National Aeronautics and
Space Administration

Global Elevation Data Adaptive Compression Algorithms

Providing greater compression and faster decompression of digital terrain maps

TECHNOLOGY OPPORTUNITY

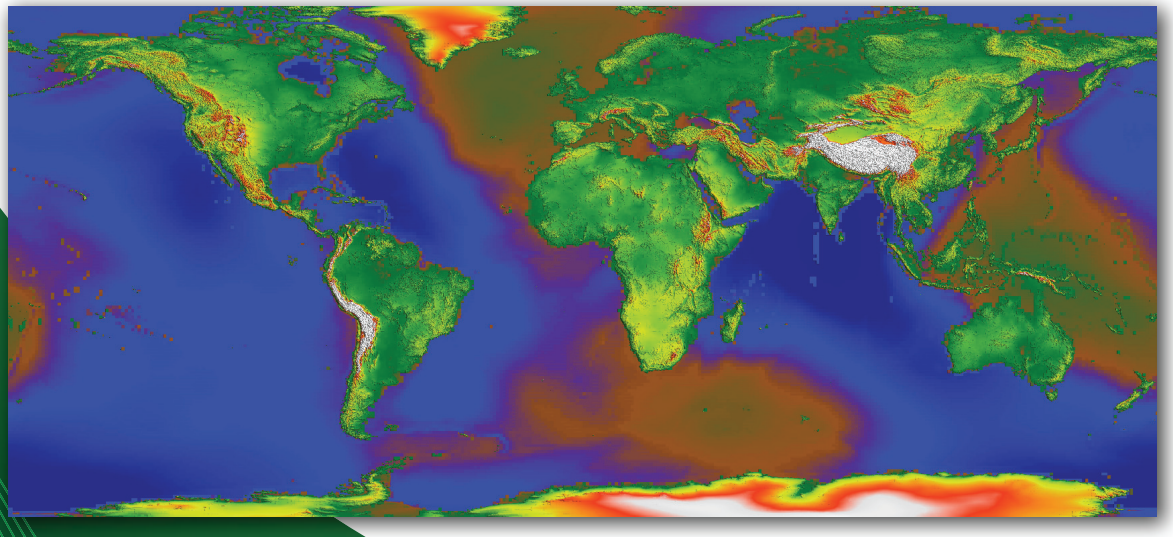
NASA's Dryden Flight Research Center invites companies to consider licensing the Global Elevation Data Adaptive Compression Algorithms (GEDACA) for further development and commercial applications. This patent-pending innovation provides compression and rapid decompression of digital terrain maps (DTMs) in constrained computing environments. With the ability to integrate more than 250 billion separate pieces of terrain information in a single compressed DTM, uses include applications that require large databases of graphical information deployed via restricted environments such as tablets and smart phones.

BENEFITS

- **Effective:** Controls error induction maximums for user-defined geographical areas from lossless to infinite and incorporates different areas seamlessly in a single compressed DTM
- **Fast:** Performs rapid, high-performance decompression in real-time constrained computing environments
- **Powerful:** Integrates more than 250 billion separate pieces of terrain information into a single compressed DTM
- **Proven:** Features technology flown and tested on several different platforms including high-performance fighter aircraft
- **Economical:** Offers industry standard C, C++ code base and map formats

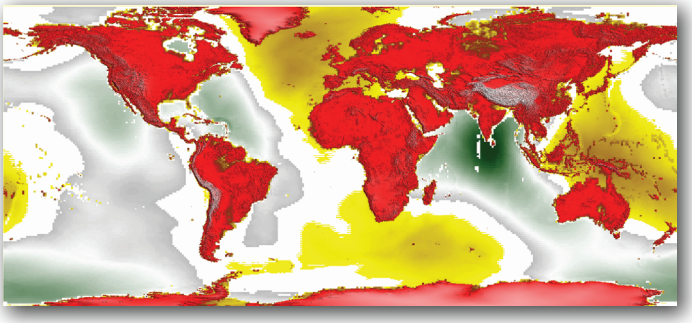
APPLICATIONS

- Global Positioning Systems (GPS)
- Any software that rapidly computes line of sight
- Any software that analyzes and plans terrain routes or analyzes continual surfaces



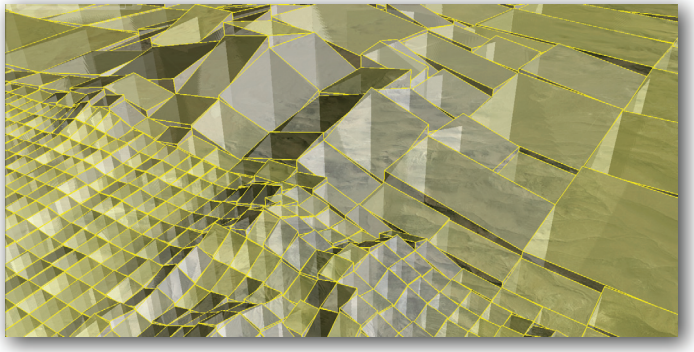
TECHNOLOGY DETAILS

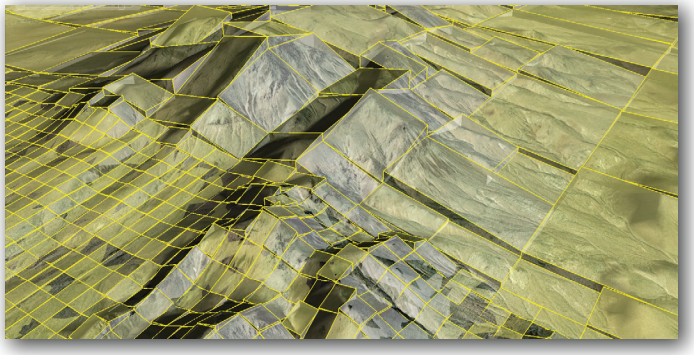
The GEDACA software provides an extensive and highly efficient compression capability for continental and global-scale DTMs, along with a real-time decompression capability to locally decompress and render map data.



HOW IT WORKS

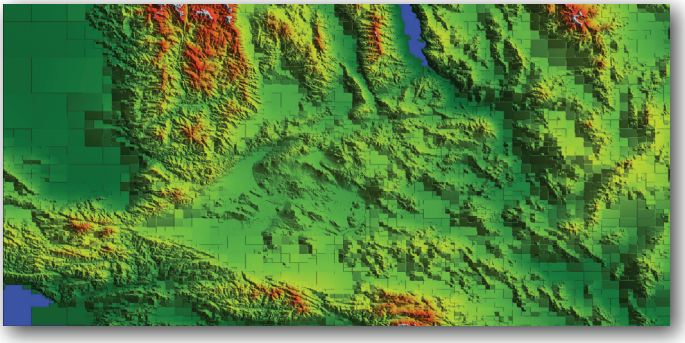
The GEDACA software achieves its high-performance compression and decompression capability using a unique combination of regular and semiregular geometric tiling allowing for the use of particular benefits of each aspect and the ability to mitigate the drawbacks of others. Geometric facets are fit to the data through linear regression or adaptive regression techniques and arranged in a combination structure. This allows for important slope information to be retained and continuous terrain representation to be generated, enabling the possibility of high-resolution decompression.





WHY IT IS BETTER

Generally, the more accurate a DTM is, the larger the resulting file size, presenting a problem for constrained computing environments. Because the GEDACA software provides high compression ratios with real-time decompression using a recursive semiregular tree-based compression that utilizes linear regression geometric tiling, resulting file sizes fit within the memory limits of conventional systems. Additionally, the ability to selectively tailor information for specific geographical areas enables high-fidelity sections of terrain data to be incorporated seamlessly into maps. This allows for compression trades to be localized and satisfy size requirements for a larger number of applications.



PATENTS

Dryden has applied for patent protection for this technology.

LICENSING AND PARTNERING OPPORTUNITIES

This technology is part of NASA's Innovative Partnerships Office that seeks to transfer technology to and from NASA to benefit the space program and U.S. industry. NASA invites companies to consider licensing the Global Elevation Data Adaptive Compression Algorithms (DRC–009–008) for further development and commercial applications.

FOR MORE INFORMATION

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