Fig. 1. The top figure shows the number of loaded lower ASVOs per each frame, and the bottom figure shows synchronization time used for connecting lower ASVOs to the upper ASVO.

Connecting lower ASVOs with linking node. In order to verify benefits of connecting lower ASVOs with the linking nodes, we measured the number of loaded lower ASVOs and synchronization time in each frame (Fig. 1). We tested two methods of connecting lower ASVOs to linking and leaf nodes. The average cost with the chosen method, connecting lower ASVOs with linking nodes, is 0.16 ms, while the cost of creating lower ASVOs for each leaf node is 4.4 ms, which is about 28 times slower than our method. This is mainly because of the drastically reduced number of update operations.

Since we create lower ASVOs for linking nodes, there are overlapping nodes between the upper and lower ASVOs. When we allow three depths overlaps between them, the memory overhead of the data redundancy is 0.15% of the total size of the ASVO. Since this overhead is negligible, we do not adopt any compression techniques to remove or reduce this overhead. We denote $r_l$ as an effective subdivision level for leaf voxels of lower ASVOs that excludes the overlapping factor between lower and upper ASVOs. In practice $r_l$ is set to 2~4. As a result, the total resolution considering the upper and lower ASVOs is $(r_u \times r_l)^3$. 

Connecting lower ASVOs with linking node.
Fig. 2. These images show progressive results after finishing preview rendering, a fetching block to generate a frame, all the tiles for the complete image (Compl. I.), and 800 frames. The converged image is computed after 40 k frames.

Fig. 4. The middle and right images visualize saliency maps by using techniques of Itti et al. and Achanta et al., respectively of the left images. Red colors indicate high saliency, while blue colors low saliency.