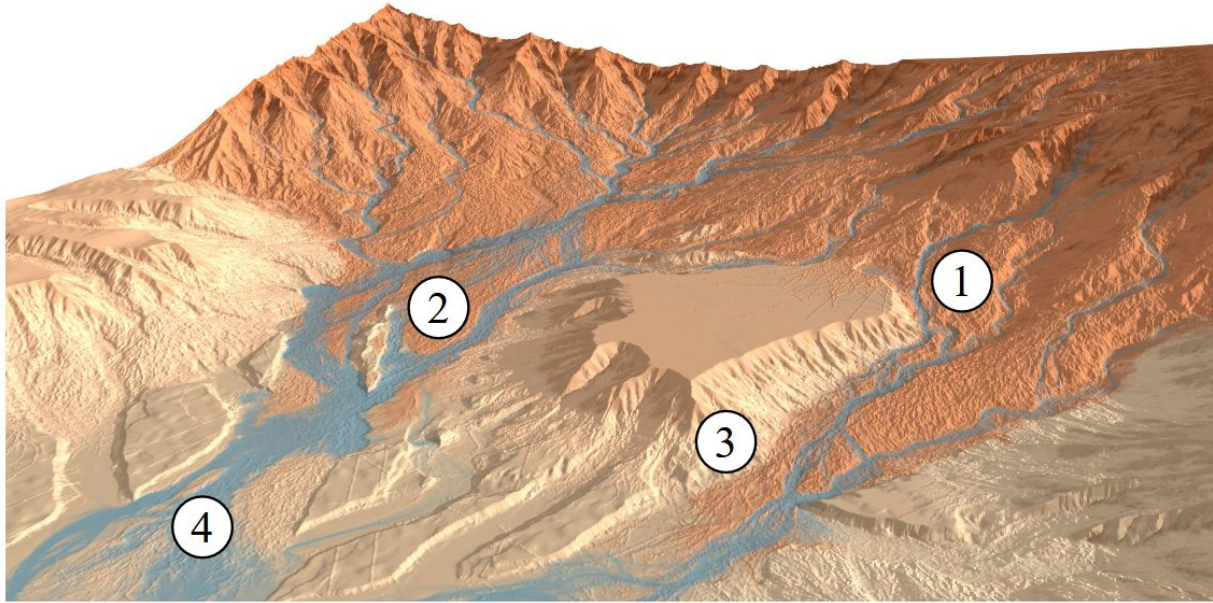
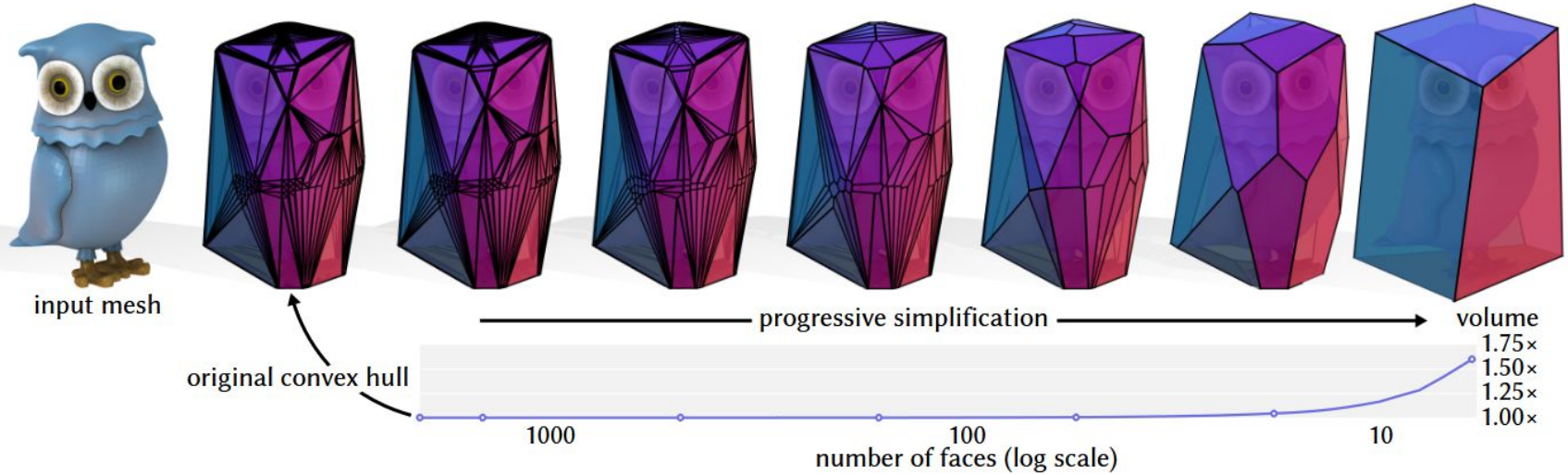


Stochastic geomorphological transport for terrain erosion simulation



Nicholas McDonald, Guillaume Cordonnier

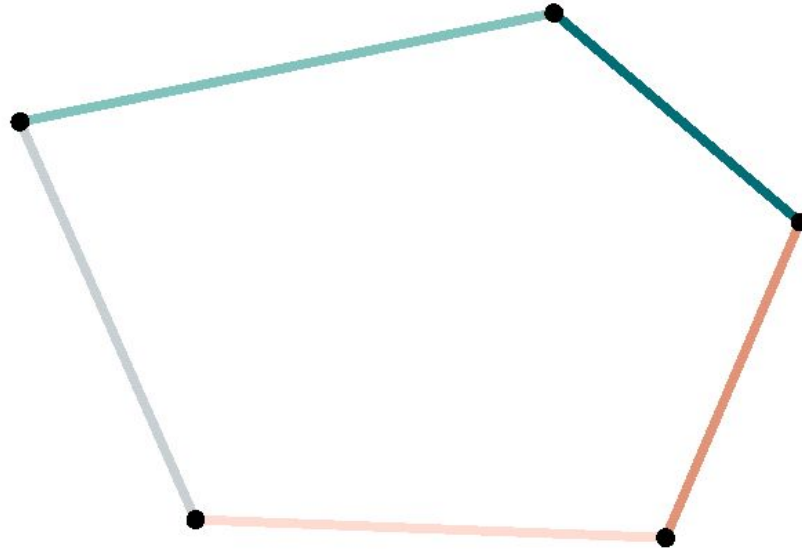
Progressive Convex Hull Simplification



Alec Jacobson



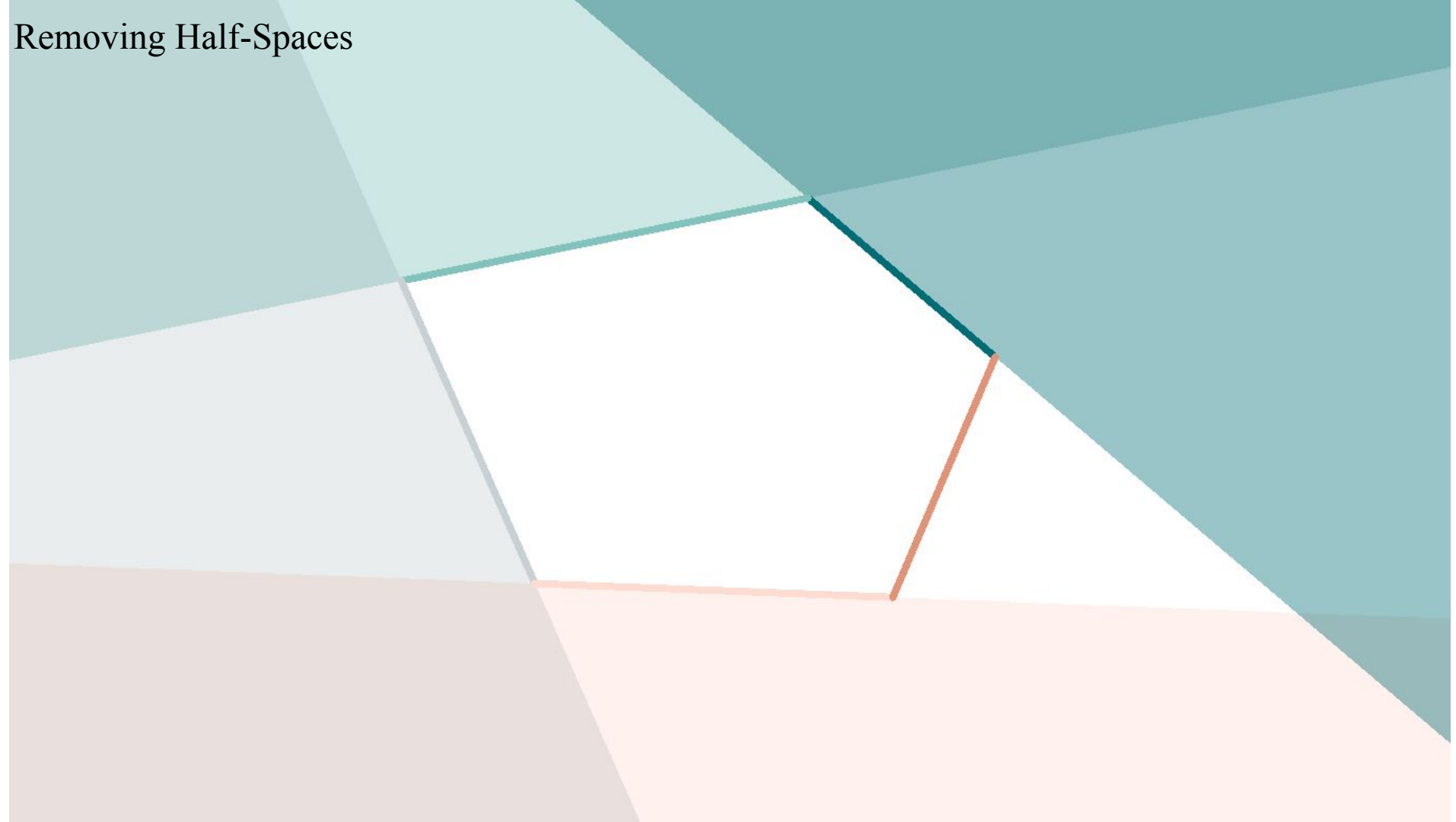
V-representation



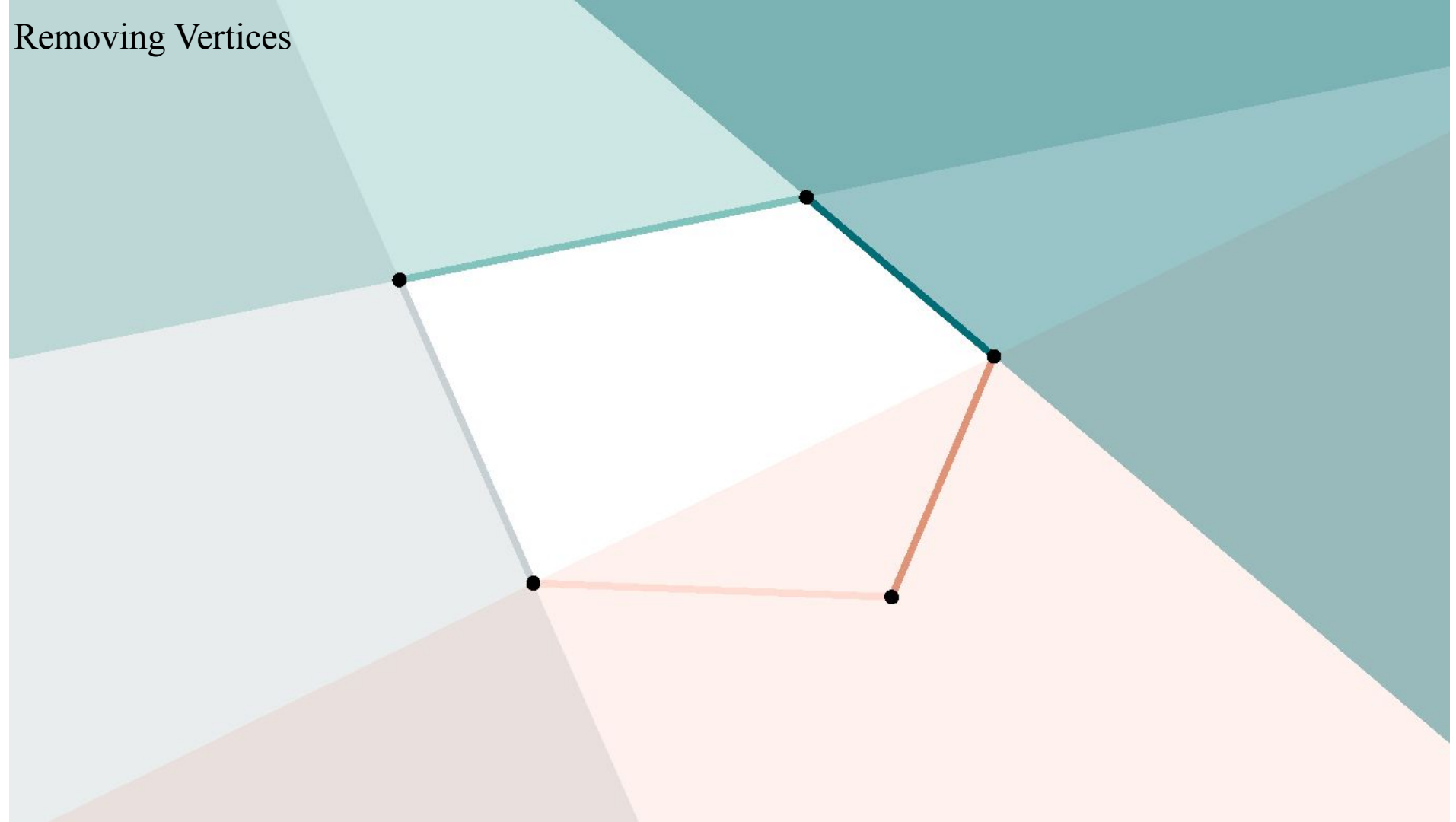


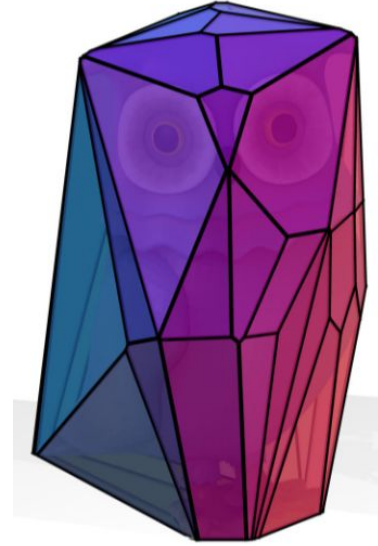
H-representation

Removing Half-Spaces



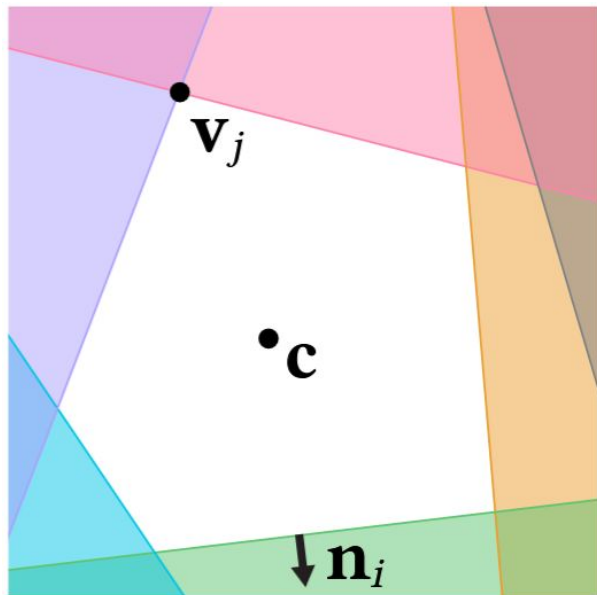
Removing Vertices



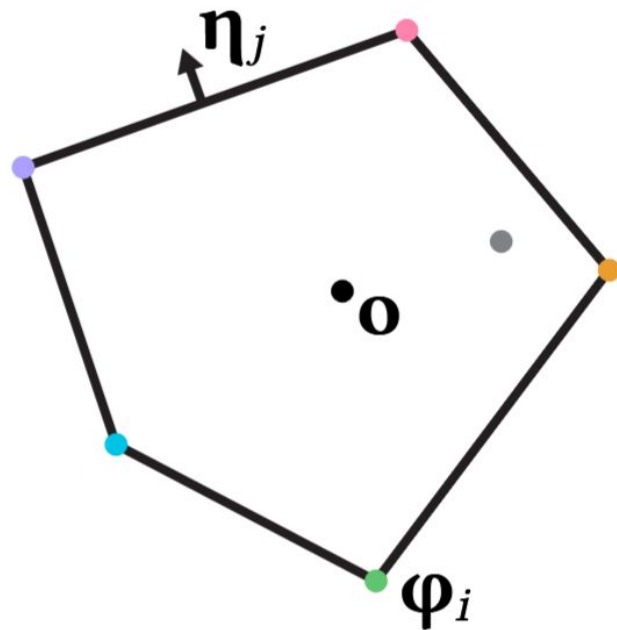


“Our goal is to select a given target number n of these halfspaces so that the resulting volume has grown as little as possible.”

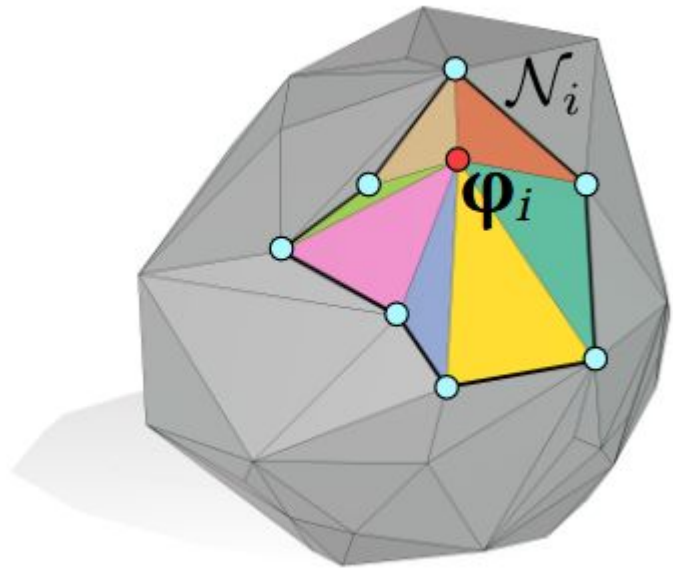
Dual Hull



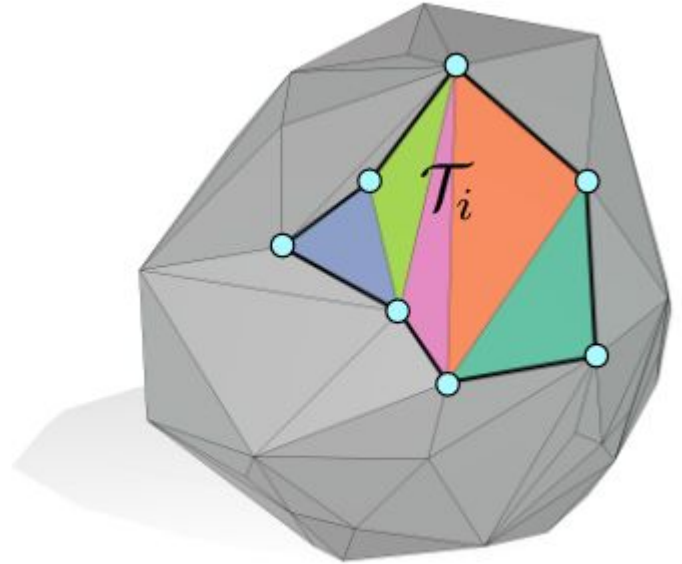
$$\phi_i = \frac{-\mathbf{n}_i}{\mathbf{n}_i \cdot \mathbf{c} + b_i}$$



Removing a half-space : removing a dual vertex



Dual hull



Loglog runtime plot

seconds

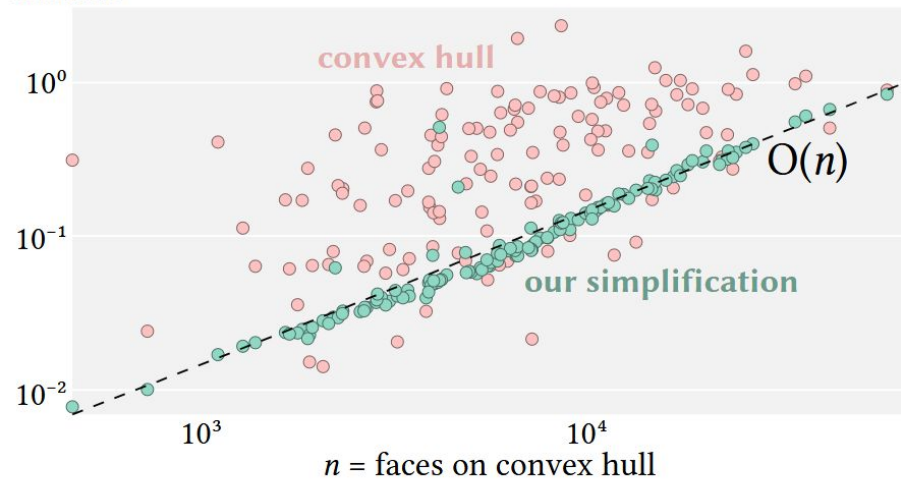


Figure 4: We collect performance timings for each of the 133 models from *threedscans.com*. We time initial exact convex hull (pink) and our simplification to 18 half-spaces (teal).

Volume increase violin plots (log scale)

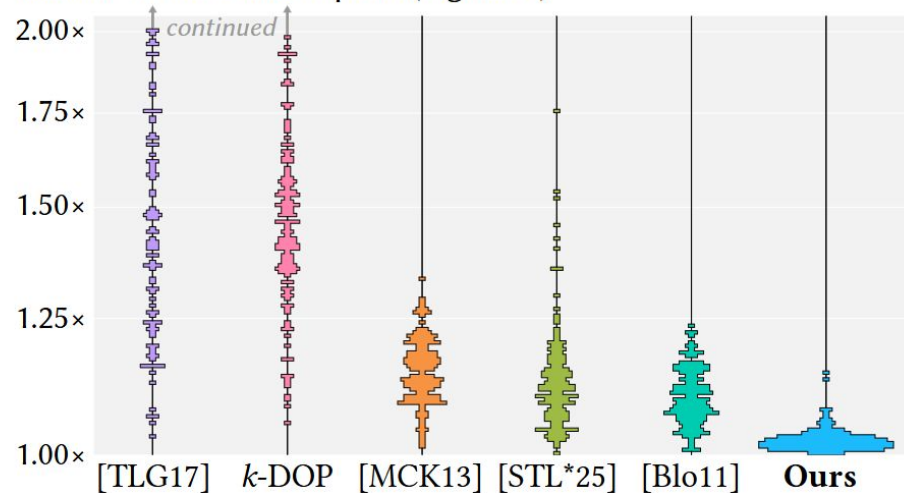


Figure 5: We simplify each of the 133 models from *threedscans.com* to 18 faces. We show a histogram collecting each output as factor of the corresponding input hull volume. Our method was always smallest and often by a significant margin.

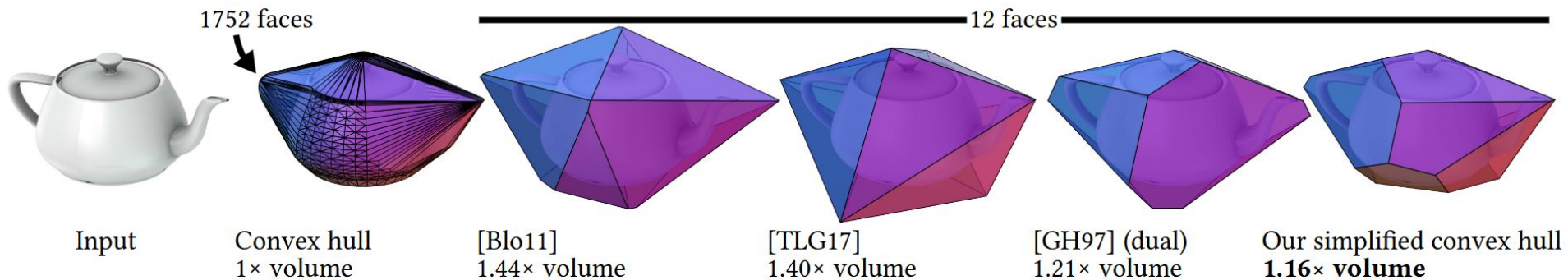


Figure 6: We compare the family of convex hull simplification techniques that are variants of mesh simplification [GH97]. Our method achieves the smallest volume change. Runner up is running naive appearance preserving mesh simplification on the dual hull [GH97] (dual).

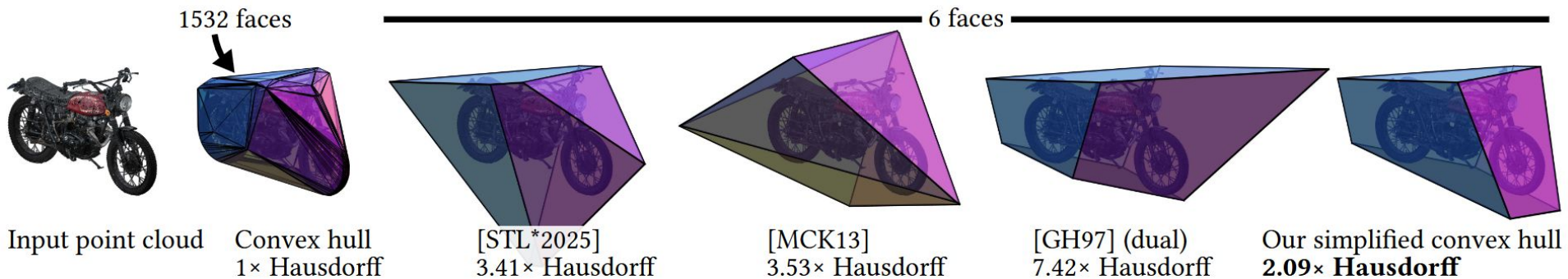


Figure 7: We take as input a point cloud, build its exact convex hull and then compare extreme simplifications with a variety of methods. Our method finds the tightest simplification measured not just in terms of volume and area (which we can target to minimize directly), but also in terms of Hausdorff distance measured post facto.

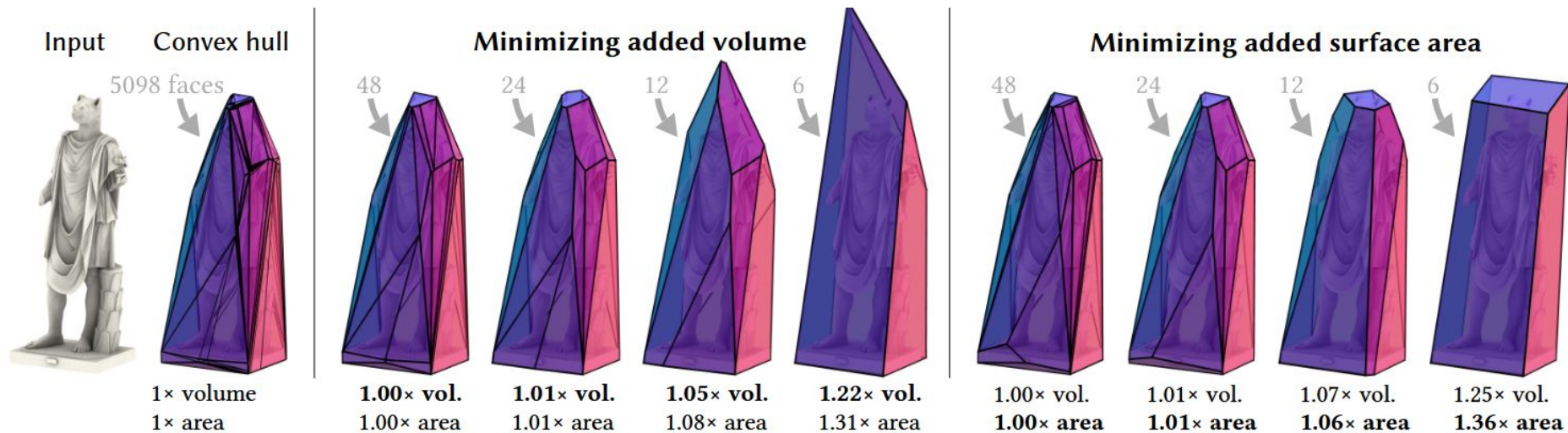


Figure 10: Both are really tight, but we can choose to minimize volume or area. Differences are a bit more pronounced at extreme simplifications, like this example down to 16 faces

