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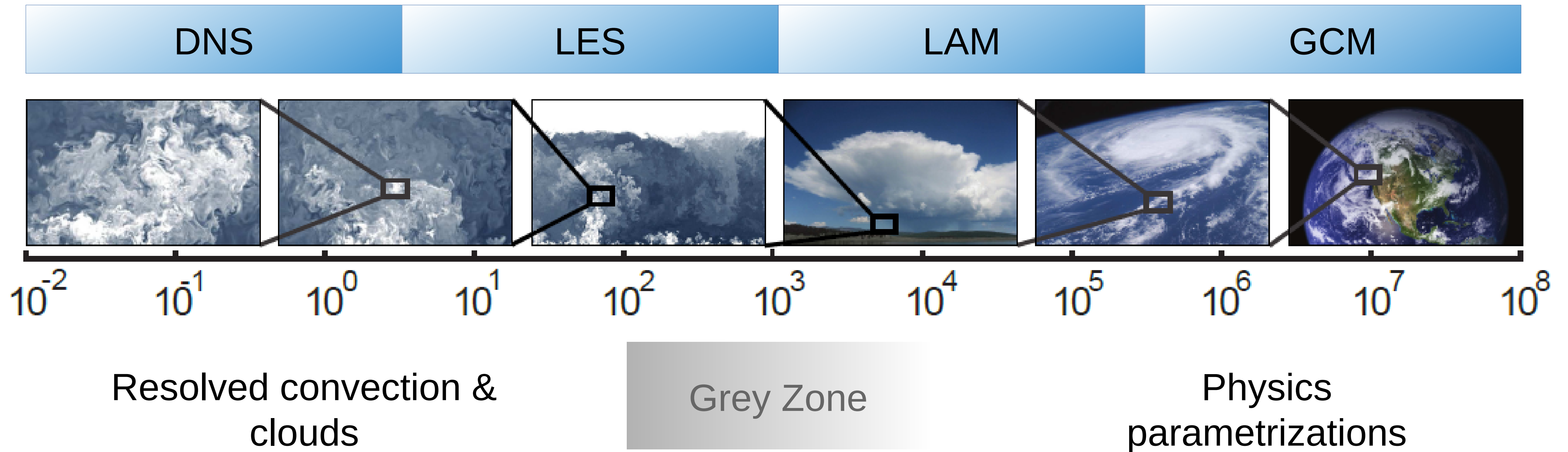
KNMI

# Regional Superparametrization of OpenIFS by 3D LES

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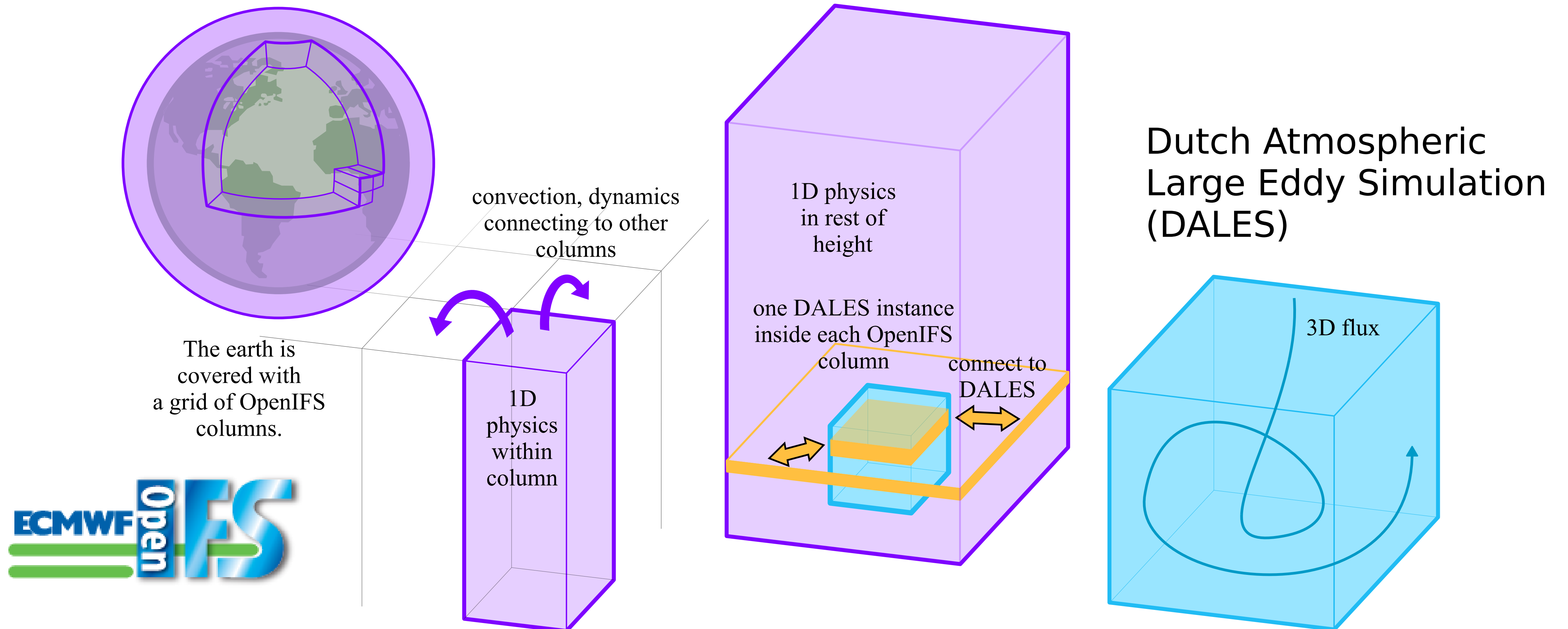


# Motivation



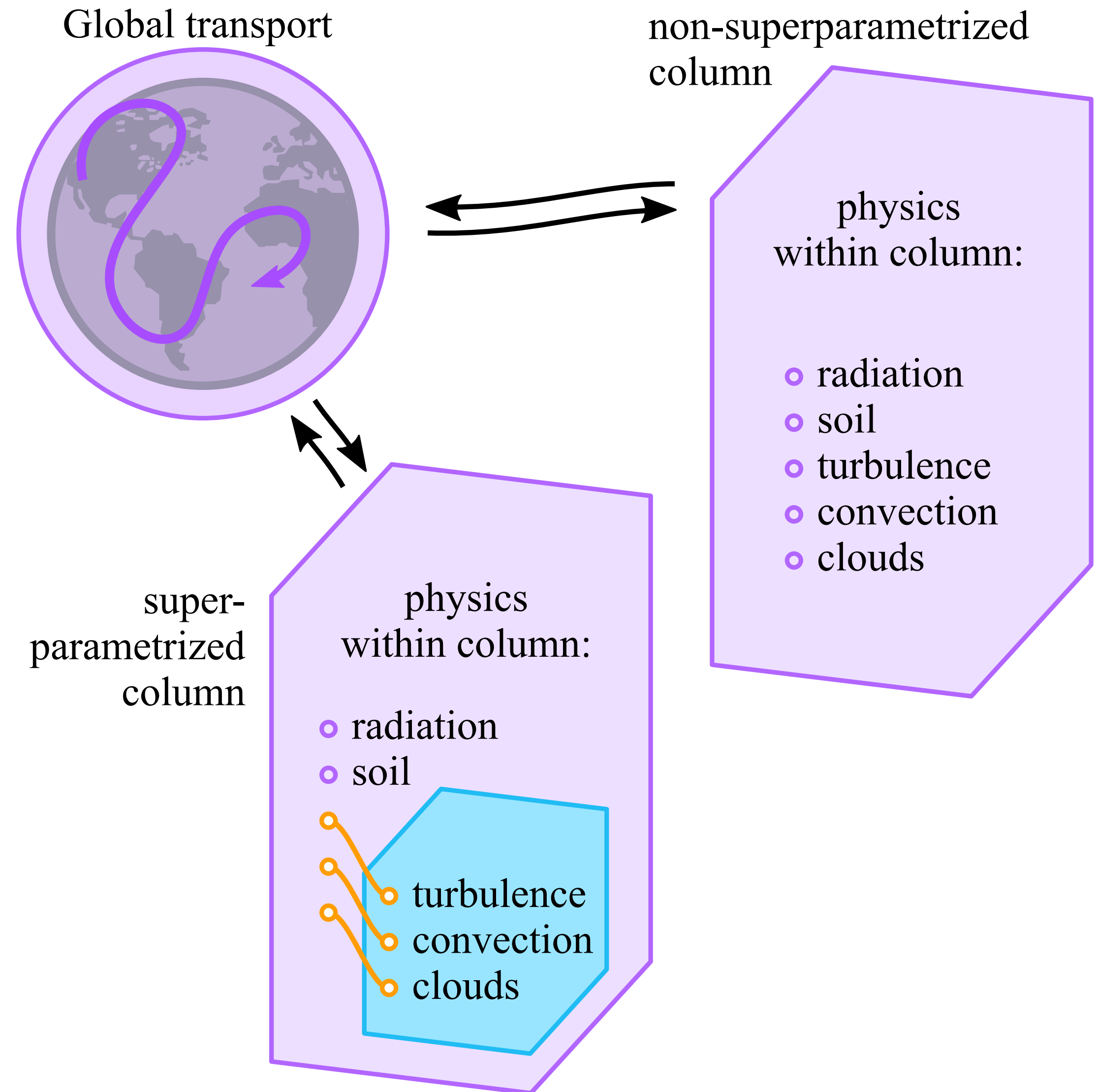


# Superparametrizing OpenIFS by DALES

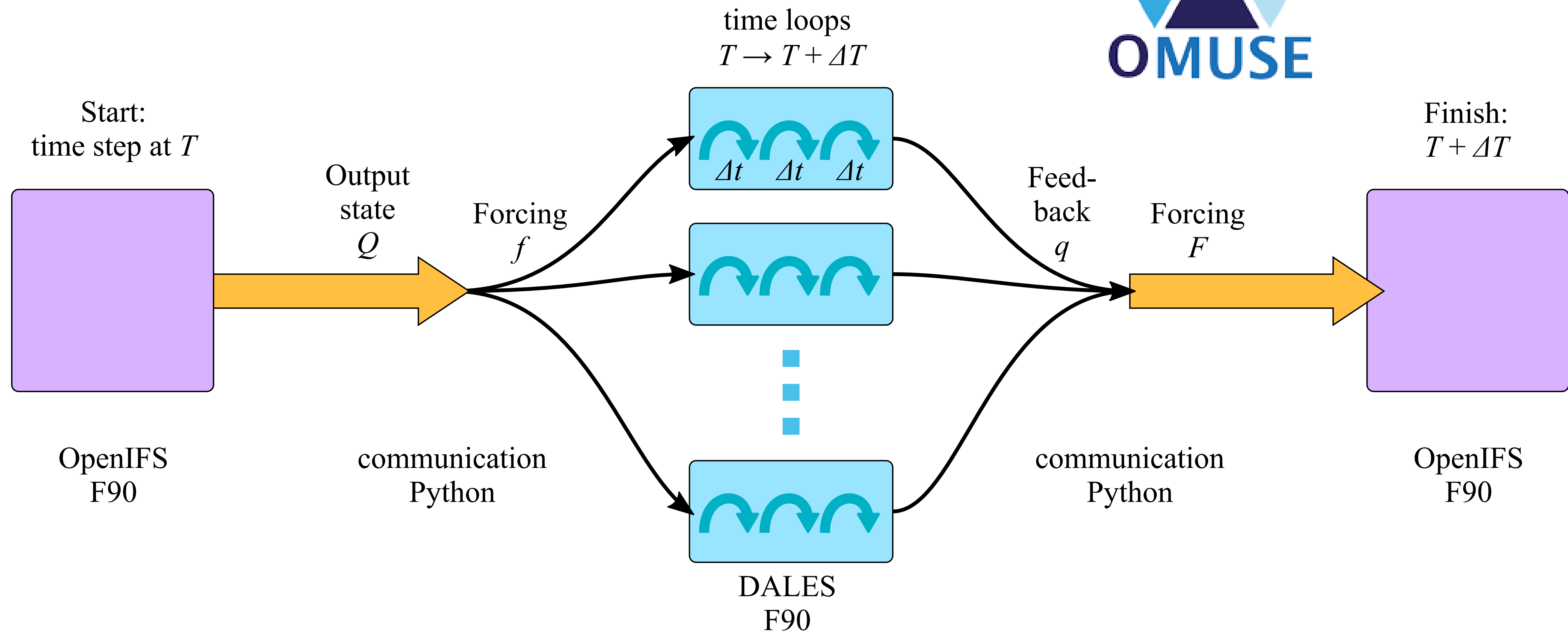


# Regional SP

- Beware not to double-count physics tendencies
- Extremely unbalanced cost between grid point physics
- Surface fluxes and roughness lengths transferred from GCM → LES

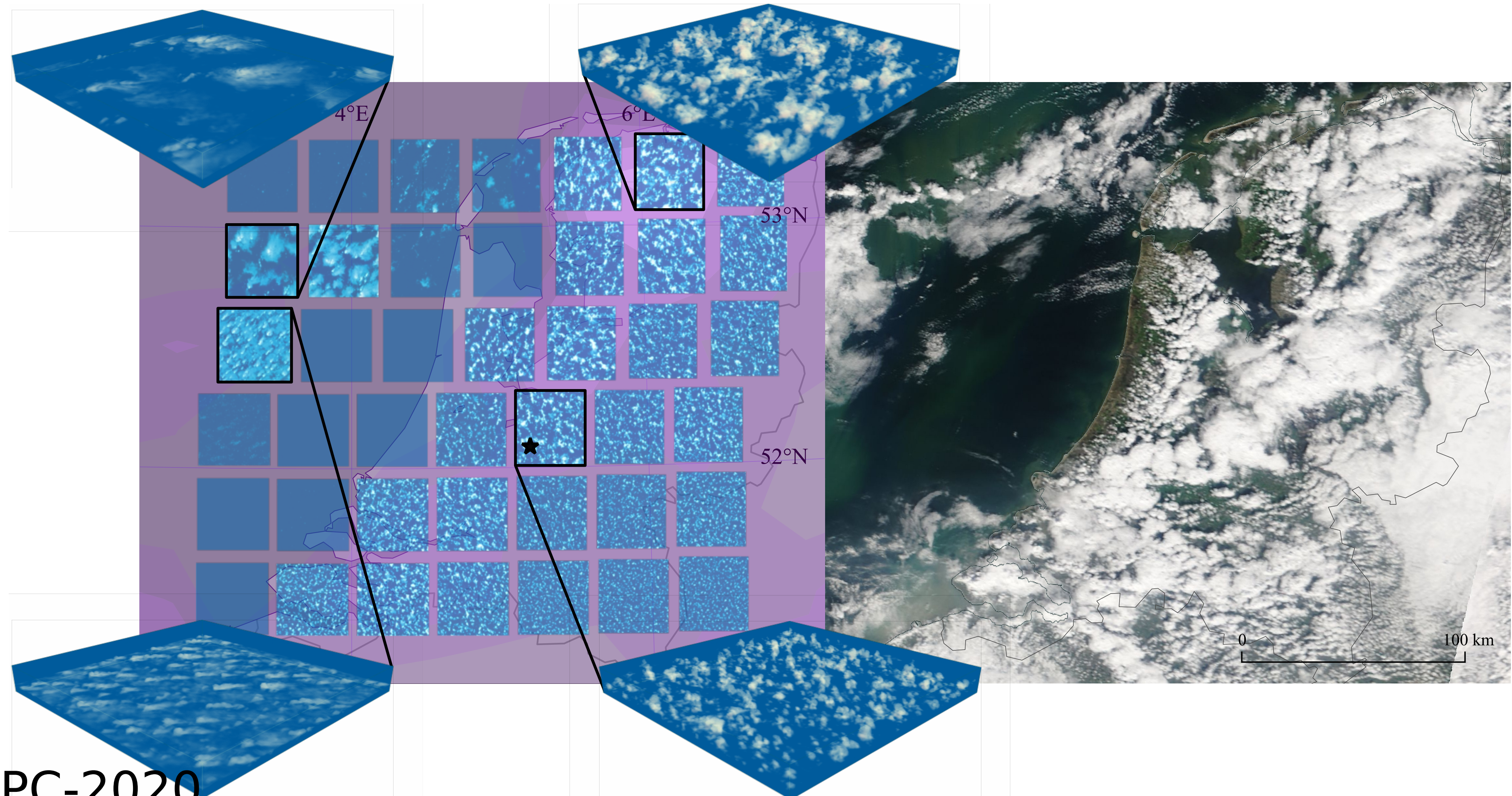


# Implementation in OMUSE



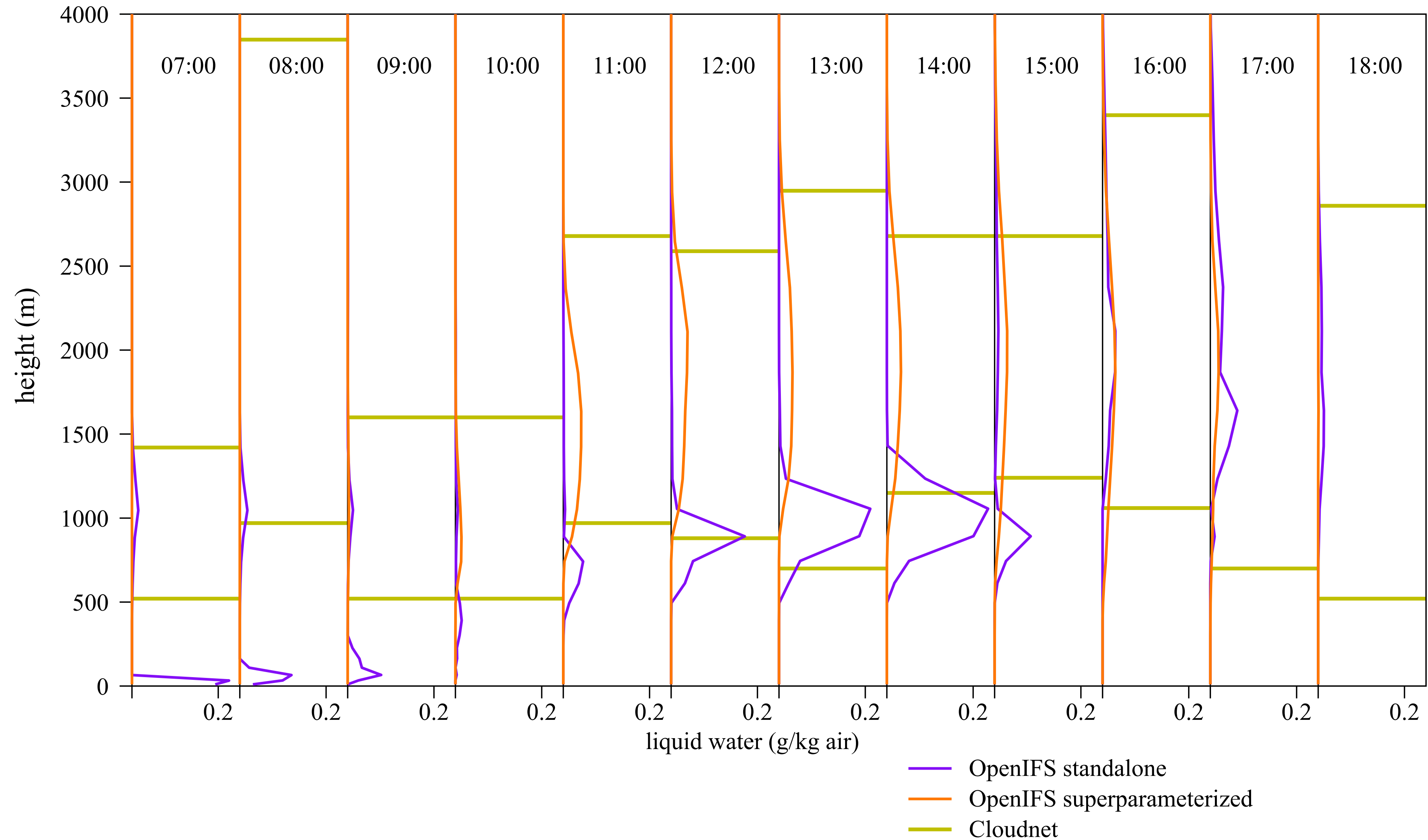


# Cabauw case





# Cabauw case

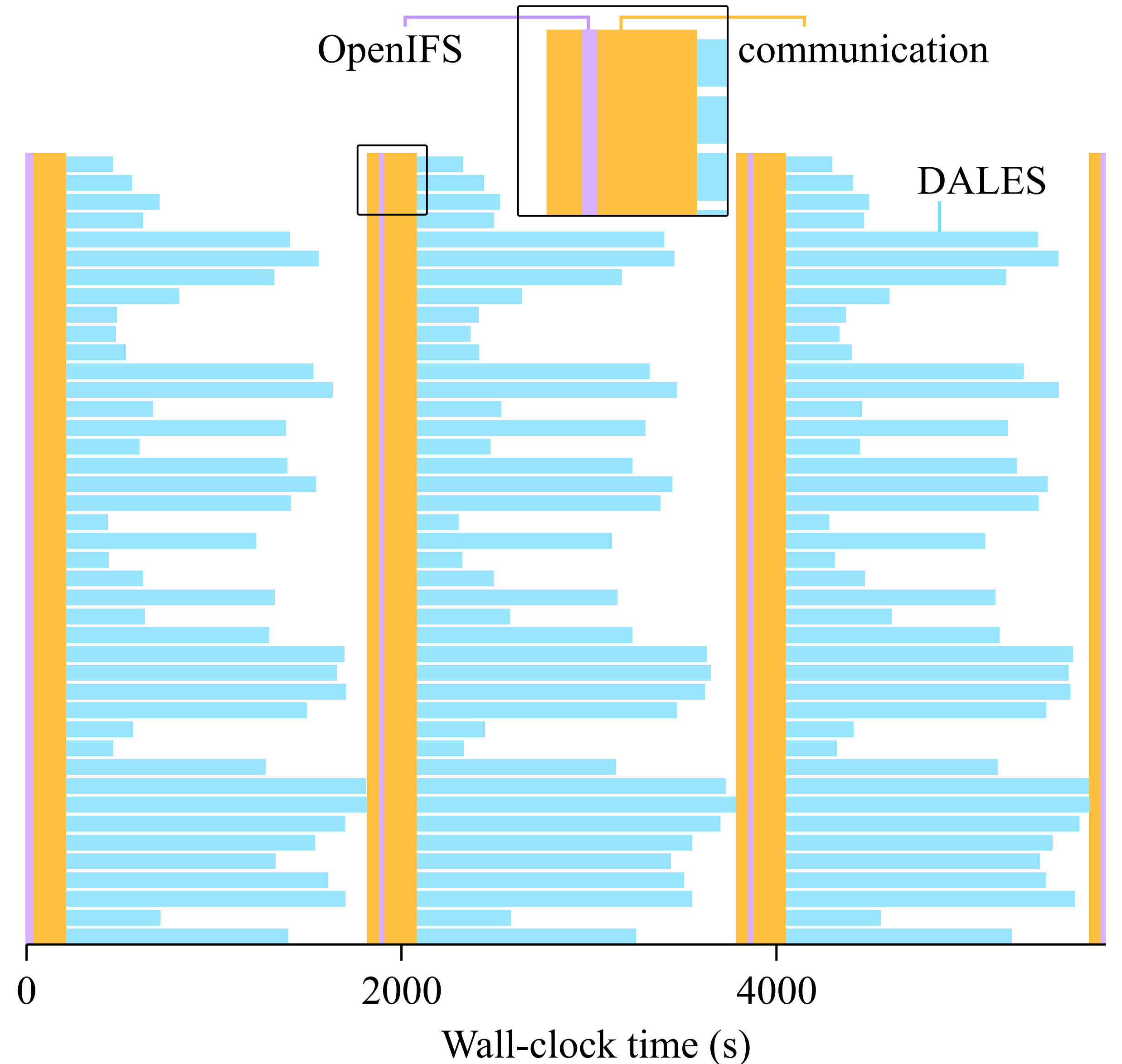


# Load Imbalance

Due to adaptive time step of DALES

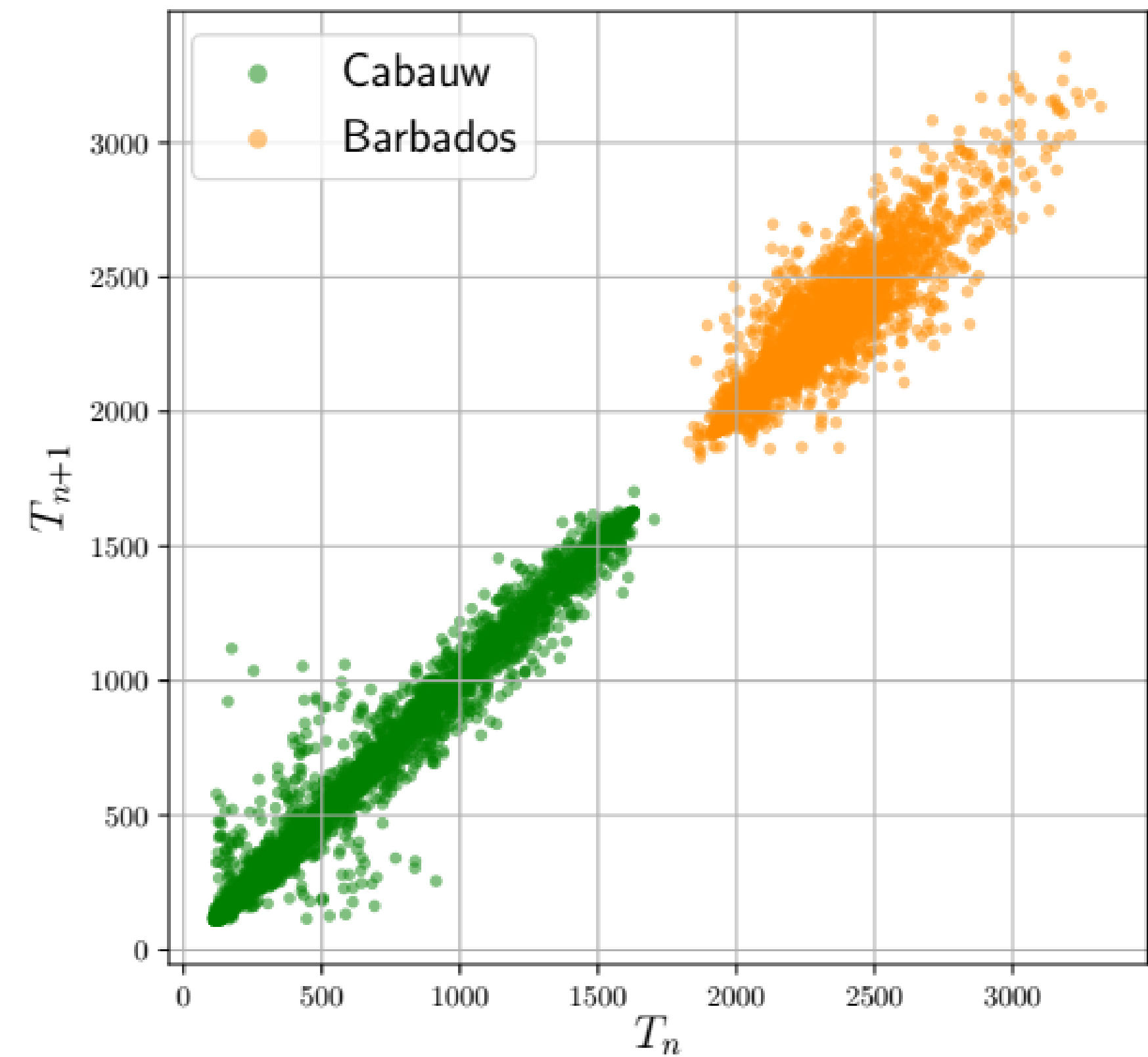
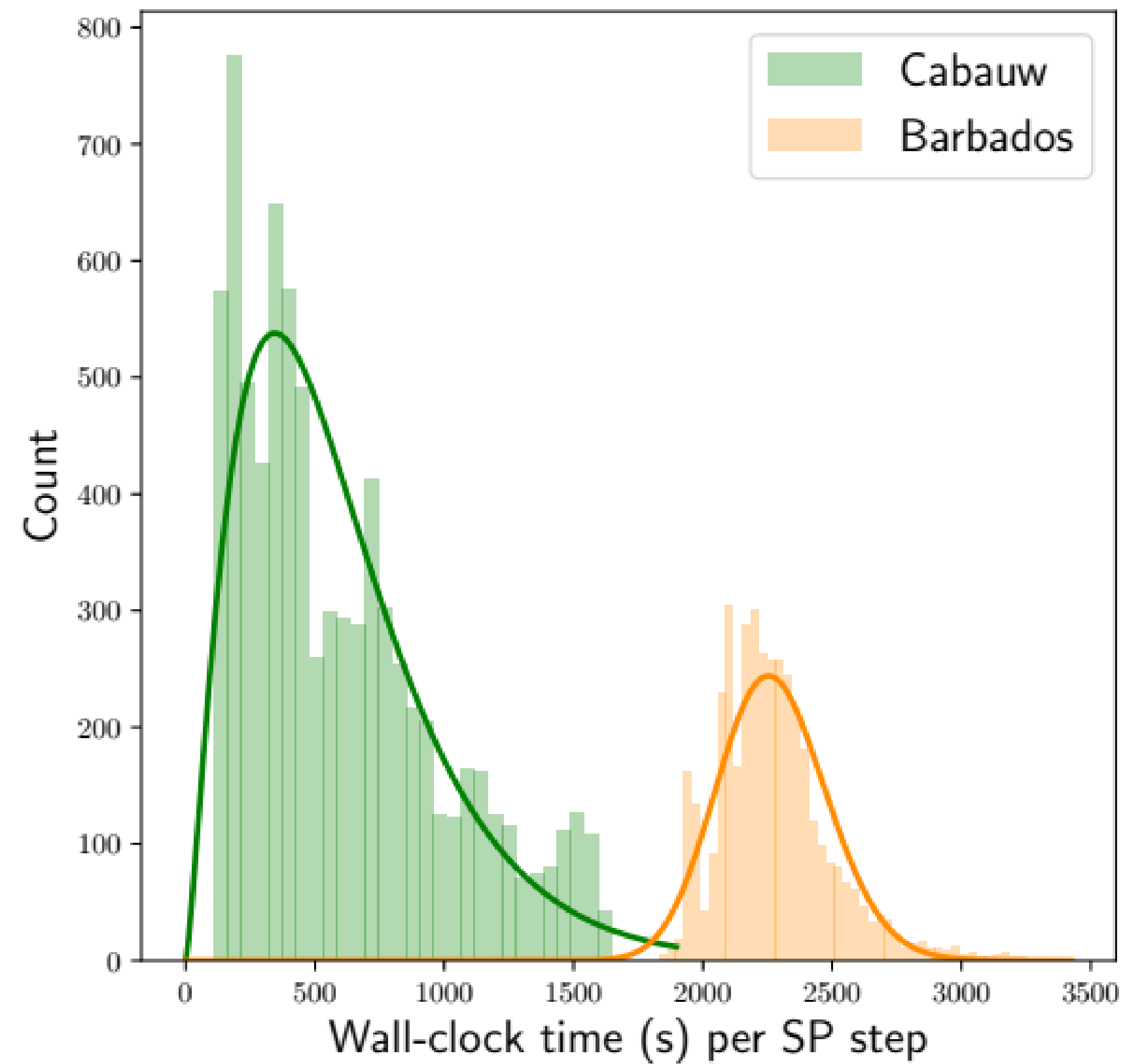
Technically challenging to address

Approach: a feasibility study!

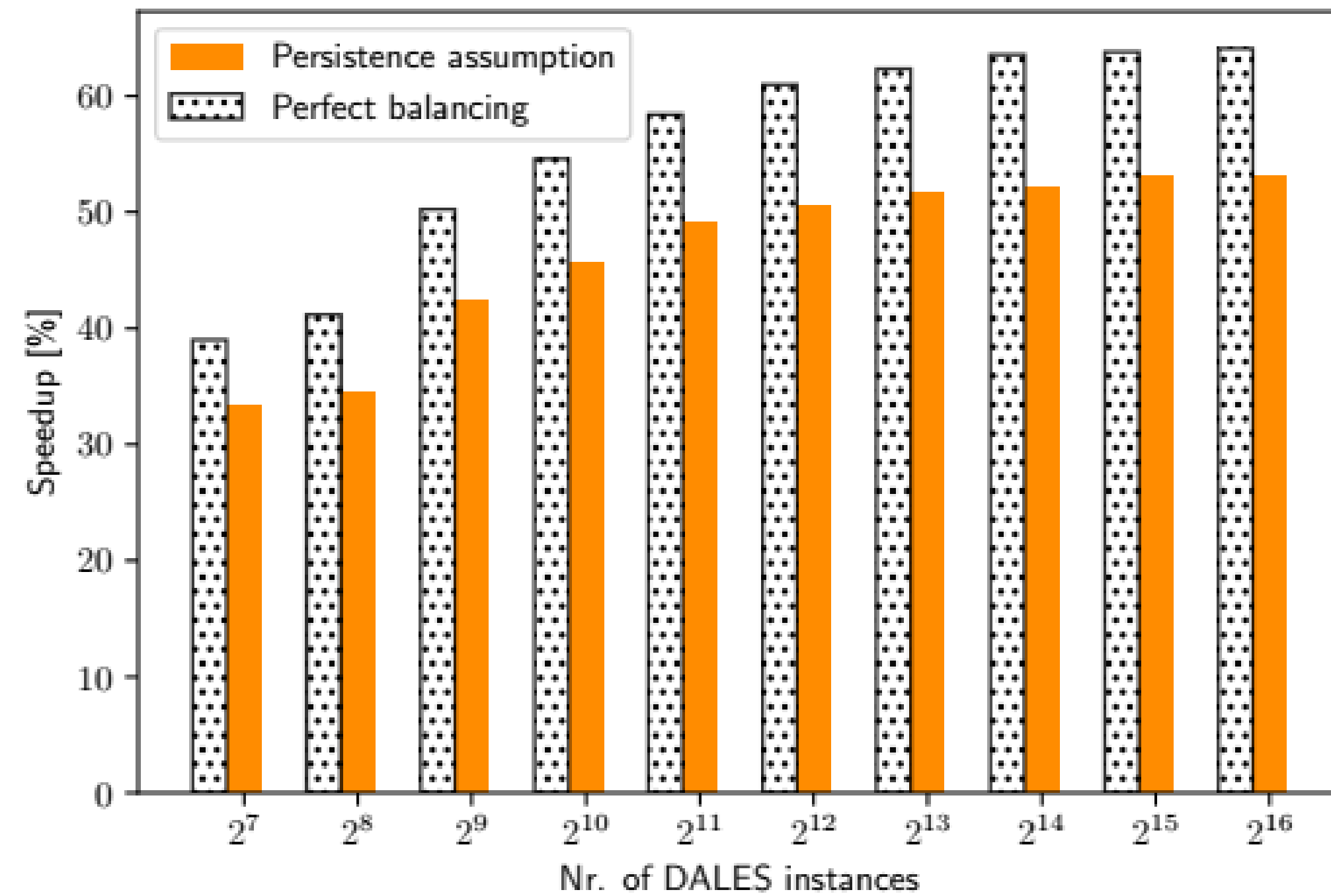
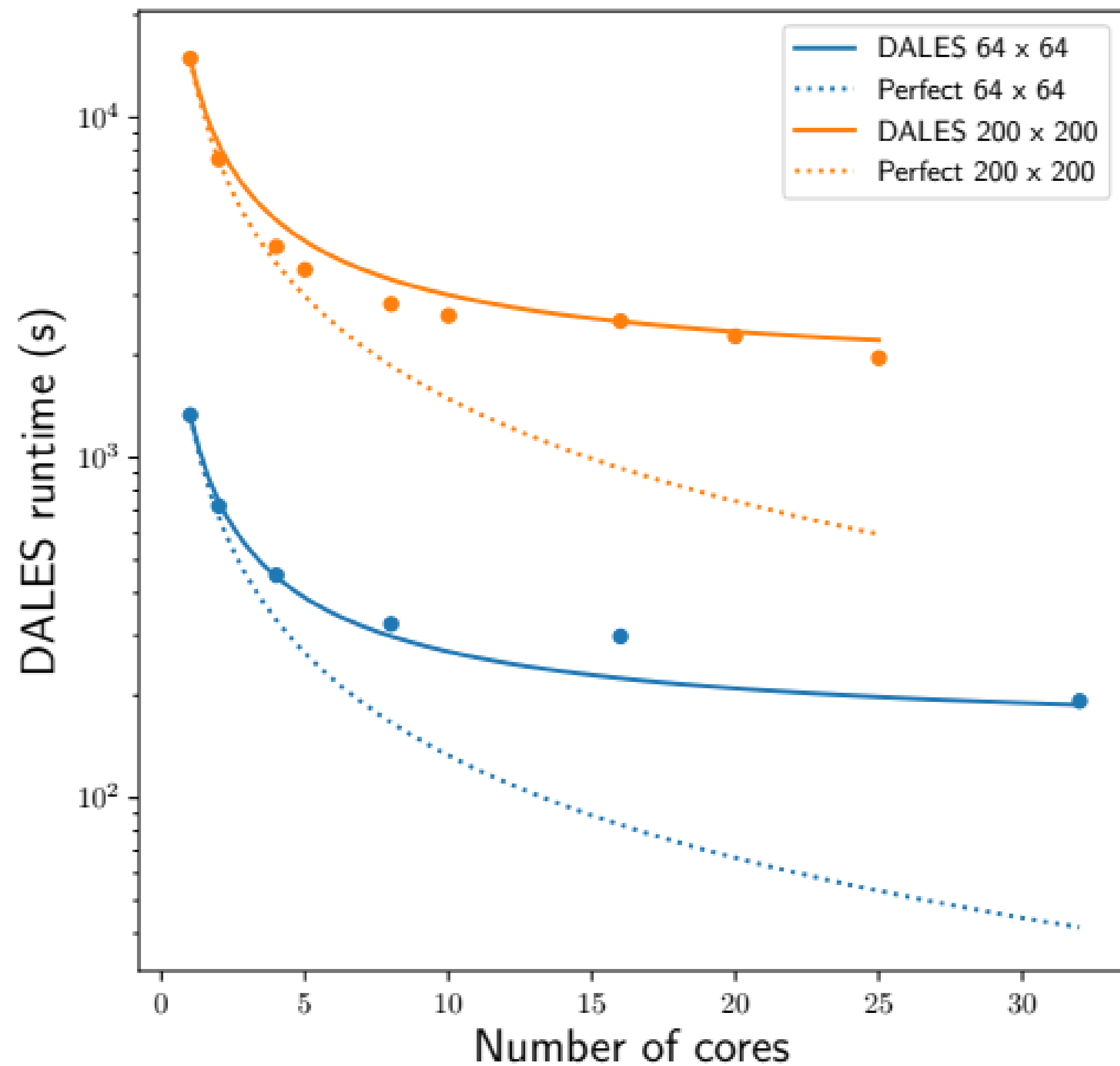




# Load imbalance: case-dependence



# Simulated greedy LB



Initial clock times from gamma fit  
(Cabauw)

Simulated SP times by Markov chain with  
Cauchy pdf



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# Conclusions

- It is very expensive
- Liquid water scheme mismatch → cloud cover bias
- Better representation of cloud top/bottom in some cases
- Load-balancing can increase performance significantly



# References

F. Jansson et al: Regional superparameterization in a global circulation model using large-eddy simulations, JAMES, 2019

## Code on GitHub

<https://github.com/CloudResolvingClimateModeling/sp-coupler>

## OMUSE

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