Categories	Requirement	Prioirty: Weather	Priority: Climate	Priority: Geospace	Notes		
Basic	Numerical Stability	1	1	1	Weather: seconds and km, Climate: up to 10-30 minutes and 100-200 km resolution		
	Convergent results across scales	2	2	2	Same as above: 1 is a science goal		
	Physical constant consistency	1	1	1			
	Dry Mixing Ratios for Mass	2	2	2	Relates to consistency: specify wet/dry ratios		
	Conservation of Mass (inc Water)	1	1	1		1=Required (Stuck if don't have it)	
	Conservation of Energy	2	1	1			
	Conservation of Momentum	3	2	2		2=Highly desired	
	Able to handle cloud scale updraft velocities/heating	1	2	1	Several M/s, or large joule heating for geospace.	3=Desirable	
	Efficient & Conservative Tracer Transport	1	1	1			
	Scientifically Consistent between parameterizations	2	2	2	Aerosols/Deposition and Clouds: Turbulence, Microphysics, Convection: Radiation code		
	Compatible with current models	2	2	2	runs in CESM/WRF		
	Agnostic to dy-core or vertical coordinate	1	1	2			
(Infrastructure)	Simplified Workflows	1	1	1	hierarchy of models to develop, evaluate and test. (1-D to 3-D, isolated cases/parameterizations): unit testing		
(Infrastructure)	Supports community development	1	1	1	API allows adding a new scheme for testing		
	Computationally Efficient (timing)				For problem at hand (simple to complex)		
(infrastructure)	Sub-columns	3	3	3			
	Modern Coding Practices	2	2	2	Portable, Scalable		
(infrastructure)	Possible to communicate across columns (stencil)	3	3	3	Future. Plan for it, not now. WOuld help for lightning flash rates at < 10km. Could be done initially with a performance hit.		
	Global communication for diagnostics				E.g., spectral nudging, nudgin to observed QBO or zonal mean O3. Not necessarily in physics		
Chemistry	Physical processing of chemical species in atmosphere model	2	2	3	Wet deposition		
		2	2	3	Dry Deposition		
		2.5	3	3	turbulent mixing depends on reaction rate.		
		1	2	3	Convective transport		
		1	1	2	Vertical mixing of tracers		
		1	1	3	Emissions, especially natural emissions		
	Aerosols: Range of Options	1	1	3	fixed aerosols, or interface to a full aerosol model (e.g.: WRF-Chem or CESM treatments)		
	Aerosols Linked to physics	2	2	3	CCN, IN for microphysics, optical depths for radiation		
	Chemistry Linked to physics	2	2	1	Chemistry affects radiation/heating rates (or a range of consistent options).		