Discrete Global Grid Systems - Interview with Perry Peterson

A number of weeks ago, I made contact with a certain Perry Peterson, the founder of a Canadian-based company called PYXIS, in order to request an interview about the Open Geospatial Consortium's new Discrete Global Grid System (DGGS) standard which will be released soon. Over the course of numerous emails, Perry, who was one of the Chairs of the OGC's DGGS working groups, agreed that an interview about the standard which he helped develop would be a more suitable option.

My initial reluctance to write an article was due to a perceived complexity of an aspect of the industry which is now much more understandable thanks to the efforts of Perry and others. This Global Grid system overhauls and simplifies an incredibly complex aspect of the geospatial industry, one which is based on the scientific aspects of tesseral geometry, projections, spatial indexing, and coordinate reference systems which underpin locational accuracy. In a world which is becoming more complex due, in particular, to the massive volumes of data from sensors, satellites, and many devices, such simplification is of utmost importance. Therefore, DGGS, which is, it should be noted, a response to a UN Proposal for a Global Statistical Geospatial Framework, reflects an effort to remove some of the barriers to involvement in the spatial analysis process which face less-technical professionals.

In terms of how it works, DGGS removes the challenges of integrating data sources from a need for the multitude of various grid reference systems and scales around the world. It replaces traditional coordinates with cells that store information about that fixed location, thereby making access to data that defines the geospatial world much simpler. Simon Chester of the OGC uses the spreadsheet analogy in order to describe how DGGS works, whereby each area of land and its data contents references a unique cell. A single DGGS partitions the earth with triangular, rectangular or hexagonal cells of equal area, each of which can be refined into a limitless number of smaller and smaller cells. Therefore, by replacing reference to Lat/Long positioning with a system that provides a cell for every location at every resolution, the difficulties which are associated with integrating spatial data from a wide range of sources and, more importantly for myself at least, in explaining DGGS are overcome.

By standardising the geospatial grid system, DGGS will allow for geospatial information (raster or vector) from any source, and spatial reference, scale and frequency to be held in a single cell. As a result, by understanding the relationship between data within cells, DGGS will make it possible for everyone, not just geospatialists, to perform integrated analysis of very large, multi-source, multi-resolution, multi-dimensional, distributed geospatial data like never before possible.

Now that we have established what DGGS is and how it works, it is worth understanding how the standard materialised in a practical sense. The first step in this regard is to understand the OGC's process of accelerating geospatial standards and particularly standards which advance interoperability. In this regard, DGGS emerged from its own standards working group which acts as an incubator, network hub and a starting point for business development and strategic technology planning. Throughout the process, DGGS was developed, refined and improved through numerous testbeds and pilot projects involving established bodies such as Environment Canada, GEOSS, USGS, NASA, Natural Resources Canada, Australia's Bureau of Statistics, Geoscience Australia, and the UN-GGIM. Furthermore, the standard was examined at a specially dedicated workshop at the EU INSPIRE conference and today DGGS can be viewed in action through the browser-based PXYIS Studio client application.

By removing the inherent complications associated with unique grid reference systems globally, DGGS is dramatically simplifying the management and analysis of increasing volumes of EO and non-EO data. AI-based supercomputers are expected to more efficiently use CPU and GPU resources for parallel and distributed processing of data in cases of say, environmental, climatic or even demographic modelling. In time, the incorporation of 4D encoding and volumetric pixels into DGGS, as well as the increasing interoperability between DGGS, OGC Web Services and IoT platforms will accelerate its likely uptake. According to Perry, the interest and uptake among the private sector is already happening. This, he says, is demonstrated by the awarding of major purchase agreement to a geointel company, and investments in the technology by major GIS software and survey companies.

Solving the geospatial data integration challenge with DGGS adoption as seen in the UN Global Statistical Geospatial Framework will advance our capabilities, make spatial data more useful, and provide insightful engagement in our changing world. At its core, the DGGS standard is about removing the technical barriers to entry so that end-use decision-makers - from scientists to citizens - can participate in the spatial analysis process. Although I, personally, will not miss the complexity of grid references systems and scales, I hope that future generations will still be able to appreciate the significant effort and collaboration which has brought us to this exciting phase in the geospatial world.

This article was published in GIS Professional December 2017