

NASA World Wind Tile Structure Technical Documentation

By
Matt Mills (f0urtyfive)

The World Wind tile structure is very basically, a XY grid starting in the lower left corner of the planet. Since obviously the planet is a sphere, this corner would be defined as -90 -180 in latitude and longitude. The coordinates of each box are from the lower left hand corner of the box. The initial point, is considered X = 0, Y = 0.

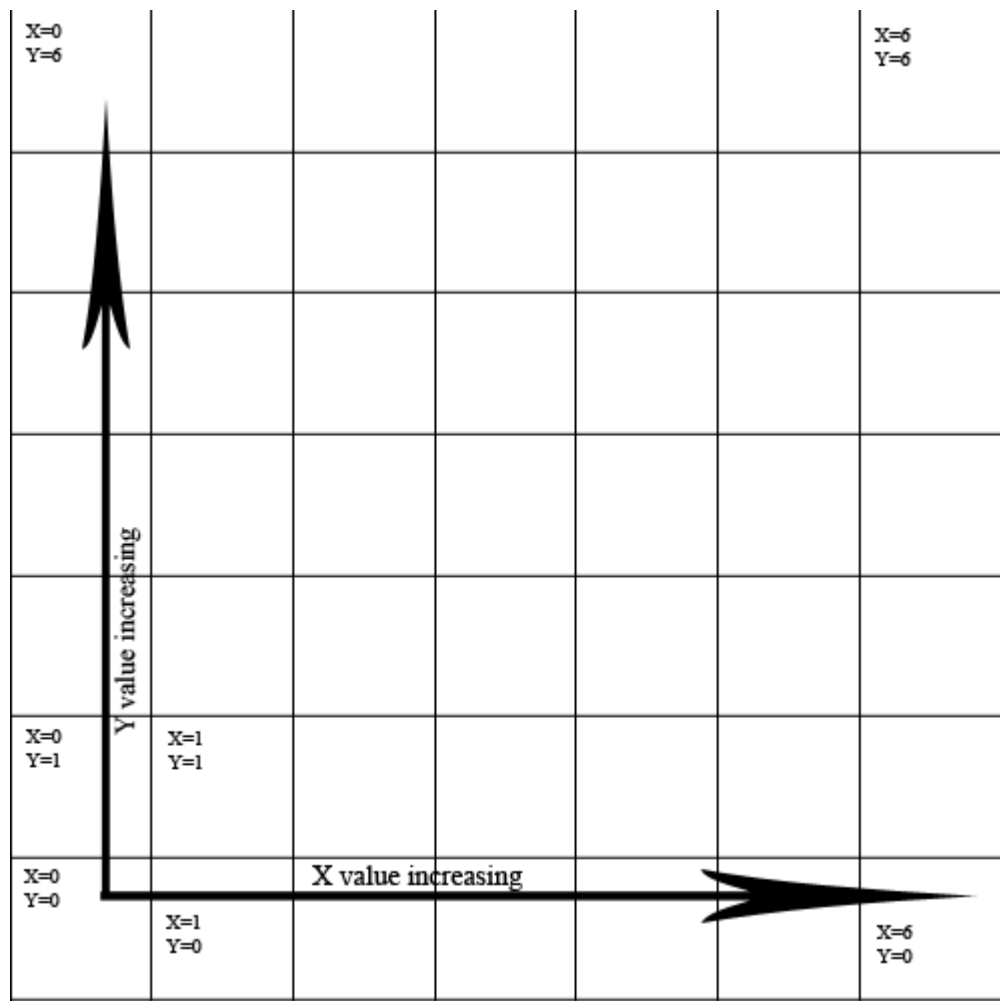


Figure 1

World Wind uses what is defined as “Level Zero Tile Size” to determine how large (in decimal degrees) each tile is in width and height (all tiles are square). A standardized level zero tile size is under consideration but is not yet implemented, but it must divide into 180 evenly. The level zero tile size (herein referred to as lzts) is simply the distance traveled in degrees from one side of a tile to the next side. In the NLT

Landsat 7 datasets, the lzts is normally set as 2.25 degrees. For each increase in level, the lzts calculated using this formula: $lzts * 0.5^{level}$. What this does effectively is decreases the tile size by one half for each increase in level. Where there was one tile, there is now four. Figure 2 demonstrates this.

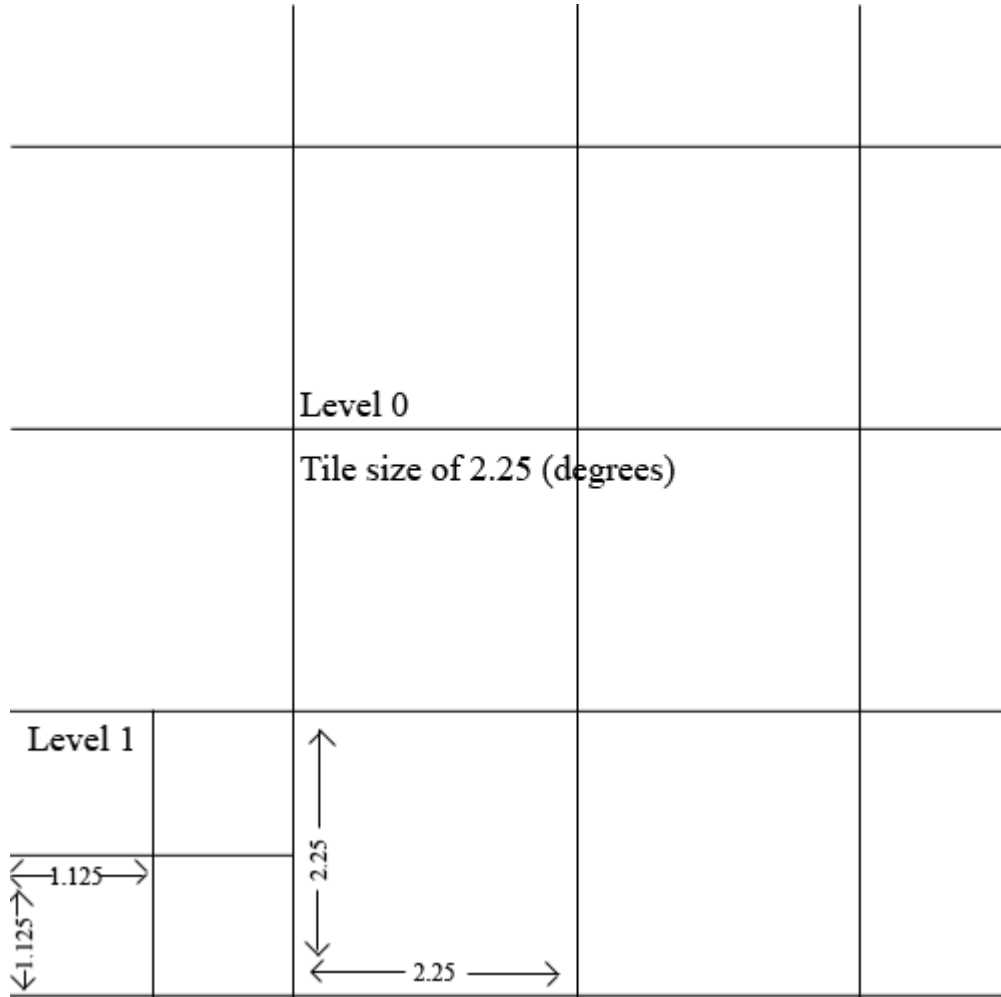


Figure 2

To find the coordinates of the bottom left corner of the next higher tile you would add the appropriate tile size for the level you are in, to the latitude and/or longitude. Adding to latitude would of course increase the Y value, longitude increasing the X value. Figure 3 demonstrates bringing both the concept of X/Y (now displayed as (x,y)) and latitude/longitude. Figure 3 has a LZTS of 2.25 degrees.

(0,6) Lat -76.5 Lon -180						(6,6) Lat -76.5 Lon -166.5
	Lat/Lon increases by Current level Tile Size (in degrees) for each tile.					
(0,1) Lat -87.75 Lon -180	(1,1) Lat -87.75 Lon -177.75					
(0,0) Lat -90 Lon -180	(1,0) Lat -90 Lon -177.75					(6,0) Lat -90 Lon -166.5

Figure 3

Why not use WMS?

NASA Learning Technologies and the NWW user community has tried in the past to use WMS to serve World Wind tiles. The immense demand of the NWW user base has crippled any WMS server we've tried to date. Instead of using an overly complex format (for serving predefined chunks that is) we opted to go with pre-rendered, pre-defined tiles that are just stored in the file system, and can be served to the client with no further processing server side. This reduces the strain on the server incredibly. If you believe you can setup a WMS server that would be able to withstand the NWW user base, feel free, we'd be happy to see that. In the mean time we are working on creating a WMS server that can read the World Wind tile structure (for compatibility with other programs).