Tuesday PM discussion

CMIP: Pros and Cons

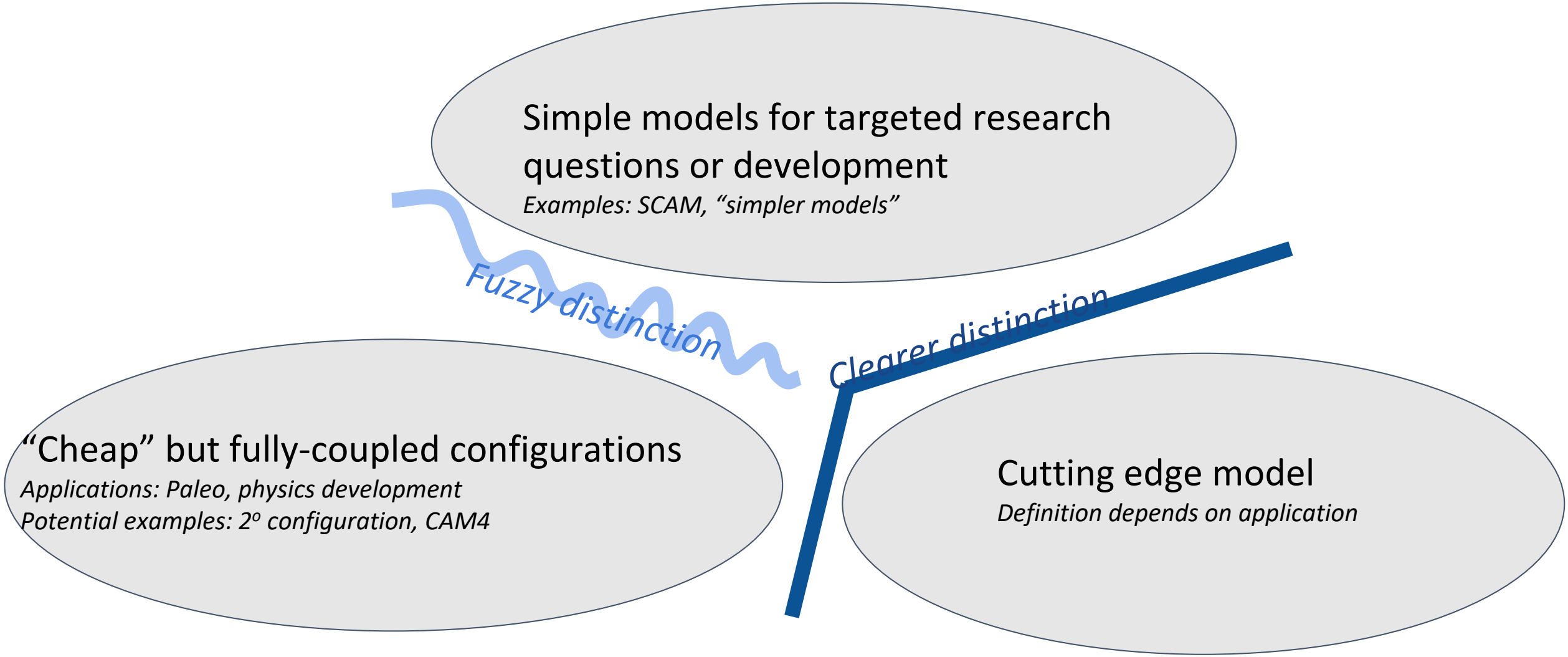
- (+) Community participation
- (+) Identification of common model problems
- (+) Social pressure to look good (–> model improvements?)

- (-) Diversion of resources, people and computational
- (-) Social pressure to look good (-> expedient fixes vs understanding)
- (-) Too many “MIPs”?

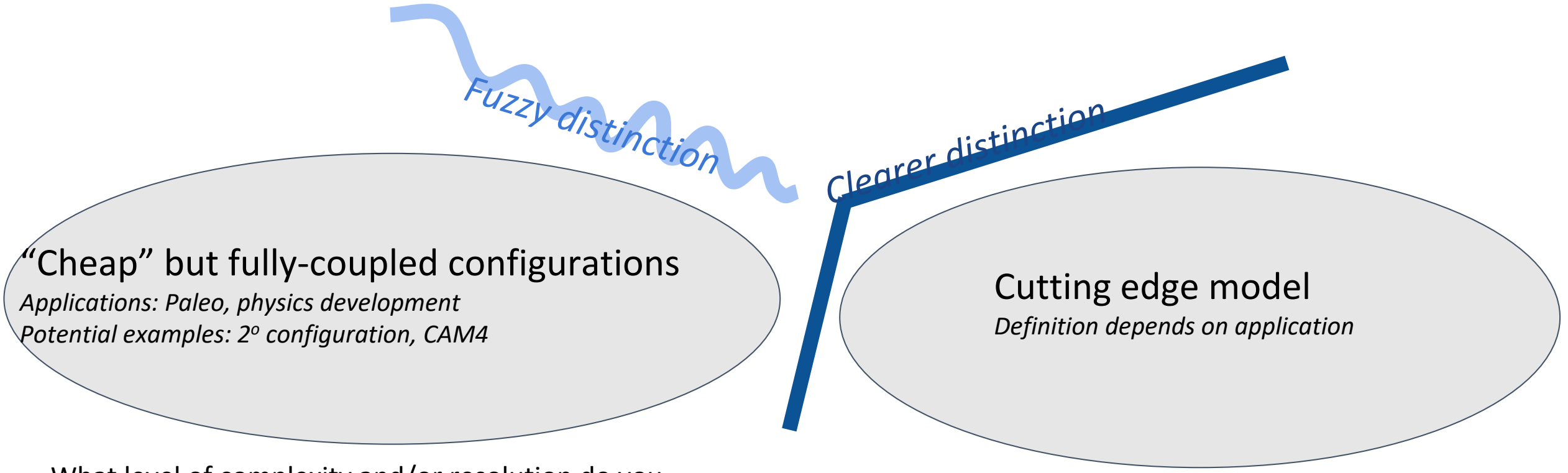
CAM/WACCM unification

- Three separate issues: Chemistry, Model top, Resolution
- Chemistry is unavoidable unless CESM wants to outsource specification of radiative constituents and oxidants
- Vertical resolution is obviously important at least in the PBL, the UTLS and the middle atmosphere in general. May or may not be essential for the free troposphere
- Proper representation of the stratosphere requires a high top; where the top is placed requires careful consideration of technical and scientific issues
- Chemistry is expensive. Adding levels in the vertical also increases expense (but only linearly)

CAM/WACCM unification



CAM/WACCM unification



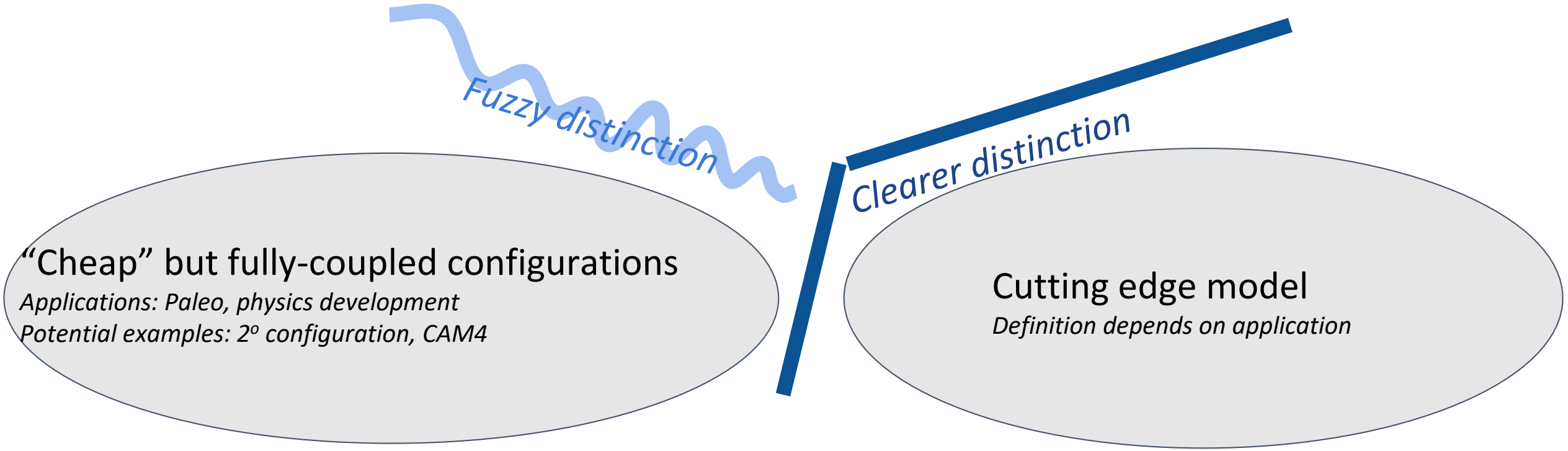
What level of complexity and/or resolution do you need for parameterization development

Do you need full chemistry and aerosols for sub-seasonal to seasonal forecasts … Or to study dynamical variability ??

What aspects of middle atmosphere do you need for "state-of-the-art" climate projection?

What do we need to study the M.A. itself properly?

Resolution??



0.25º **horizontal** resolution or higher for impacts studies? Stick to 1.0º for climate projection? Typical cost increase is a factor of 8 when halving the horizontal resolution (factor 4 from halving the grid spacing, factor of 2 from the decrease of the time step to meet CFL stability criterion).

high **vertical** resolution (~500 m) is essential to study the stratosphere (QBO, UTLS, …), both dynamics and chemistry, cost increase is linear with number of levels