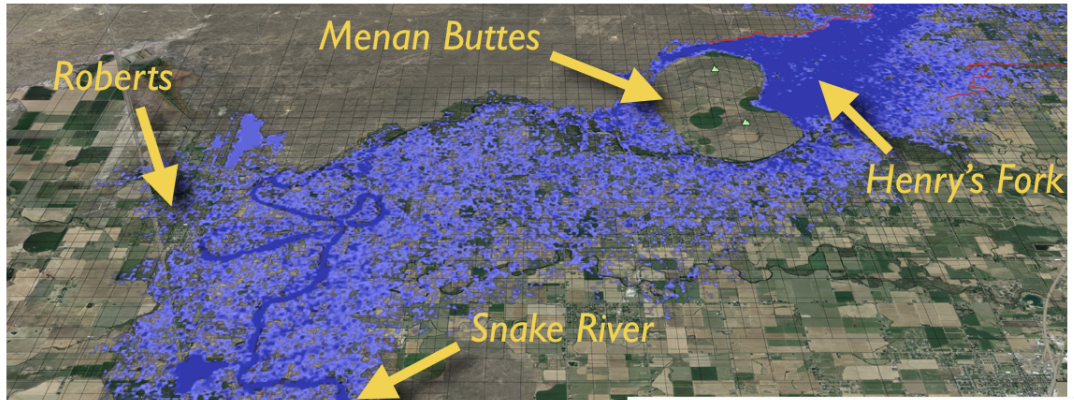
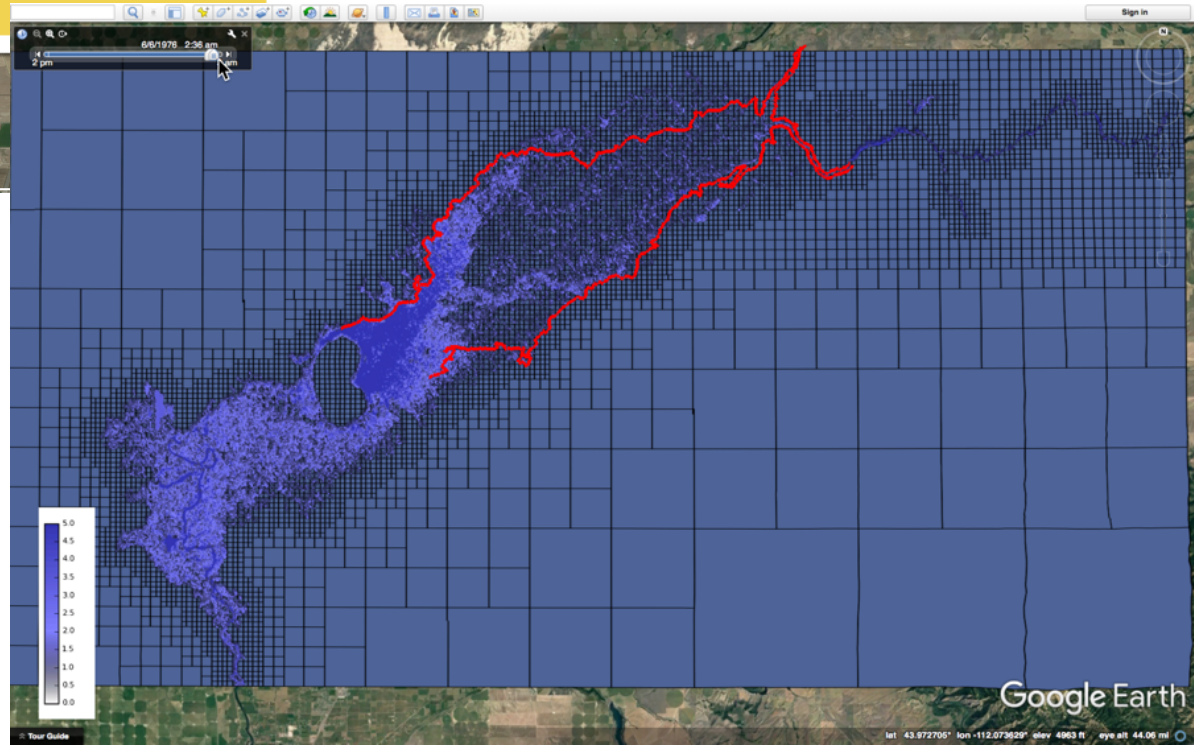
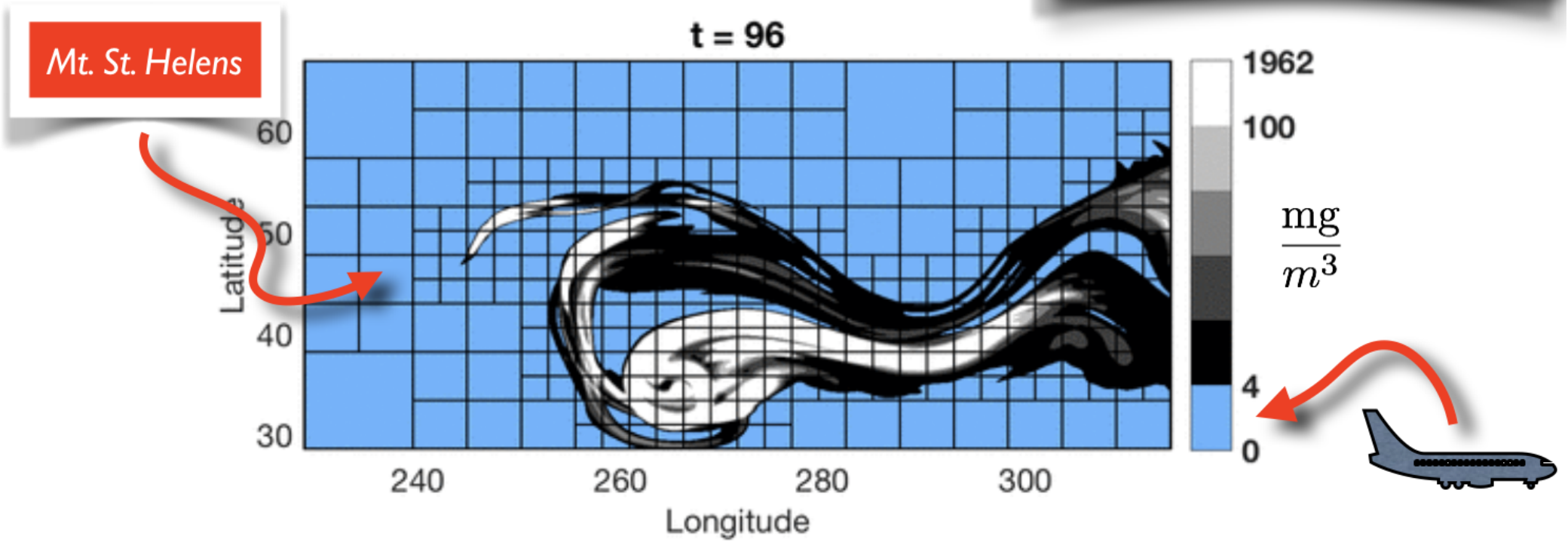
Team Riemann Sweepers



The flood waters traveled west along the route of the Henry's Fork of the Snake River, around both sides of Menan Buttes, significantly damaging the community of Roberts. (Wikipedia)



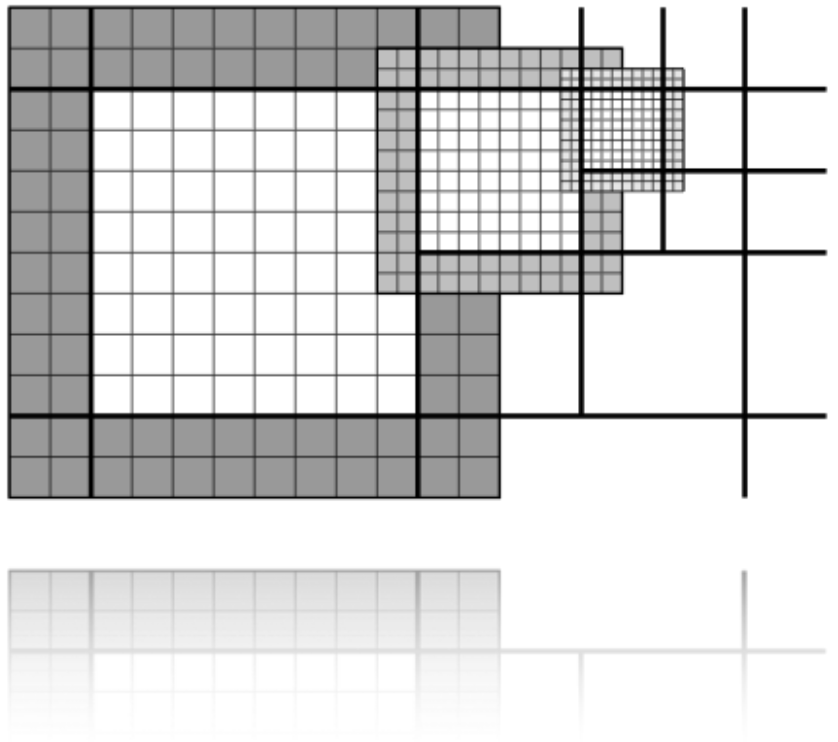
- May 18, 1980; largest eruption in lower 48 since 1915
- 1024 x 512 x 25 effective resolution
- 32x32x25 blocks (Surface to volume ratio = 0.25)
- 96 hours simulation time; results averaged in the vertical
- 16 virtual CPUS; 64 GB Ram; RHEL “cloud server”



Riemann problem on AMR grid

- 2D refined mesh; extruded in 3rd dimension
- Refined cells are split in four -- Quadtree
- Space filling curve

- Codes: forestclaw and clawpack



Parallelism

- MPI between nodes

- CUDA for GPU on the node
  - Transfer of data (solution) from the CPU to the GPU
  - Solution of the Riemann problem for one time step
  - Copy back of the data from the GPU to the CPU
- Exchangeable / user defined solvers in the complex AMR framework

Optimisation

- Processing of several patches but not all in single kernels

- Problem: large amount of data copied back and forth