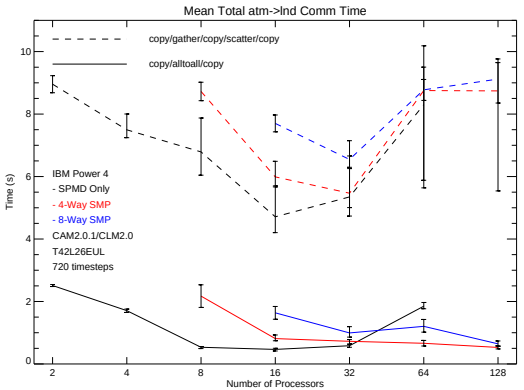
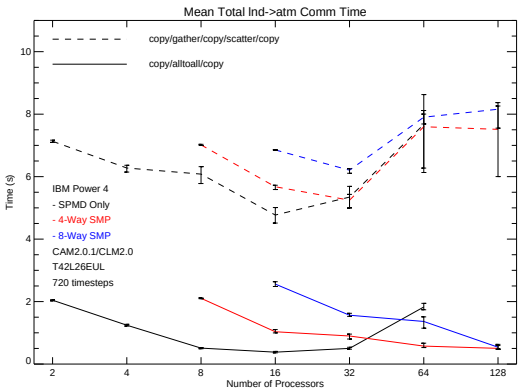
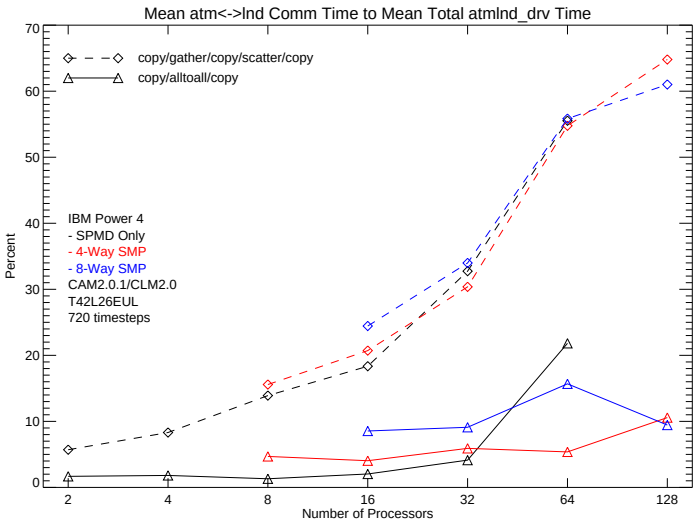
Parallel Data Structure and MxN Mapping Introduced into the Community Land Model (CLM)

Forrest Hoffman, Pat Worley, John Drake

- ★ A new data structure which groups grid cells into ‘‘clumps’’ distributed across multiple processes was introduced into CLM
- ★ Clumps contain information about sub−grid−scale land area (or patch) properties
- ★ Clumps provide a structure to the land model similar to the chunk structure contained in the physics of the Community Atmosphere Model (CAM)
- ★ An additional structure was introduced to provide a mapping between land model grid cells in clumps and columns in atmosphere chunks
- ★ This direct MxN mapping between CLM processes and CAM processes significantly reduces the time spent communicating surface state and flux between the atmosphere and the land (see graphs at right)







- ★ Since communication time is attributed to land model run time, improved communications reduces total land model run time and total simulation time
- ★ New mapping and communication now becomes a significantly smaller percentage of total land model run time (see graph at left)