

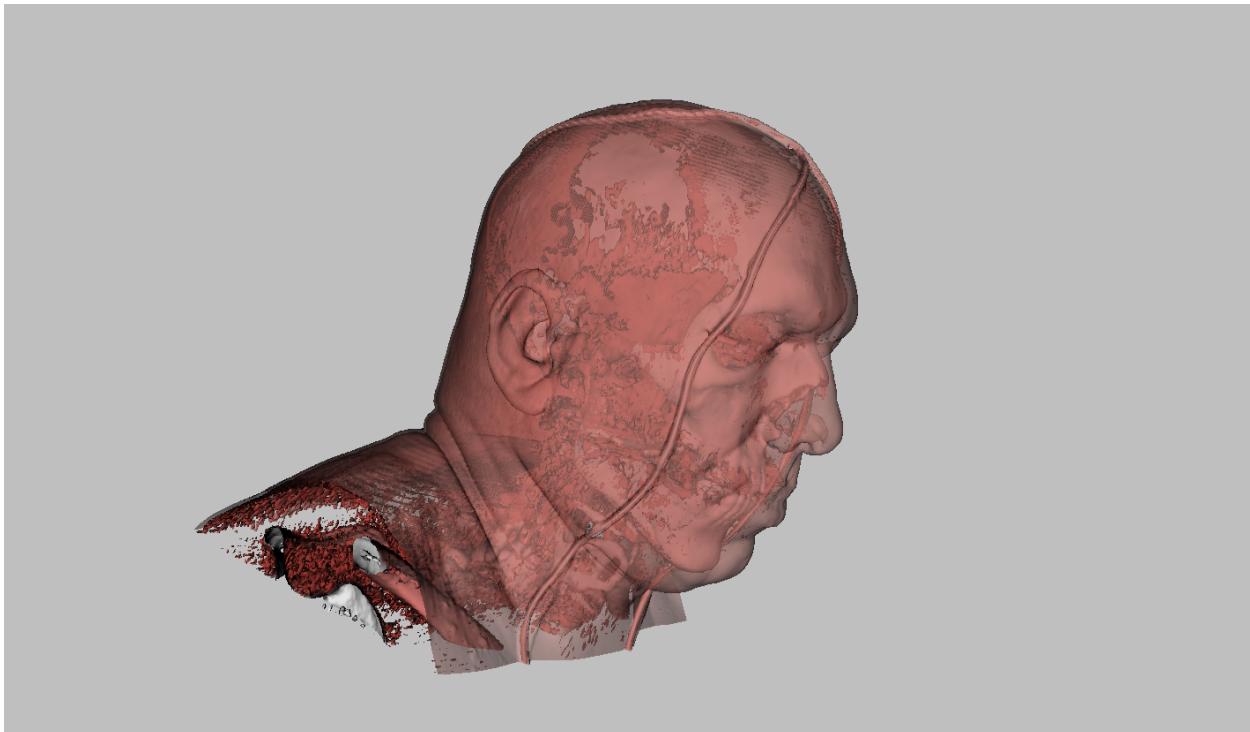
# CS 530 Project 3

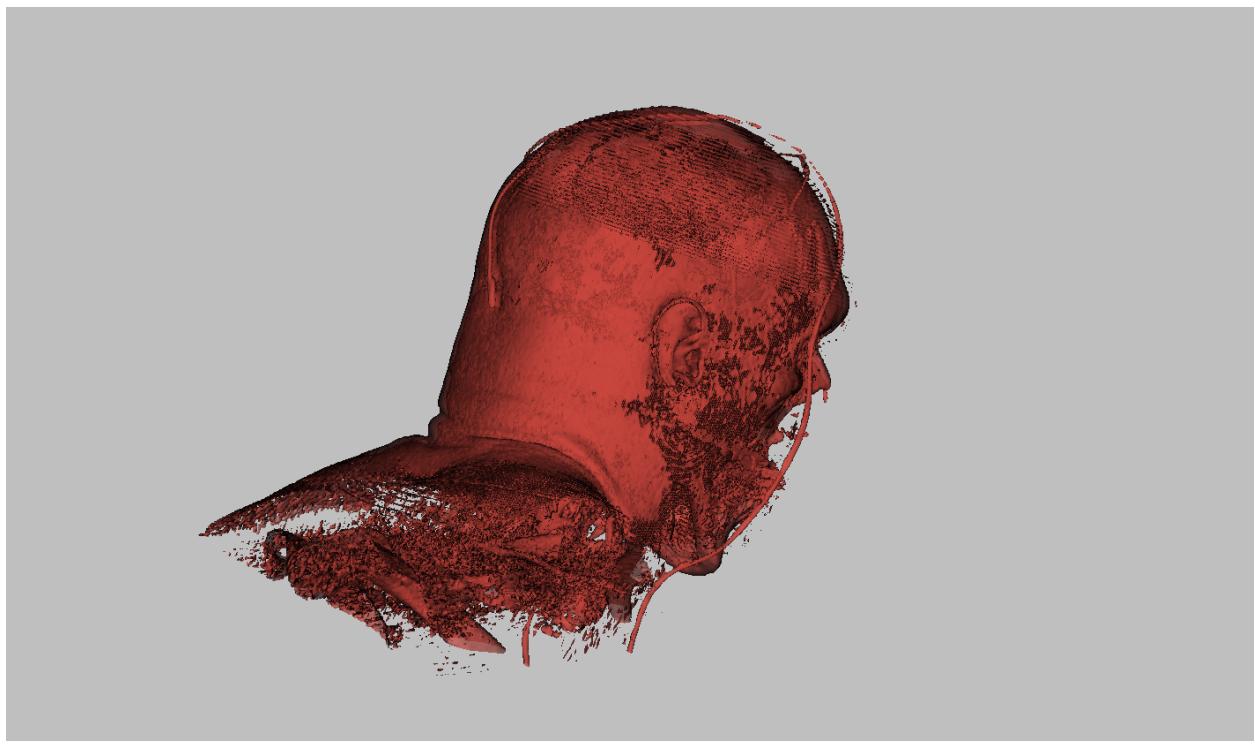
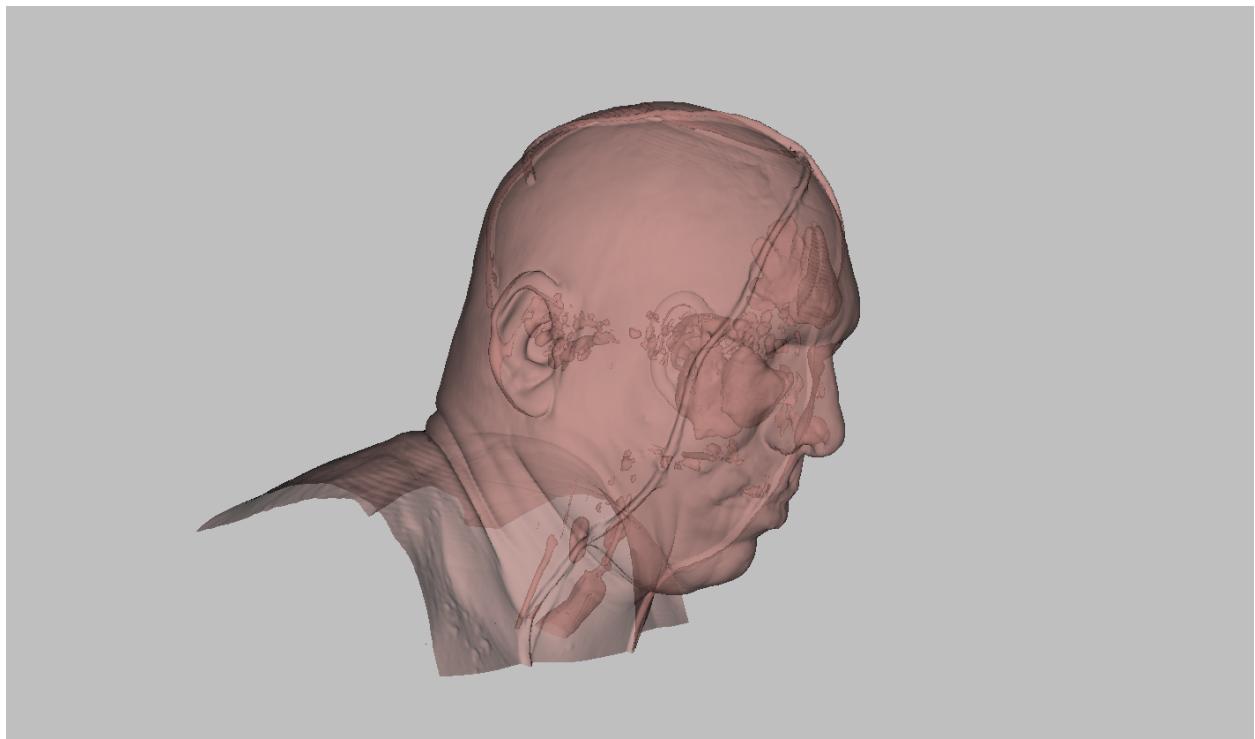
Luke Jiang (0028440468)

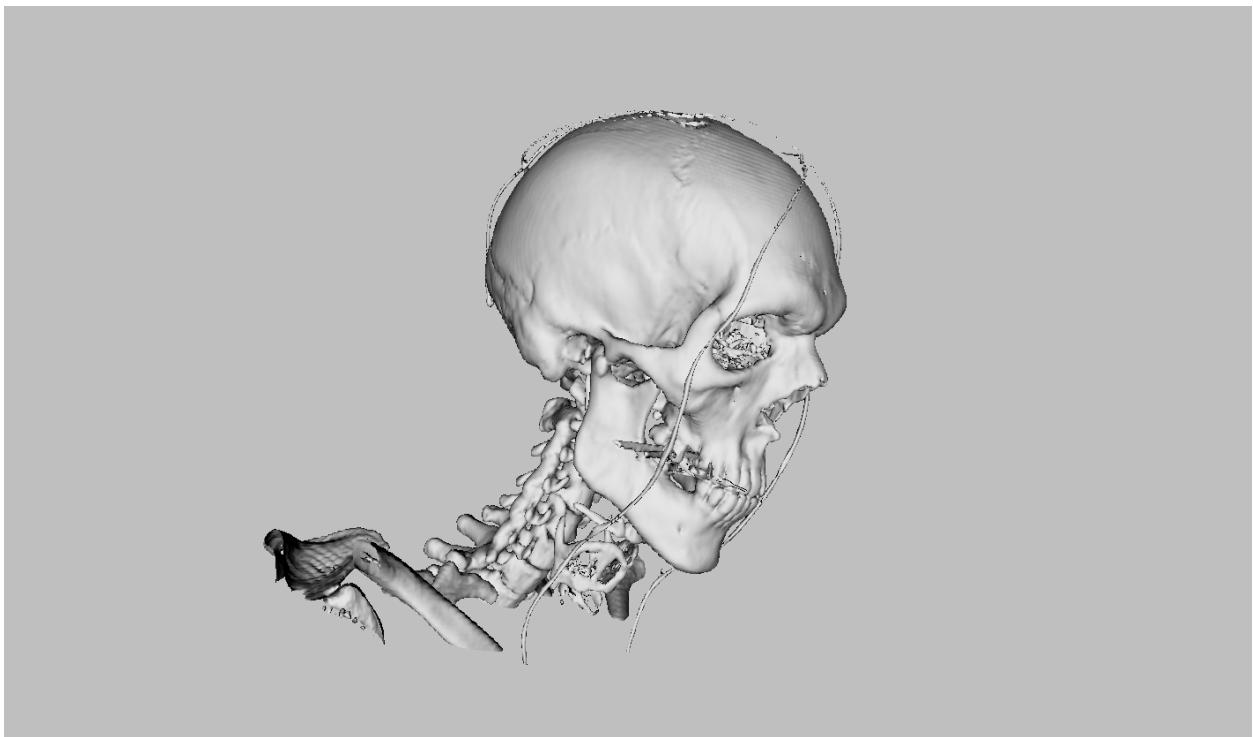
03/02/2020

## Task 1:

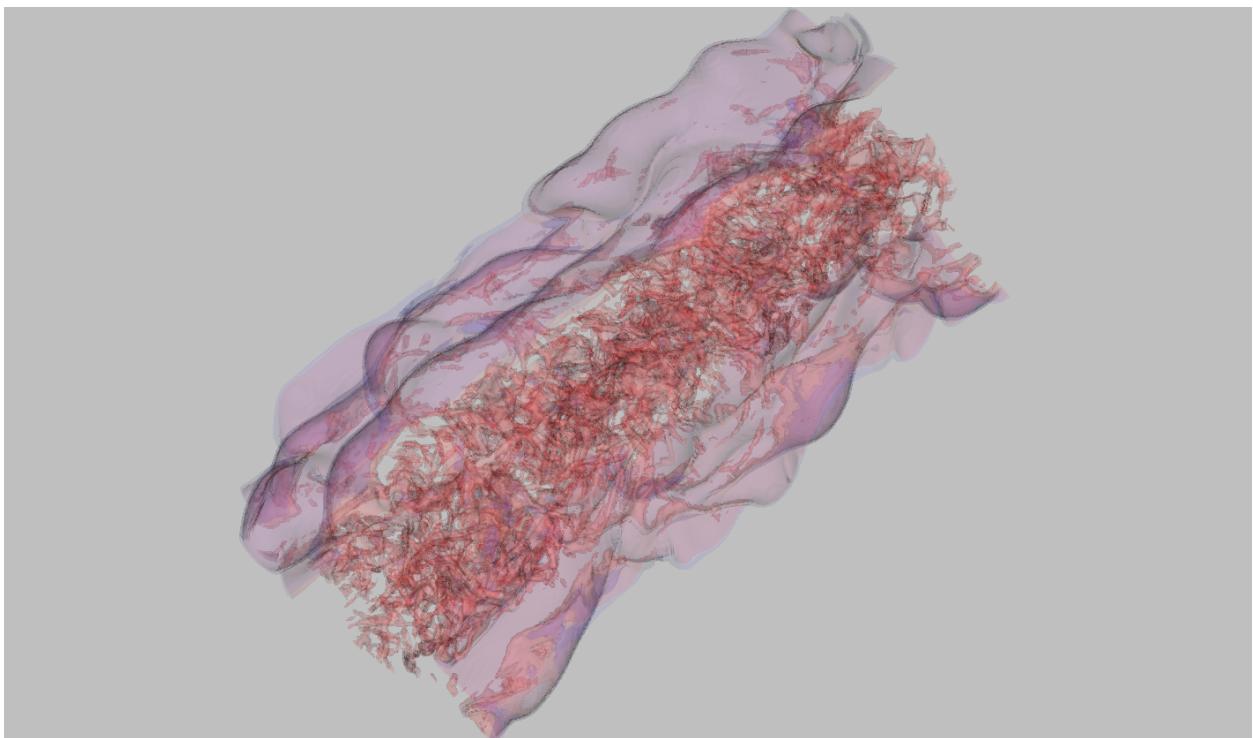
Rendering Results of Head Dataset:

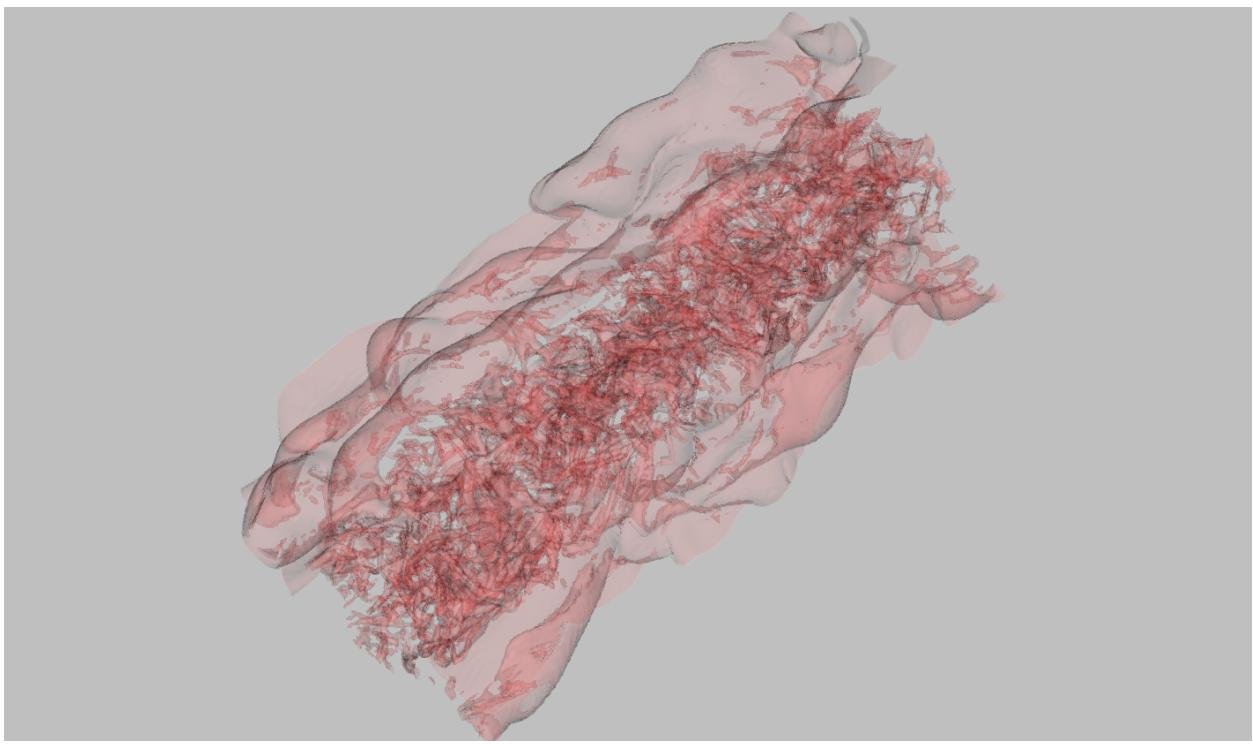
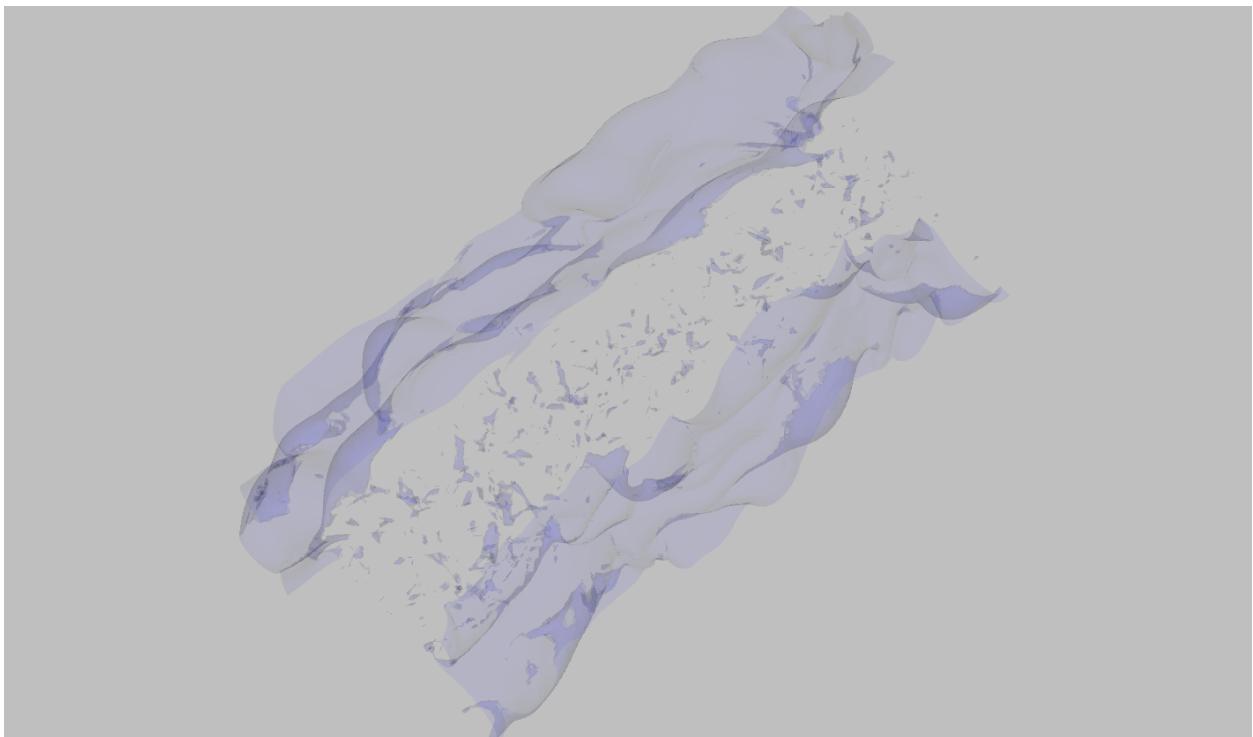






**Rendering Results of Flame Dataset:**



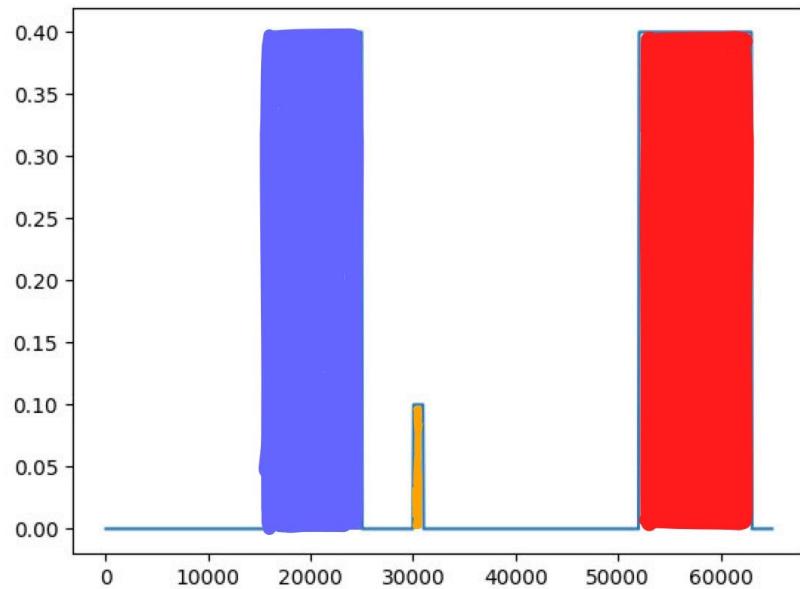


**Q: Describe in the report how you selected the isovalue for each dataset.**

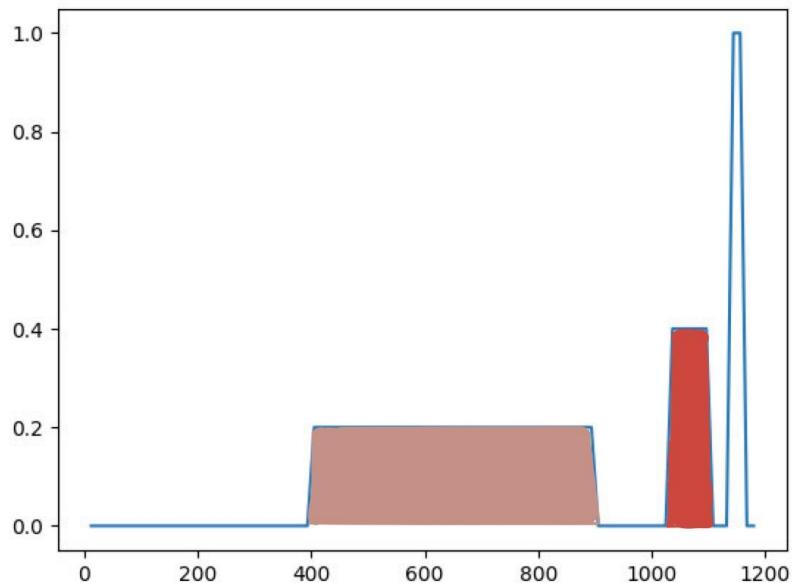
**A:** I created a slide bar to find the most suitable isovalue.

**Task 2:**

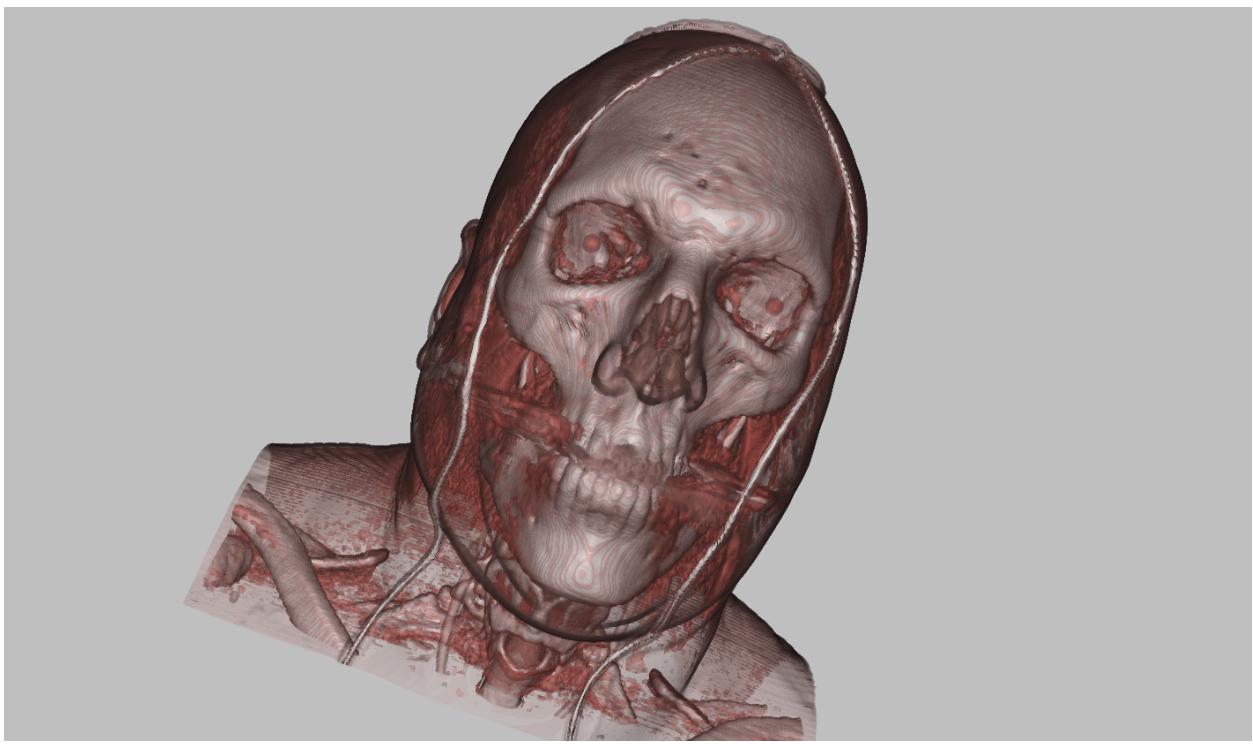
**Color and Opacity Transfer Function for Flame Dataset:**



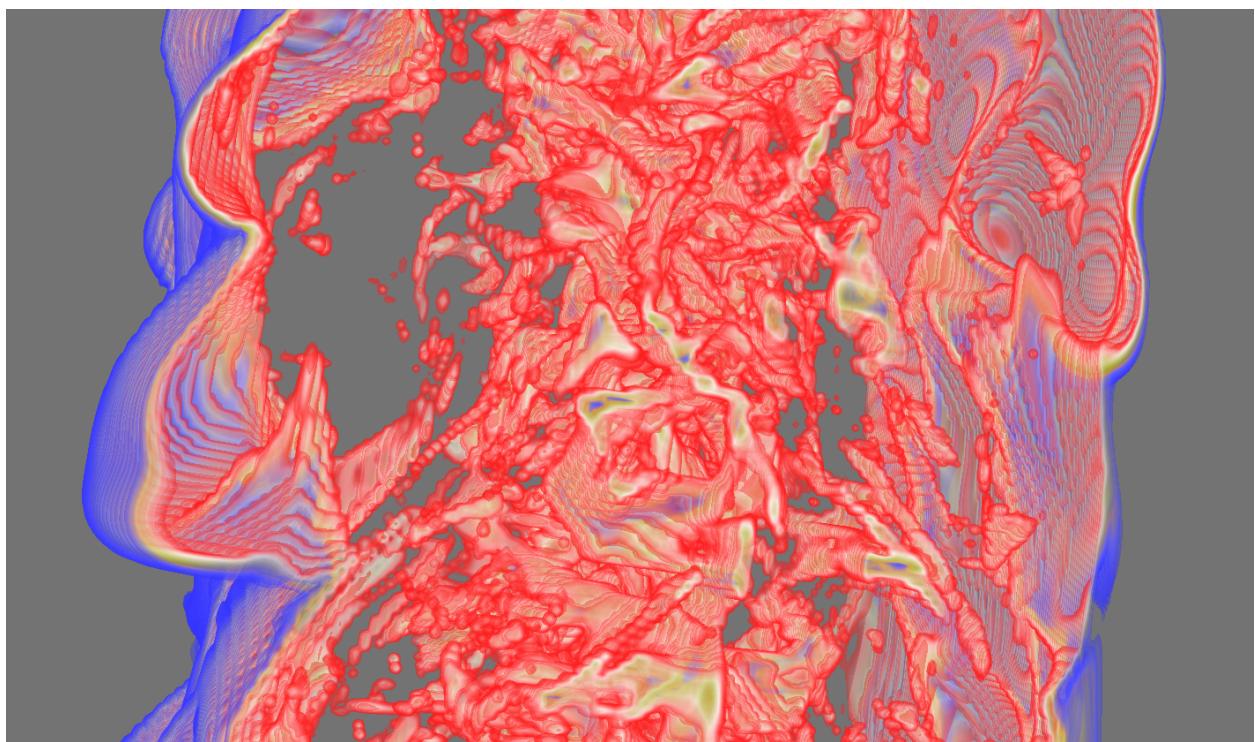
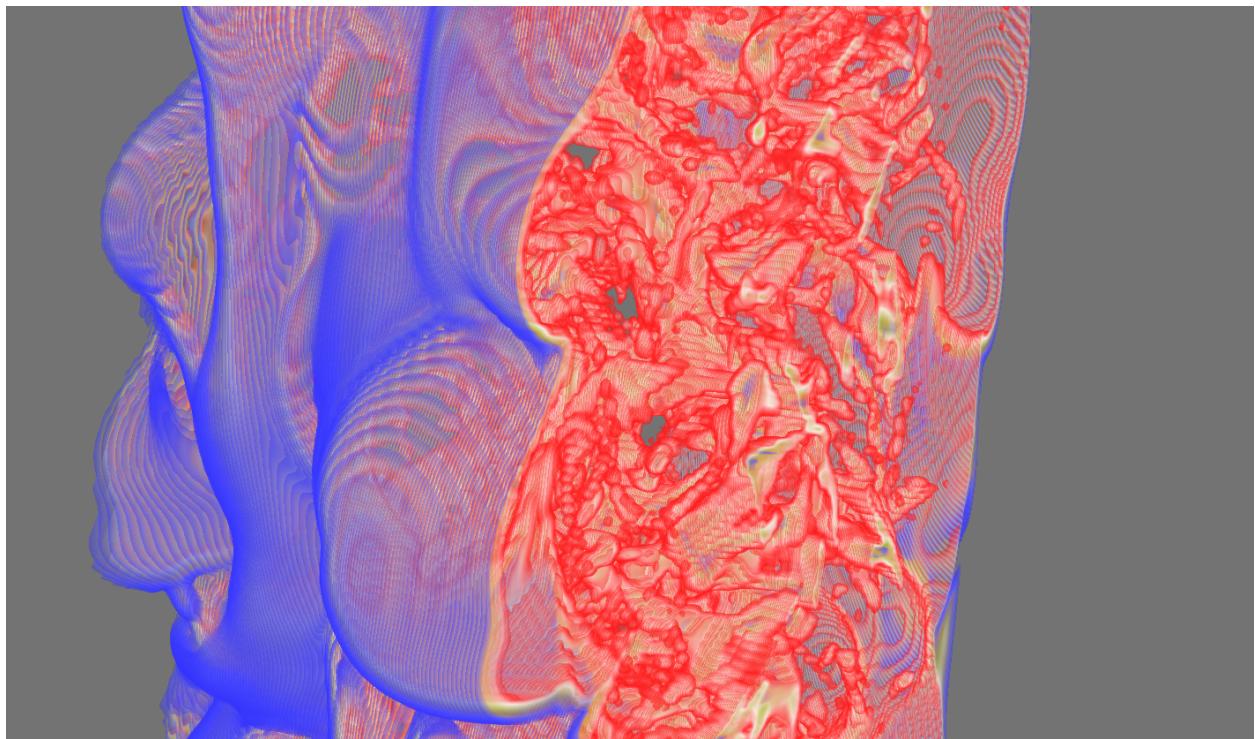
**Color and Opacity Transfer function for Head Dataset:**

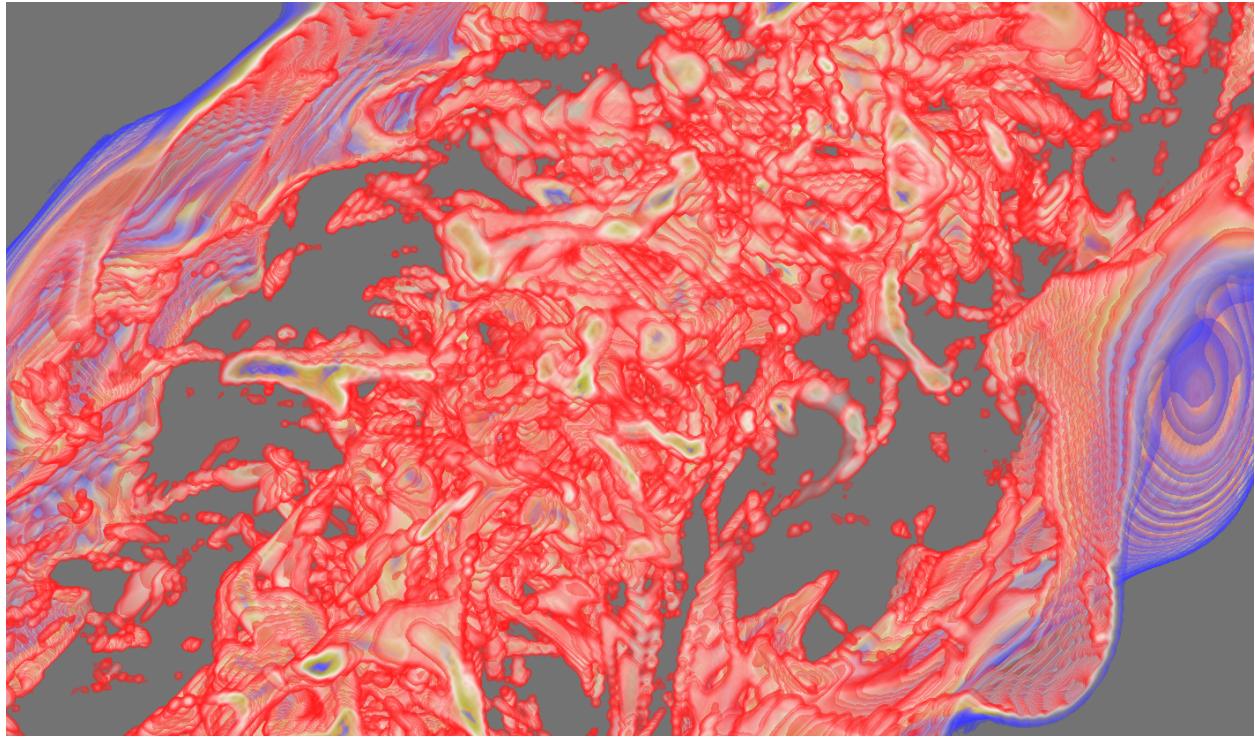


**Rendering Result of Head Dataset:**



**Rendering Result of Flame Dataset:**





**Q: What method did you use to create each opacity transfer function?**

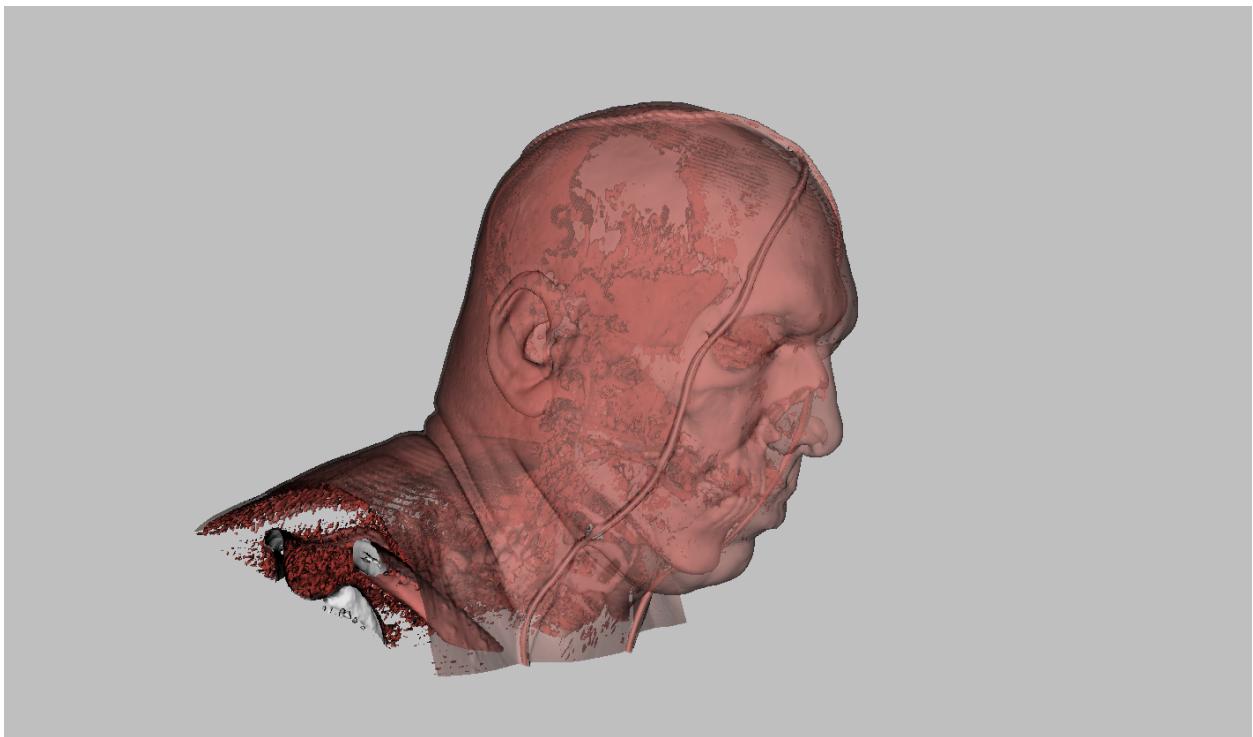
**A:** I used the salient isovalue I discovered from task 1 to determine the isovalue to use for volume rendering. Then, using trial-and-error, I find out the most suitable opacity value for each isovalue by displaying each isovalue at one time. Finally, I display all isovalue and adjust the opacity values accordingly so that the whole rendering result looks balanced.

**Q: What do you consider to be the strengths and limitations of your solutions?**

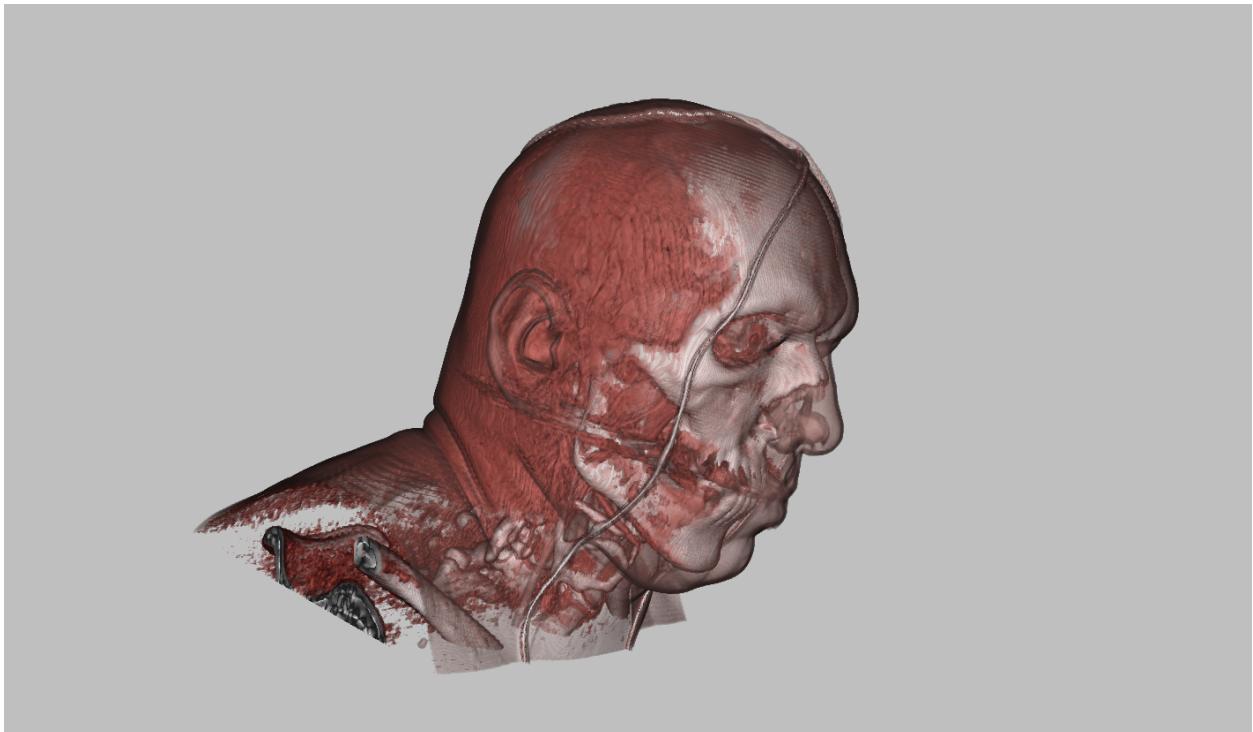
**A:** The strength of my method is that I can include more colors (orange, white, different shades of red) to my transfer function to make my result similar to the picture in the spec. The most obvious limitation of my method is that I cannot levitate the moire effect effectively.

### **Task 3:**

**Comparison of head dataset:**

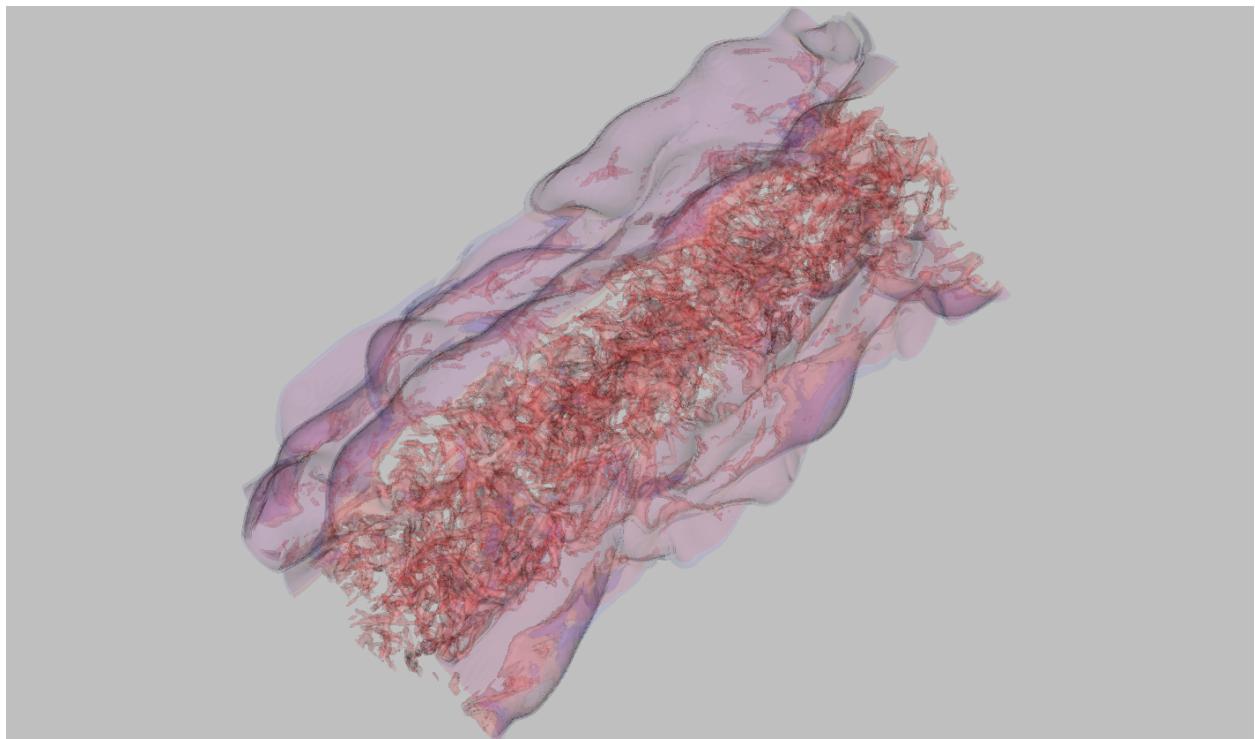


*(from task 1)*

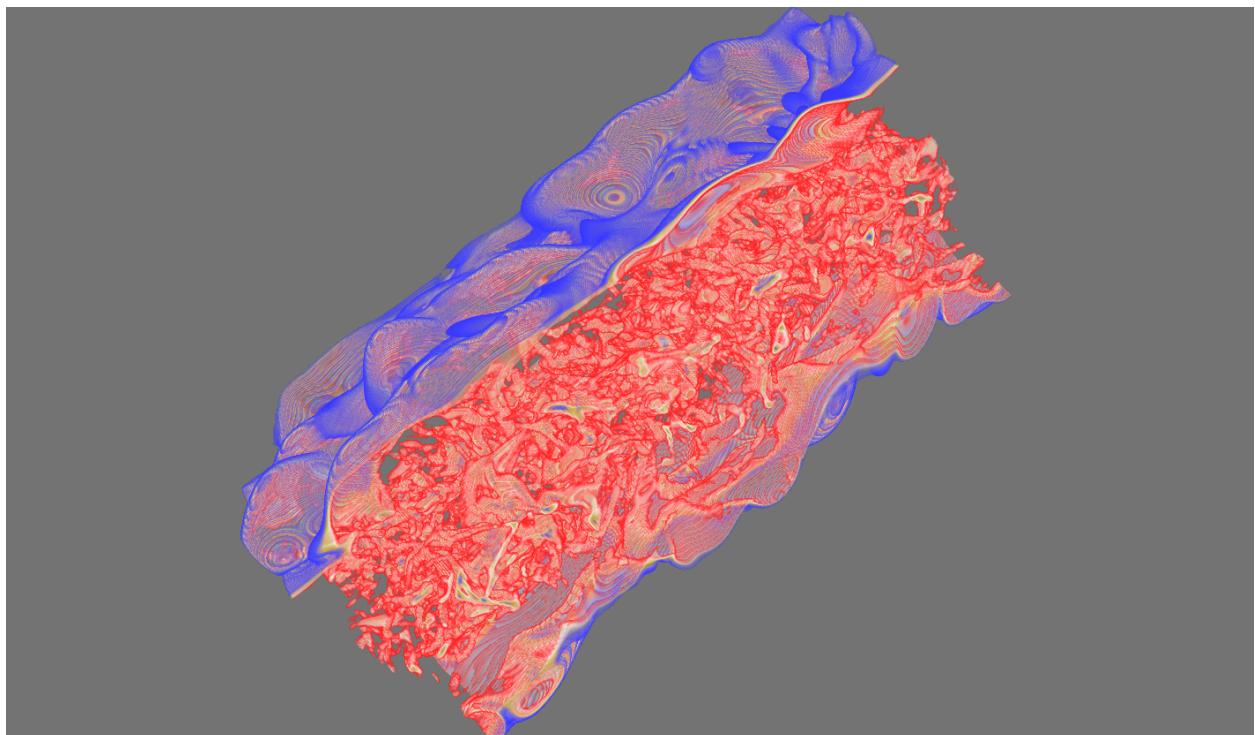


*(from Task 2)*

**Comparison of flame dataset:**



(from task 1)



(from task 2)

**Q: Comment on the differences between the two techniques.**

**A:** For the head dataset, volume rendering makes the color contrast between bone and muscle more obvious, but it also introduces more moire effect. For the flame dataset, volume rendering removes the dark shadow produced by isosurfaces and makes the flame look more real. Similarly, it also introduces moire effect.

**Q: For each dataset, which technique do you find most effective? Why?**

**A:** I think volume rendering is better than isosurfacing for both data sets. For the head data set, it's hard to find a suitable isosurface that nicely separates the muscle and the bone, so the contrast of these two parts is not obvious. But volume rendering can produce better results that clearly shows the muscles. For the flame dataset, isosurfacing requires me to use relatively low opacity to levitate the shadow, but volume rendering does not.

**Q: What are in your opinion the pros and cons of this technique? Refer to the tasks of this project to justify your opinion.**

**A:** As we can see from task1 and task2, volume rendering in general produces better rendering effects than isosurfacing, and the code is easier to implement as well. However, volume rendering creates a moire effect that is hard to levitate even by adjusting the sample distances.