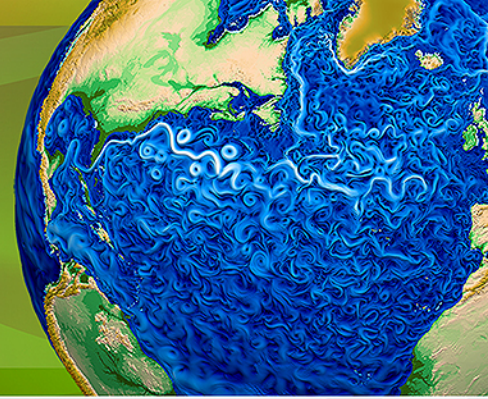




Accelerated Climate Modeling
for Energy



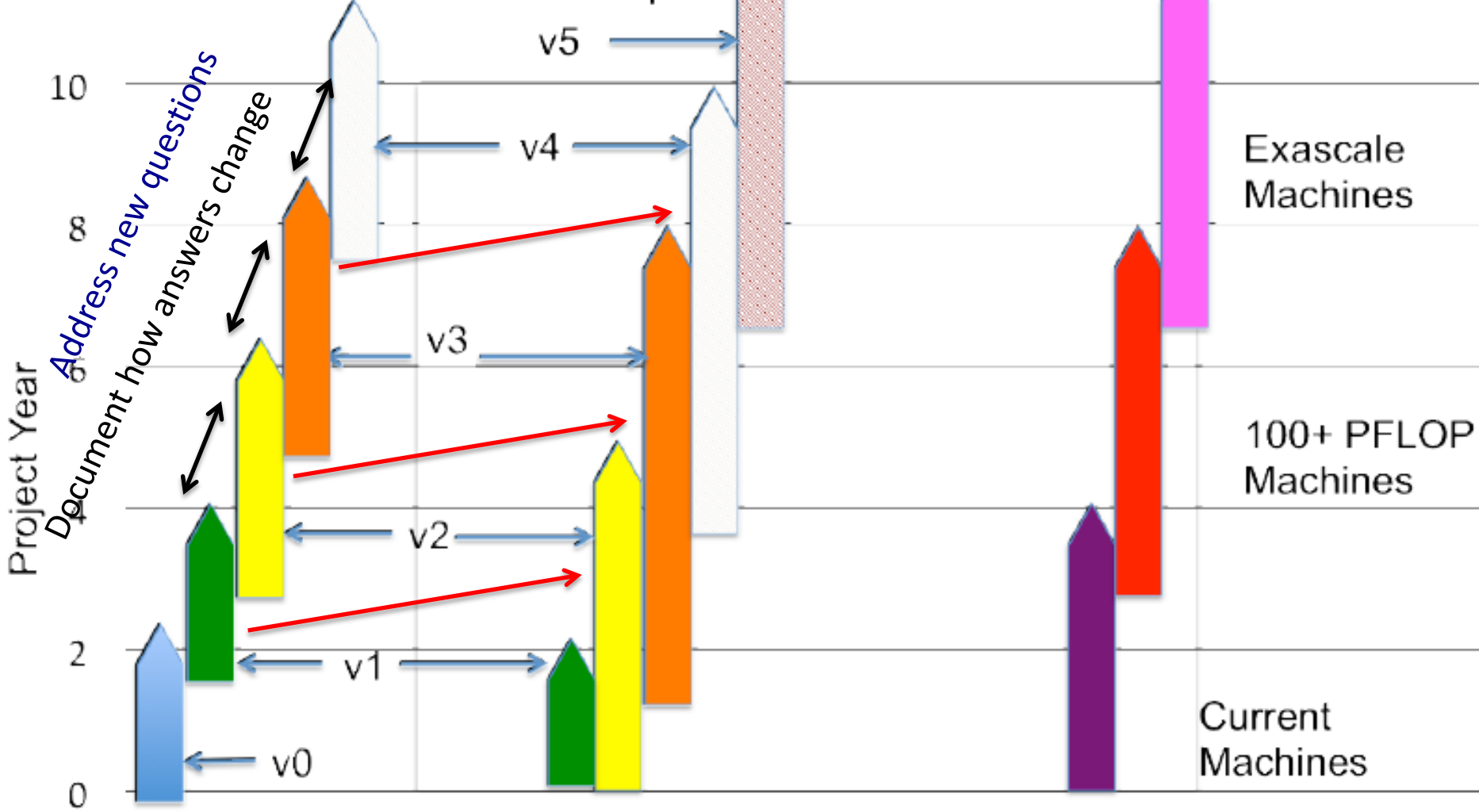
ACME v2 Science Driver Experiments

ACME Fall Meeting
November 2 – 4, 2015
Albuquerque, NM

Overarching Science Questions

Questions	Near-term (3yr) experiments	Long-term (10-yr) experiments
Water Cycle What are the processes and factors governing precipitation and the water cycle today and how will precipitation evolve over the next 40 years?	How will more realistic portrayals of features important to the water cycle (resolution, clouds, aerosols, snowpack, river routing, land use) affect river flow and associated freshwater supplies at the watershed scale?	How will the integrated water cycle, ranging from bedrock to the tropopause, evolve in a warmer climate with changes to land and water use, and changing forcing agents (aerosols, greenhouse gases)?
Biogeochemistry What are the contributions and feedbacks from natural and managed systems to current greenhouse gas fluxes, and how will those factors and associated fluxes evolve in the future?	How do carbon, nitrogen, and phosphorus cycles regulate climate system feedbacks, and how sensitive are these feedbacks to model structural uncertainty?	How will coupled terrestrial and coastal ecosystems drive natural sources and sinks of carbon dioxide and methane in a warmer environment?
Cryosphere Systems What will be the long-term, committed Antarctic Ice Sheet contribution to sea level rise (SLR) from climate change during 1970–2050?	Could dynamical instability in the Antarctic Ice Sheet be triggered within the next 40 years?	How will regional variations in sea level rise interact with more extreme storms to enhance the coastal impacts of SLR?

Relationships Among Simulation, Development and Architecture Roadmaps



Inform v+1 development

Major Simulations

Model Development

Leadership Architectures

Science Drivers for v2

- Diagnose/address model biases
 - Longstanding biases in uncoupled and coupled simulations
 - How will v1 fare in terms of these biases?
 - What are the gaps and opportunities for v2?
- Answer v1 questions better or more holistically
 - Improving model fidelity to improve answers
 - Adding missing processes for more holistic answers
 - Factoring in enabling computational advances
- Answer new (specific 10-yr) questions
 - Extreme events (e.g., precipitation efficiency, extreme convective precipitation, hurricane, SLR and coastal inundation, compound extremes)
 - Abrupt changes (e.g., methane – represents interactions among water cycle, BGC, cryospheric processes)
 - Energy mission (energy, water and land use and management)

Water Cycle:

- Longstanding biases: gaps and opportunities
 - ...
- What aspects of answers to v1 questions may be improved?
 - ...
- What new questions can be addressed with new model features?
 - ...

Biogeochemical cycle:

- Longstanding biases: gaps and opportunities
 - ...
- What aspects of answers to v1 questions may be improved?
 - ...
- What new questions can be addressed with new model features?
 - ...

Cryospheric Processes / SLR:

- Longstanding biases: gaps and opportunities
 - ...
- What aspects of answers to v1 questions may be improved?
 - ...
- What new questions can be addressed with new model features?
 - ...