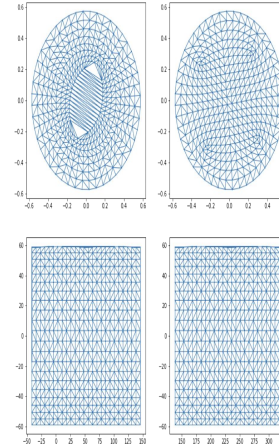
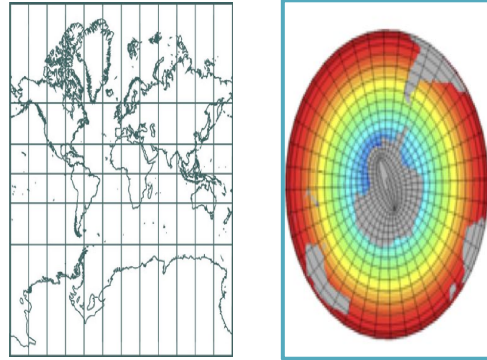


Abstract

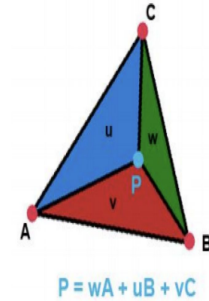
The goal of this project is to construct a visualization interface of the global ocean circulation data generated by the Poseidon Project. The scalar fields will be mapped onto the warped LLC 4320-grid via the barycentric interpolation method, and the resulting image will be generated based on the zoom -level.

Methods

Barycentric Interpolation:
 Step 1:



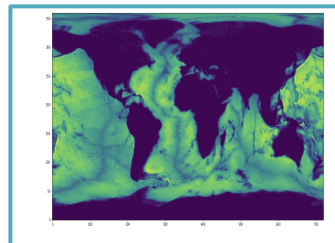
Step 2:



We form a uniform web-mercator grid and compute its Delaunay triangulation, then we can compute the weights of the triangle vertices with respect to a data point inside the triangle.

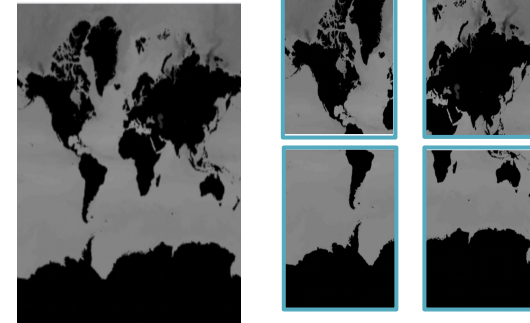
We take a subsample of the data points on the LLC-4320 grid and map it to 4 zones according to its lat-lon value

Step 3:



Using the barycentric weights, we can assign a value to every point on the image grid, which creates an image

Step 4:



To accommodate the different zoom-in levels in the visualization interface, we can shard each image into 4 smaller images, and repeat it for the smaller images.

Introduction

Web Mercator Projection
 Coordinates:

$$x = \left\lfloor \frac{256}{2\pi} 2^{\text{zoom_level}} (\lambda + \pi) \right\rfloor \text{ pixels}$$

$$y = \left\lfloor \frac{256}{2\pi} 2^{\text{zoom_level}} \left(\pi - \ln \left[\tan \left(\frac{\pi}{4} + \frac{\varphi}{2} \right) \right] \right) \right\rfloor \text{ pixels}$$

Using the formula above, we can map lat-lon values to pixel values based on the zoom-level.