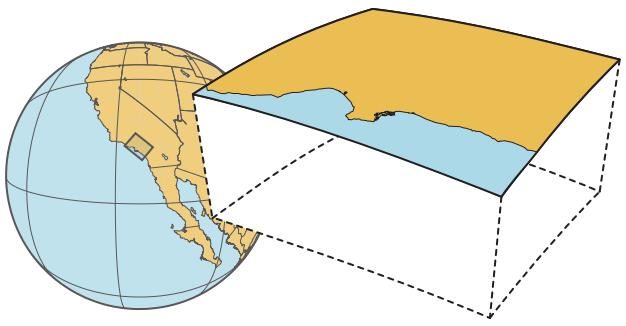
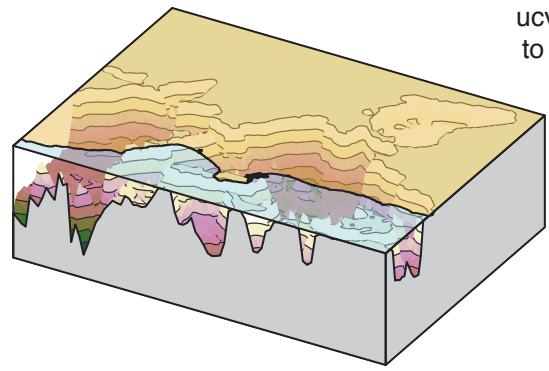
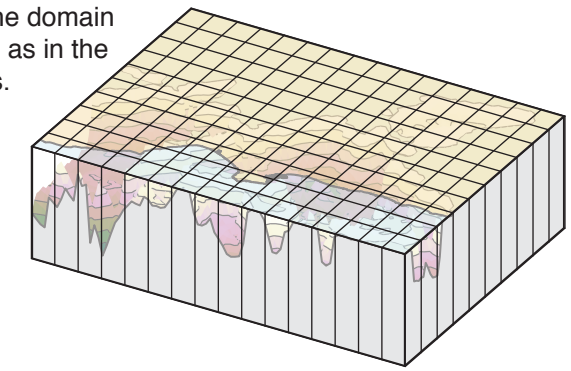
ucvm2etree **ucvm2etree_[*mpi-process*]**



Map projection from a longitude-latitude-depth to a x-y-z coordinate system.

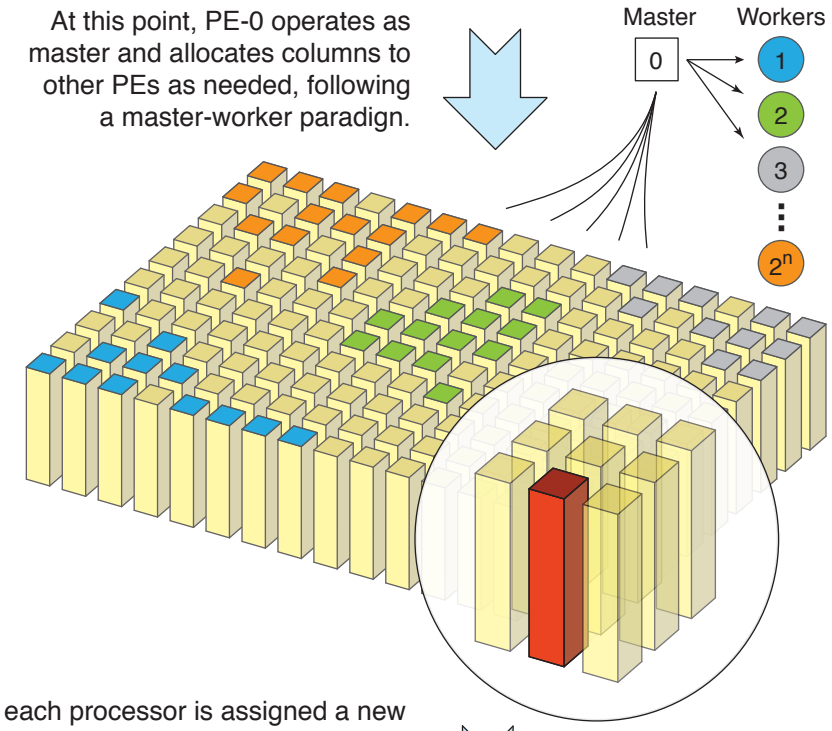


In the first step of the parallel process, ucvm2etree_extract maps the domain to the same $c_x \times c_y$ columns as in the single-core process.

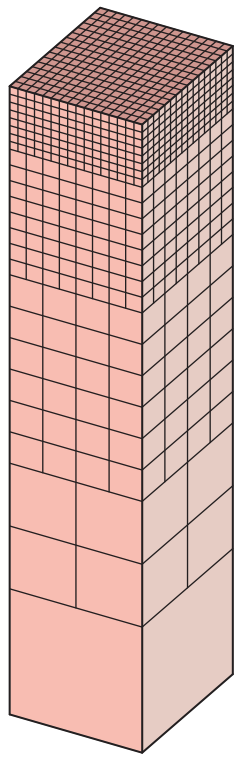


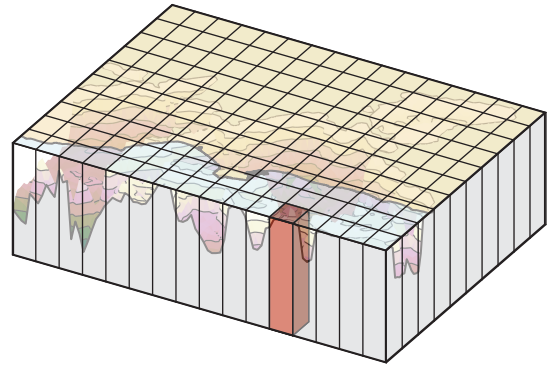
In the single-core command, the model domain is divided into $c_x \times c_y$ columns. Each column is meshed as an independent octree.

At this point, PE-0 operates as master and allocates columns to other PEs as needed, following a master-worker paradigm.



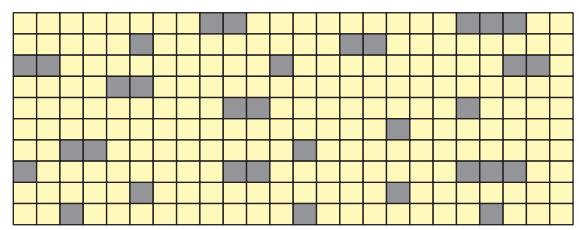
In both the single-core and the parallel programs, each column is meshed progressively downward, adjusting the octants size at each horizontal layer according to the lower bound size $V_{min}/(p \cdot f_{max})$. Each column has an independent vertical discretization.

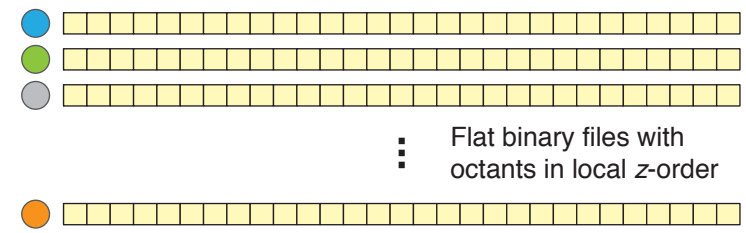




As ucvm2etree queries the meta-model, it stores the data-point payloads into the etree using etree_insert() from the etree library. Since the inserts are not done in global in z-order, the outcome does not optimize disk-space.

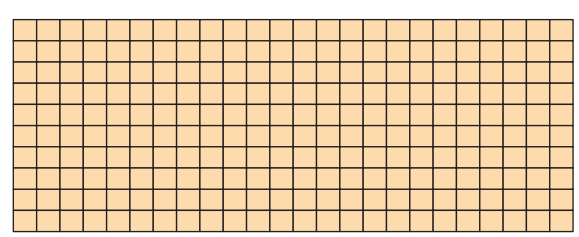
As each processor is assigned a new column, it queries the meta-model and stores the data-points in a flat binary file (one per PE). Here, the octants in the mesh of each column are arranged in **local *z*-order**.

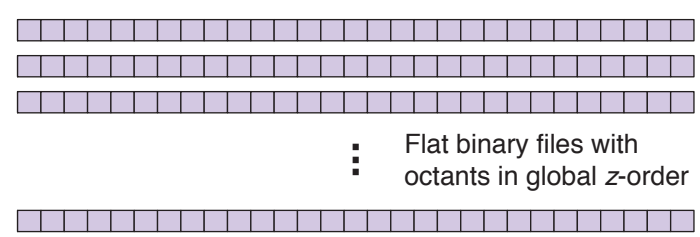




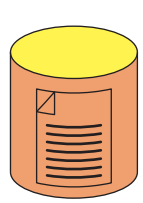
A recommended step after running ucvm2etree is to run the program ecompact. This code traverses the etree generated by ucvm2etree and builds a copy by appending octants in z-order. The outcome is an equivalent smaller file, optimal for querying performance.

In ucvm2etree_sort The local column meshes are sorted in **global *z*-order** so they can later be merged, but remain in separate files on disk.





The end result is a binary file (etree) with metadata about the model origin coordinates, dimensions, date of creation and authorship.



The last step the parallel version, ucvm2etree_merge, merges the global *z*-ordered column files into a single mesh.