

# ***Asynchronous I/O Using the Earth System Modeling Framework***

**User Productivity Enhancement,  
Technology Transfer, and Training (PETTT)**

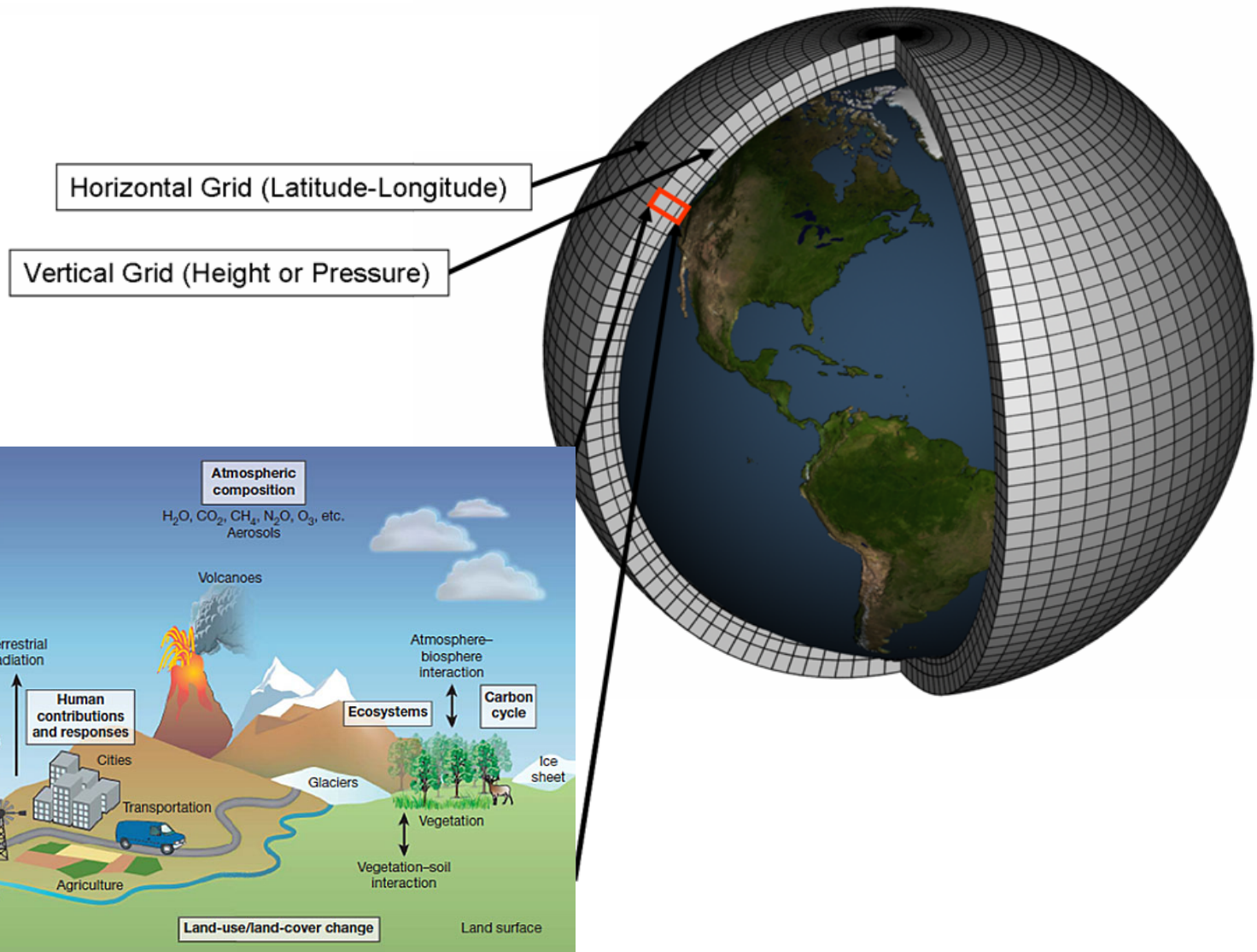
***Presented by***

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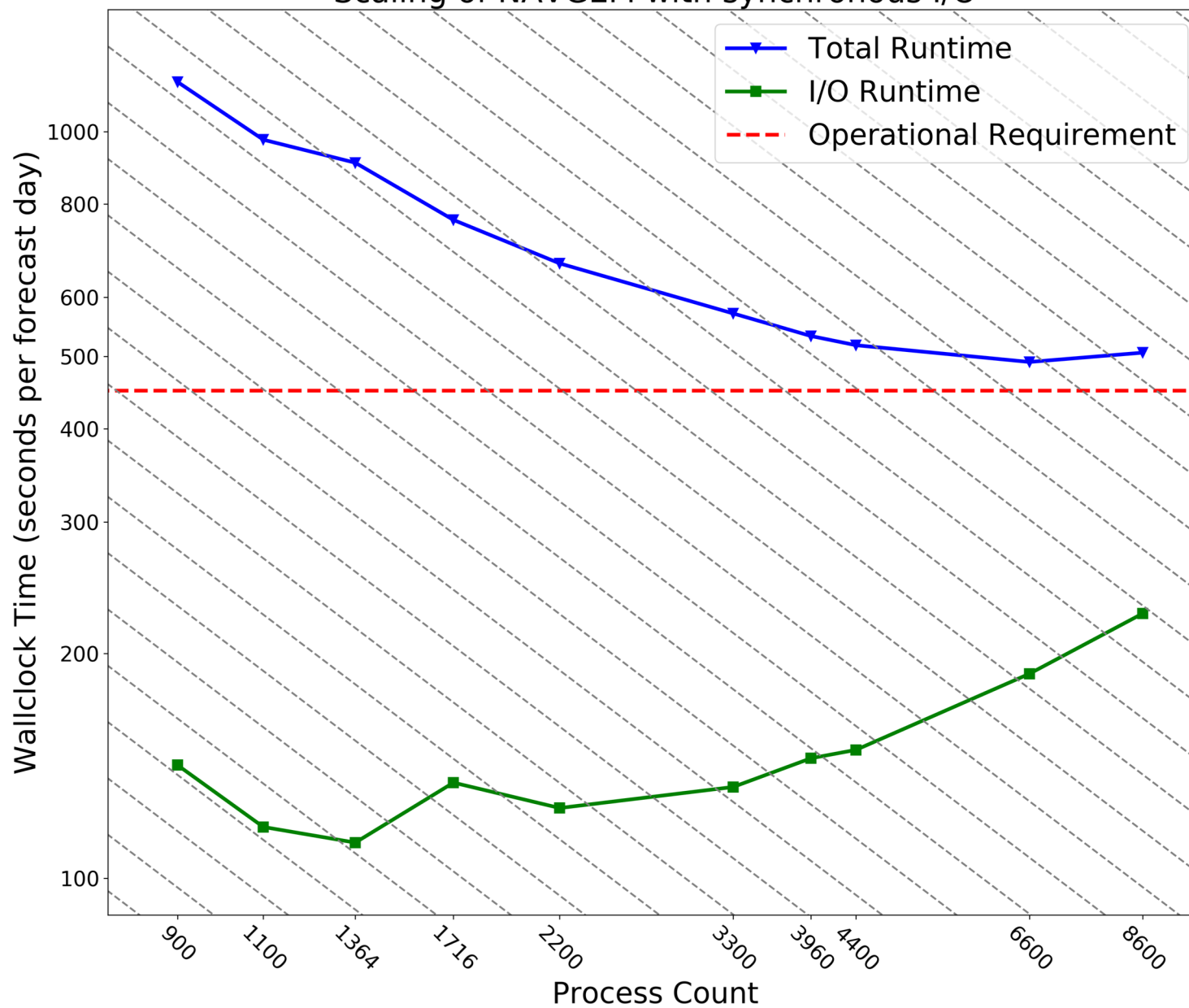
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# Numerical Weather Prediction Models



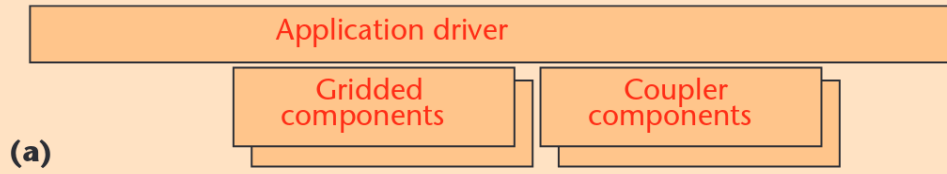
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## Scaling of NAVGEM with synchronous I/O



# Earth System Modeling Framework (ESMF)

1. ESMF provides an environment for assembling components



2. ESMF provides a toolkit that components use to

- ensure interoperability
- abstract common services

Component run(), checkpoint():	
Field: halo(), import(), export() + I/O	Grid: regrid(), transpose() + Metrics
DELayout, PEList, Machine model	

(b)

3. Gridded components and coupler components are user written

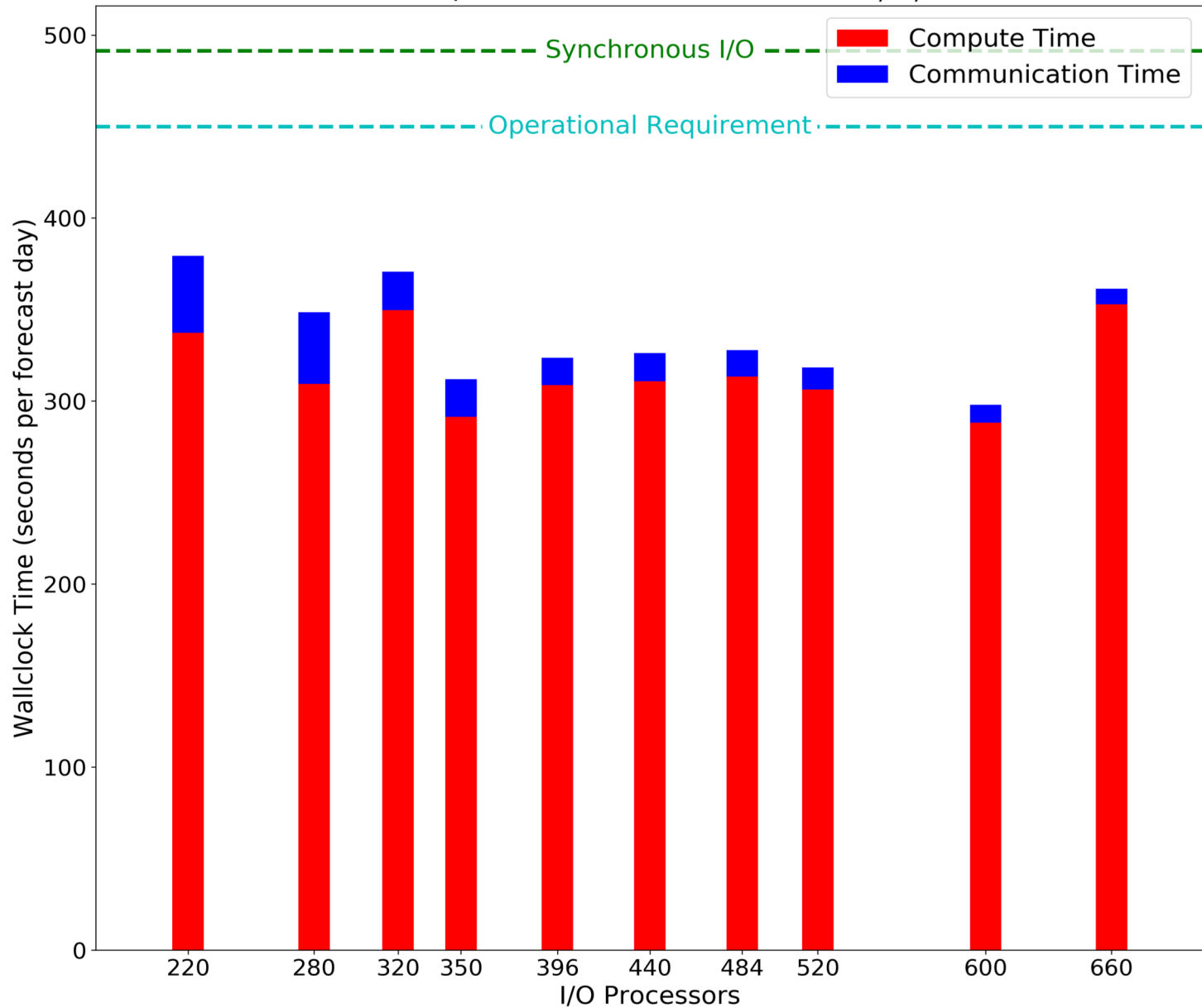
(c)

The Earth System Modeling Framework (ESMF) programming paradigm. An application is an assembly of (a) one or more gridded and coupler components. Components can use the (b) ESMF infrastructure toolkit, but all components are primarily (c) user written).<sup>1</sup>

- Open source project
- Component framework used to couple earth system models
- Includes an *infrastructure* of utilities that can be used to build model components
- Includes *superstructure* that is used to couple components together
- Performs fast parallel regridding and redistribution

1) C. Hill, C. DeLuca, Balaji, M. Suarez and A. Da Silva, "The architecture of the Earth System Modeling Framework," in Computing in Science & Engineering, vol. 6, no. 1, pp. 18-28, Jan.-Feb. 2004.

# NAVGEN Runtime Across I/O Process Counts - T1023L80, 6,600 Total Processors



# NAVGEM Runtime Across I/O Process Counts - T1023L80, 8,600 Total Processors

