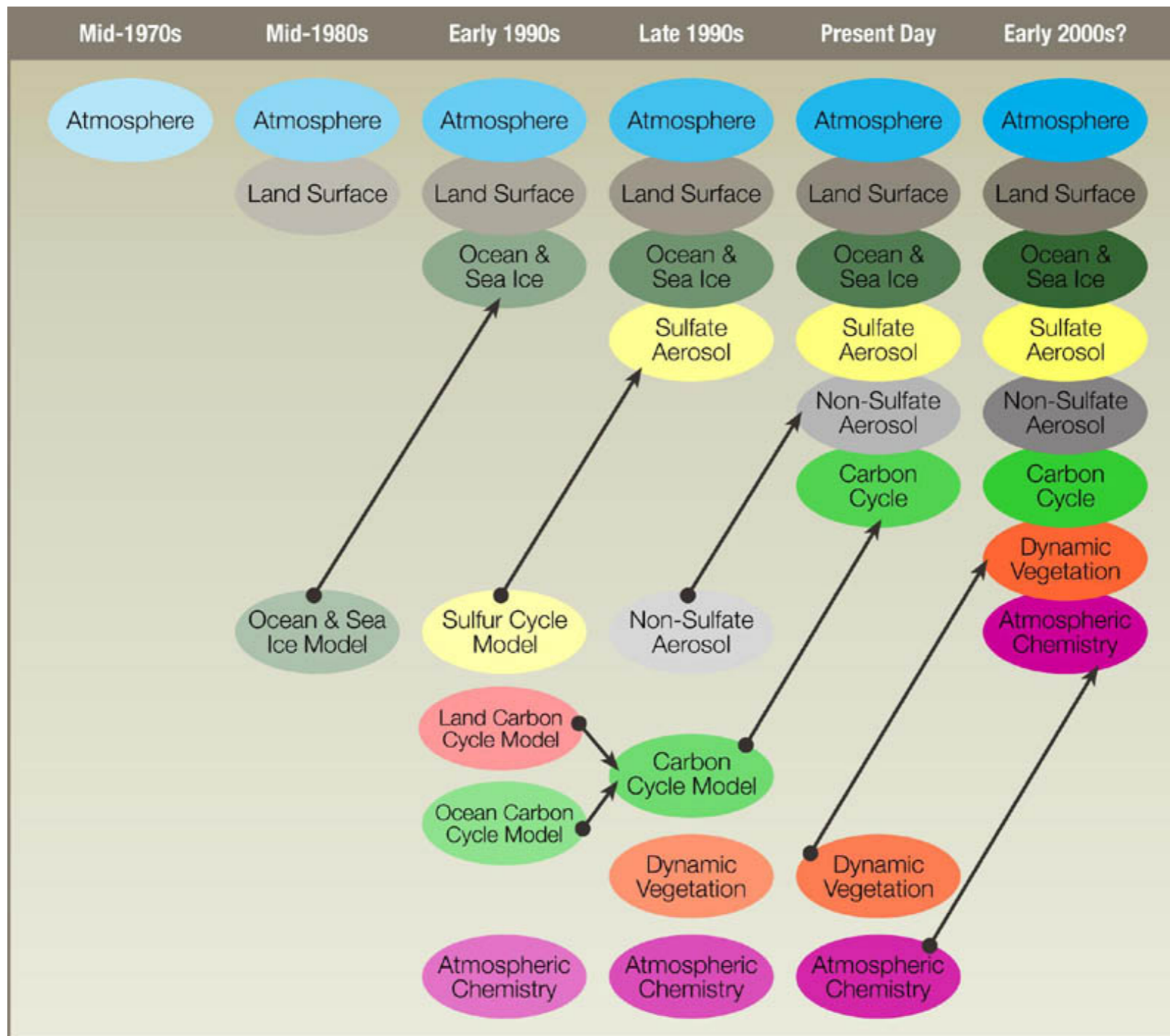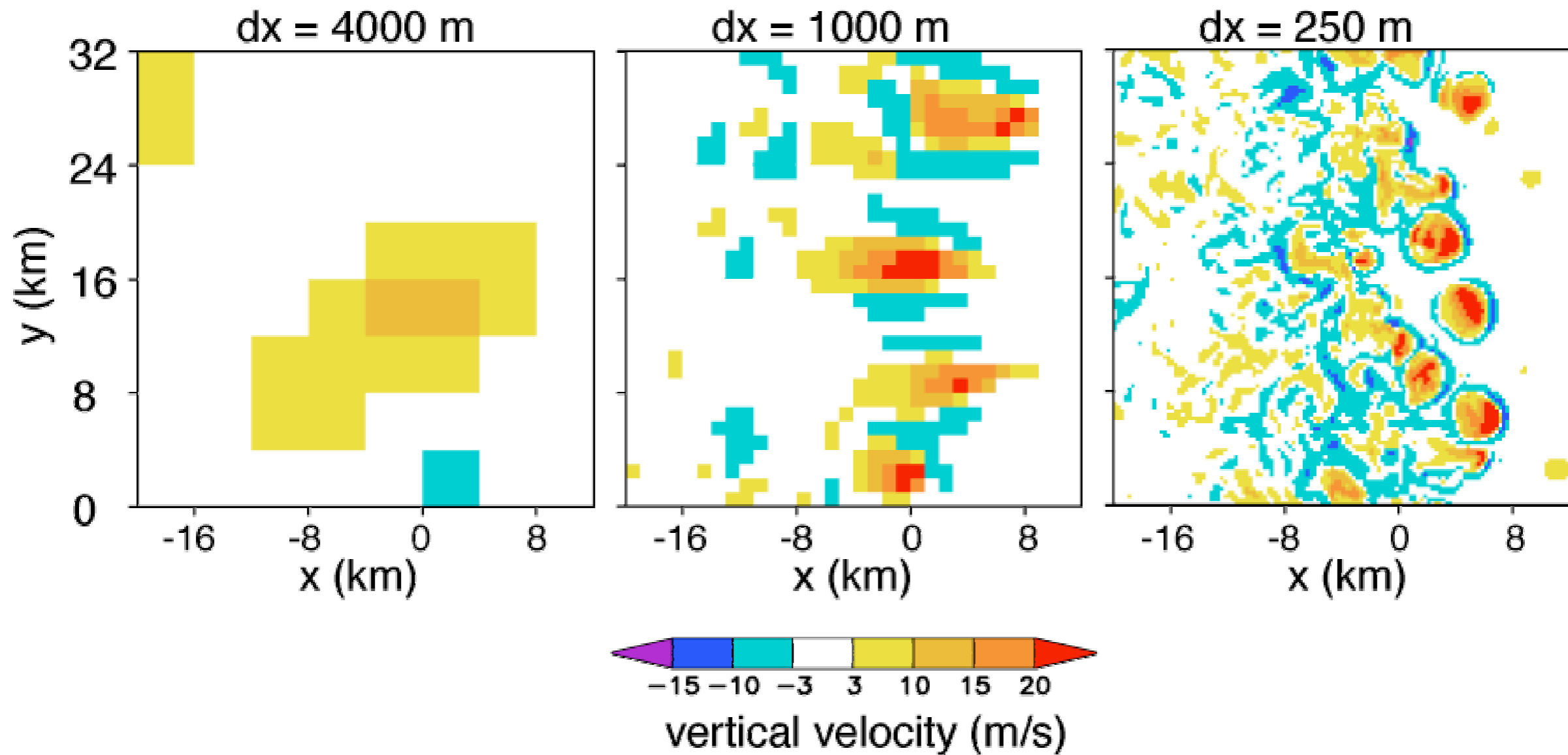# What will our computing needs at ESRL be in the coming decade(s)?

All roads lead to cloud-resolving/eddy-resolving coupled GCMs...

Solutions for atmospheric convection do not statistically converge
until h < O(1000 m)

WRF

- High resolution global models
  - Below 5 km, scales and physics change
- Global non-hydrostatic numerical weather model
  - 2 km resolution requires ~200 TF sustained
  - 1 km requires 1.6 PF sustained
- Major research problem just getting started

Resolution (km)	TFLOPS sustained to achieve 60 days/day	TFLOPS sustained to achieve 5 years/day	Global WRF Data volume TB/sim year
1	1609	48260	1892
2	212	6350	466
3	66	1975	206
4	29	875	116
5	15	467.5	74
8	4.3	129	29
10	2.4	71	18.5

Src: Petascale Collaboratory for the Geosciences, 2005

and it's not just a single run of the model...
- *ensembles*
- *data assimilation*