

## MOSART-Lake: Development and global validation

Hong-Yi Li<sup>1</sup> (hli57@uh.edu), Wondmegn Yigzaw<sup>1</sup>, Guta Abeshu<sup>1</sup>, L. Ruby Leung<sup>2</sup>, Zeli Tan<sup>2</sup>, Tian Zhou<sup>2</sup> <sup>1</sup>University of Houston, Houston, TX <sup>2</sup>Pacific Northwest National Laboratory, Richland, WA





### **MOSART-Lake**

Both lake water and heat balance can be improved by 1) accounting for advective fluxes between rivers and lakes and 2) using more realistic area-volume-depth lake geometry



## **Simulation protocol**

- Simulation period: from 1979 to 2008
- Forcing data: 0.5-deg 3-hourly GPCP data
- Simulation resolution: 0.5-deg for both ELM and MOSART
- The 1979-2008 cycle was repeated 10 times to spin-up large lakes





## **Benchmarking datasets**

- Monthly surface temperature for 202 large lakes in 2002-2012 (Copernicus Global Land Operations Cryosphere and Water)
- Annual surface area data for 672 large lakes in 1995-2015 (Global lake area, climate, and population dataset V4)







# Long-term average lake surface temperature validation (2002-2008)







## Long-term average lake surface area validation (1995-2008)



Energy Exascale Earth System Model



#### Monthly lake surface temperature



#### Annual lake surface area



Energy Exascale Earth System Model **ENERGY** 

## **Summary & next steps**

- MOSART-Lake reasonably captures the seasonal variation of lake surface temperature and long-term lake surface area.
- We will continue to improve the parameterizations of lake hydrology and heat balance



