

# Tracking the global flows of atmospheric moisture and associated uncertainties

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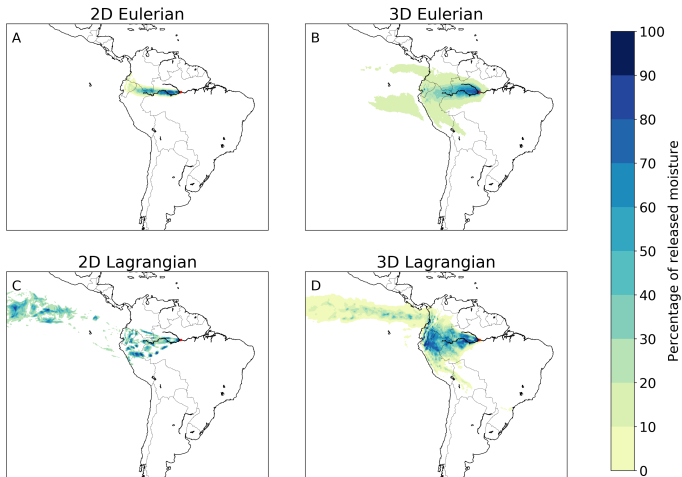


## Study

- ▶ Here we test moisture tracking assumptions regarding:
  1. Model structure
  2. Number of parcels released
  3. Release height into the atmosphere
  4. Internal interpolation
  5. Number of vertical data layers
  6. Horizontal resolution
  7. Internal timestep
  8. Vertical atmospheric mixing
- ▶ The following results are for evaporation released from Manaus, Brazil in July 2012, with ERA5 forcing.



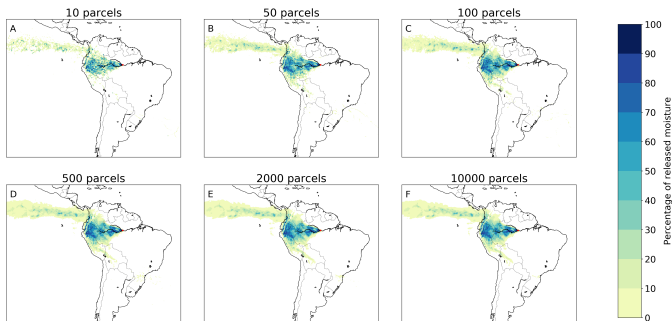
# Model Structure



Significant differences between Lagrangian and Eulerian models.  
3D versions much better than 2D.



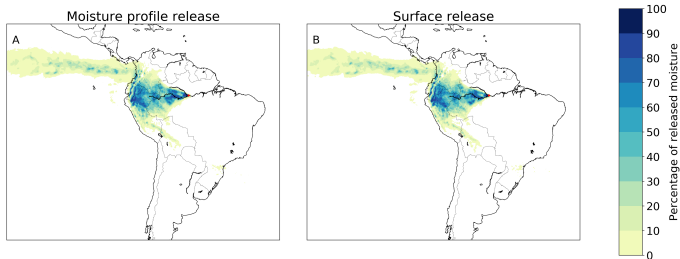
# Number of Parcels



More than 50 Lagrangian parcels per mm does not add a lot of value.



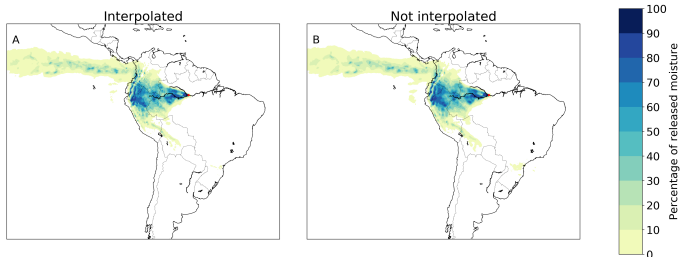
# Release height



Release height is not very influential.



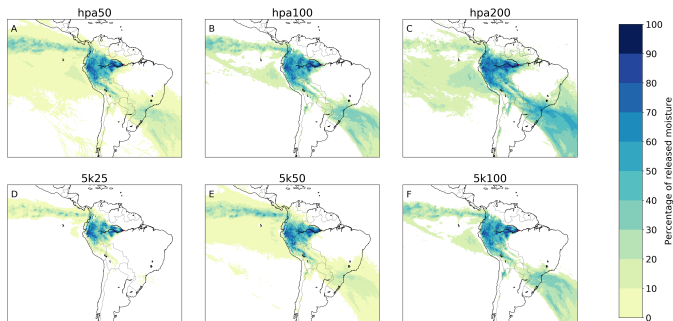
# Interpolation



Minimal difference between interpolated and non-interpolated simulations.



# Vertical resolution of forcing data

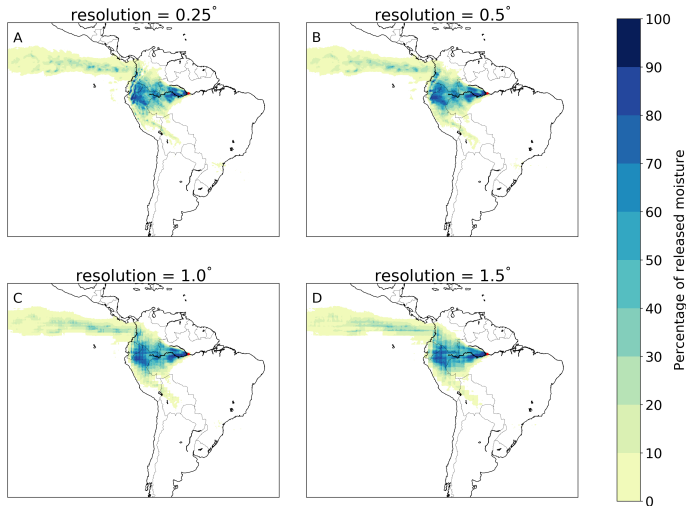


Simulations degrade strongly with degrading vertical resolution.





# Horizontal resolution of forcing data

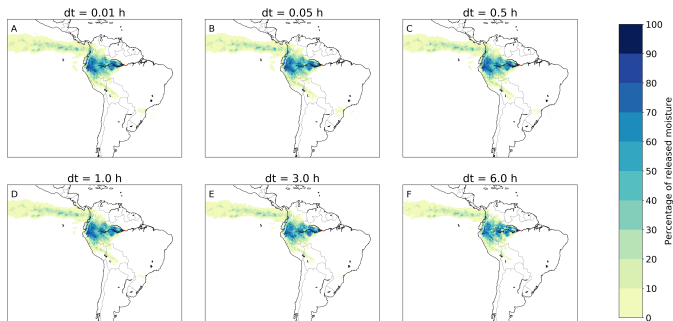


Less so for horizontal resolution degradation.



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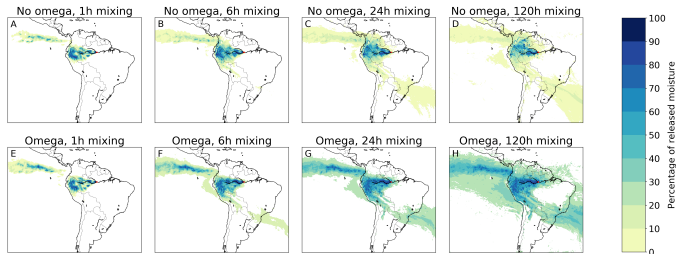
# Internal time step



Internal model timestep is not very influential.



# Vertical mixing during the simulation



Vertical mixing assumptions have strong influence on moisture recycling.



## Conclusion

- ▶ Atmospheric moisture recycling estimates may differ significantly, depending on model assumptions
- ▶ The vertical mixing assumptions are the most influential model assumptions
- ▶ The vertical resolution is the most influential on the forcing data side

For more information, please contact Obbe Tuinenburg  
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See Tuinenburg and Staal, 2020 (HESS) for more elaborate results.



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