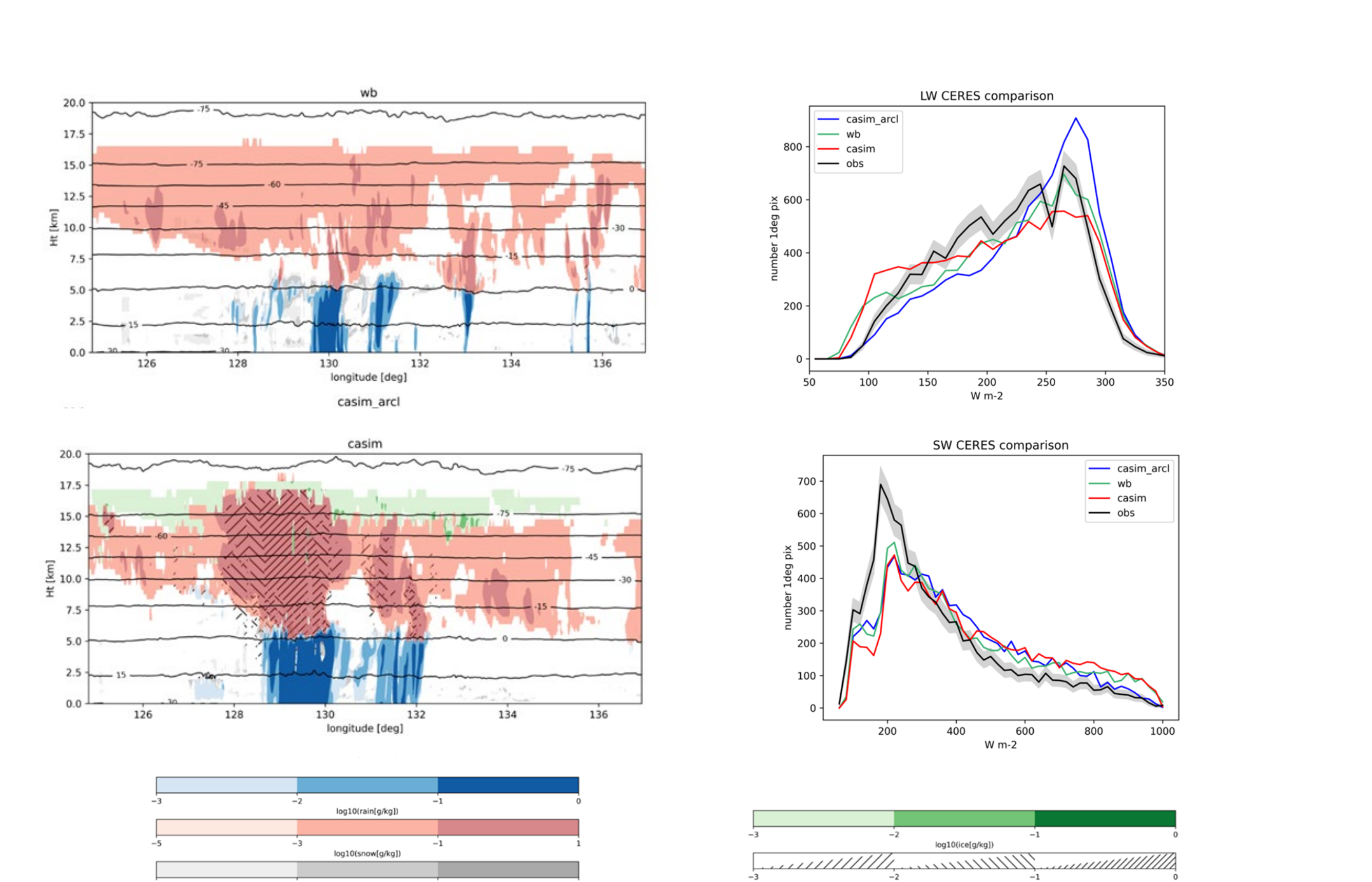
↓ Make activated number depend on aerosol

## Bimodal with casim and aerosol modulated activation (casim arcl/murk)

– ARCL/MURK mass-only climatological soluble aerosol converted to ccn number and activated by CASIM



- CASIM convective cell sizes are smaller



- CASIM has less intense precipitation and more lighter precipitation

- CASIM+bimodal cloud scheme unifies the configuration for midlatitude and tropics – no requirement for separate configurations
- CASIM is the new double moment microphysics accepted for use in the next operational regional configuration (RAL3).