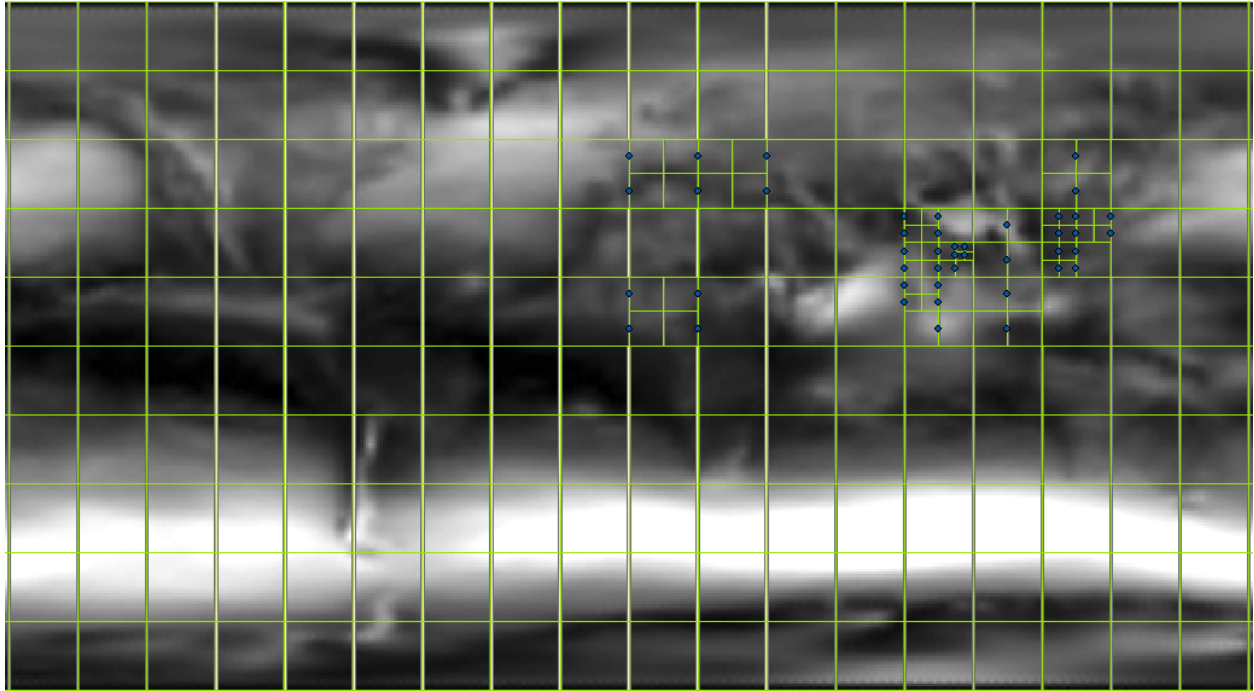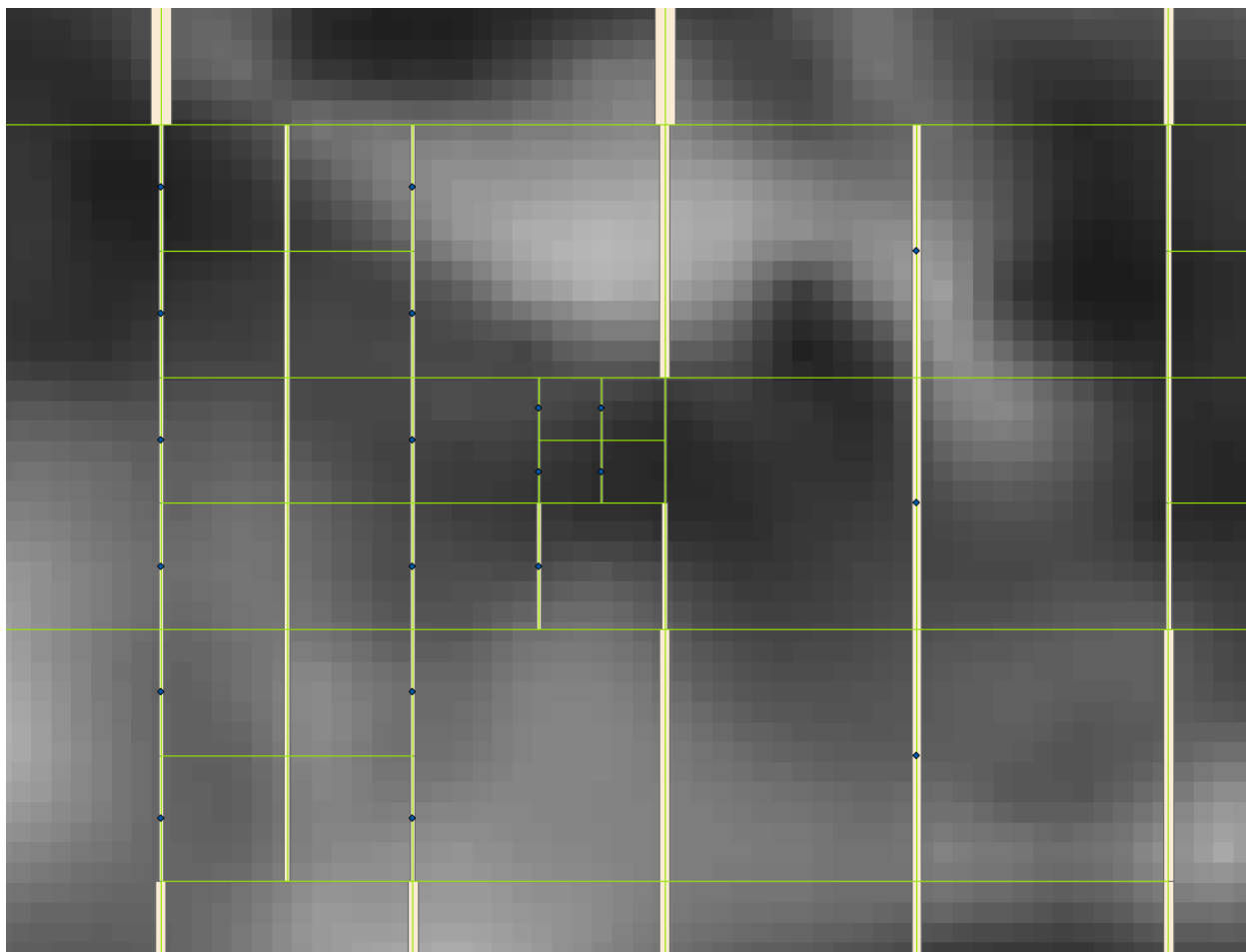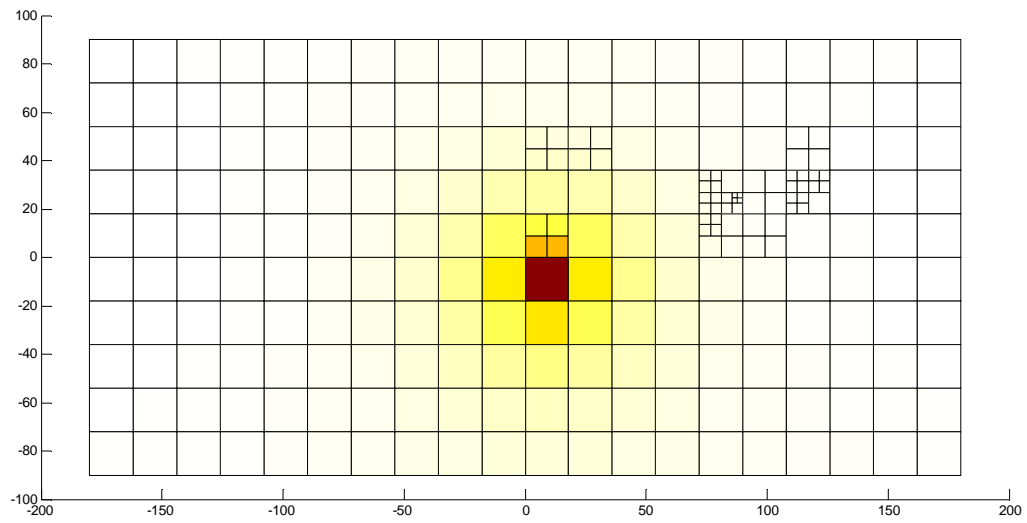Issue with Zonal Statistics: some small zones (buffers around the edges of the grid) are missed by the zonal statistics, which "screws" my pollutant distribution (constant wind field in every direction => should have a central symmetry).

By comparing the zone feature class to the output table of the zonal statistics, we can find polygons that were missed, and determine their centroids. The goal is then to take a sample of the input raster at cendroids locations.

We can see the original zones (buffers), and we understand that samples might not be better than rough approximations, because zones cover sometimes a significant amount of pixels (even if it is partial).

Running the zonal statistics with completion "solves" the problem in this trivial example.

.. but it is nothing more than a rough workaround.