EARTH OBSERVATION SYMPOSIUM (B1)
Big Data, Data Cubes and new platforms to exploit large-scale, multi-temporal EO Data (6)

Author: Dr. Matthew Purss
Geoscience Australia, Australia

Dr. Robert Gibb
Landcare Research NZ, New Zealand
Prof. Faramarz Samavati
University of Calgary, Canada
Mr. Perry Peterson
PYXIS, Canada
Mr. Clinton Dow
ESRI, United States
Dr. Jin Ben
Zhengzhou Institute of Surveying and Mapping, China
Dr. Adam Lewis
Geoscience Australia, Australia
Mr. Jonathon Ross
Committee on Earth Observation Satellites, Australia

DISCRETE GLOBAL GRID SYSTEMS: A NEW PLATFORM TO EXPLOIT BIG EARTH DATA

**Abstract**

The emergence of the internet and cloud/HPC platforms has both enabled the exploitation of 'Big Earth Data' and helped to drive an increasing demand for the rapid integration and analysis of a pool of rapidly growing geospatial data from an increasing number of sources across the globe. However, conventional Geospatial Information Systems (GIS) platforms, built from the 'flat earth' cartographic perspective imposed by maps, are an impediment to the true realisation of this demand. And without a new approach it will be very difficult to transform the every expanding volume, variety and veracity of 'Big Earth Data' into useful information in a timely fashion.

Fortunately, there is a solution to this problem; one that actually pre-dates the conventional GIS approach. This new (or rather 'old') approach uses Discrete Global Grid Systems (DGGS) as a platform to describe the curved surface of the Earth rather than a warped and flattened representation. DGGS provide an alternate spatial reference system that is based on an equal area, hierarchical tessellation of the spheroidal model of the Earth at multiple resolutions; where each cell is referenced by a globally unique identifier. A DGGS presents a common framework that is capable of linking very large multi-source, multi-resolution and multi-domain datasets together to enable the next generation of analytic processes to be applied. Because each cell of a DGGS represents a uniform spatial coverage with a unique reference identifier, a DGGS is able to reduce complex multi-dimensional spatial queries to one-dimensional array processes that enable rapid and accurate computation and integration of data using a computer (even at the poles!).

The emergence of DGGS as a technology is being driven by the development of international standards through the Open Geospatial Consortium (OGC). A new OGC Abstract Specification for DGGS will be published in 2017 that will provide the necessary guidance for the development of scalable and interoperable spatial data infrastructures that are able to meet and grow with the demands of 'Big Earth Data'

into the future. This paper will describe the key elements of DGGS under the new OGC Abstract Specification, explore the differences between conventional GIS and DGGS and will demonstrate the potential that DGGS as a technology bring to the world of 'Big Earth Data'.