Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

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Visualization of Geodetic Data in ArcGIS
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Almost all processes taking place in nature have analog character (gravitational interaction, atmospheric pressure, air temperature, etc.) and vary continuously with time.

In practice, we, as a rule, have separate measurements performed either at a specific moment of time, or in a certain place of space, i. e., we deal more often with discrete representation of a continuous process. Discretization of continuous processes is one of the fundamental ideas of digital information processing.

In problems of physical geodesy, initial data has discrete representation; therefore, it is effective to implement for their resolution algorithms of linear discrete transforms, such as the Fourier transforms, Hartley transforms, wavelet-transforms. An effective method of calculations is developed for the above discrete transformations - fast algorithms; they allow one to calculate arrays of discrete information that are characteristic of problems of physical geodesy in real time. It is especially important that implementing such algorithms results in obtaining solutions at knots of a regular grid, which helps considerably their further application to visualizing solution results.

Modern development of computer technology and software makes it possible to build 2-D and 3-D digital models of various solution results of physical geodesy problems. The models can be used not only for demonstrations, but also for practical purposes, for example, for modeling a relief, situation, modeling geoidal surface, for doing special scientific calculations, etc.

The paper discusses the issue of computing anomaly height by the fast Fourier transform (FFT), which performs the calculation process by two orders faster than by traditional methods. Calculation of anomaly height has been done by two algorithms: the first one used gravity disturbances and the second one utilized gravity anomalies.

From the results of calculations, there have been generated anomaly height maps for both the water area of the Okhotsk Sea and the area of the Central Alps, as well as a 3-D relief model of this area of the Central Alps.

ArcGIS has been selected as a tool for building the three-dimensional relief model, it being a family of software products of the American company ESRI.

キーワード: Fast Fourier Transform(FFT), anomaly height, digital models, ArcGIS
Keywords: Fast Fourier Transform(FFT), anomaly height, digital models, ArcGIS

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Centralized Geodatabase and Mobile Field Data Collection for University Campus Information System

Centralized Geodatabase and Mobile Field Data Collection for University Campus Information System

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Recently, the use of mobile communication devices, such as smart phones and cellular phones, in field data collection is increasing due to the emergence of embedded Global Position Systems (GPS) and Wi-Fi Internet access. Accurate, timely and handy field data collection is required for disaster management and quick response during emergencies. In this presentation, we introduce a web-based GIS system to collect the field data from personal mobile phones and smart phone through a Post Office Protocol POP3 mail server and Web-GIS. The main objective of this work is to demonstrate a real-time field data collection method to students using their mobile phones to collect field data in a timely and handy manner, either in individual or group surveys at local or global scale research. This Web-based GIS will be used as Tsukuba University campus information system and facility management for students and visitors.

キーワード: Web-Based GIS System, Real-Time Field Data Collection, POP3 Mail Server, Smart Phone, Personal Mobile Phone
Keywords: Web-Based GIS System, Real-Time Field Data Collection, POP3 Mail Server, Smart Phone, Personal Mobile Phone

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3D レーザースキャナーを用いた鍾乳洞の地形解析
Geomorphological analysis of a limestone cave using a 3D laser scanner

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近年，3D 技術を用いた地形解析が行なわれている．3D 技術を用いることにより，従来よりも高精度かつ高密度なデータを得られ，断面図の作成や面積・体積の計算なども容易となる．しかし，鍾乳洞の地形解析に 3D 技術を用いた例はまだ少ない．本研究では，3D レーザースキャナーを用いて鍾乳洞の測量を行い，その地形を 3 次元的に解析した．静岡県浜松市にある竜ヶ岩洞を対象地とし，総延長約 470m の洞内 41ヶ所で計測を行い，904 万 5800 点の測量点数からなる洞内 3D 測量図を作成した．計測には TOPCON 製 3D レーザースキャナー GLS-1500 を使用し，データの編集には ScanMaster を用いた．測量で得られた 3D データを定量的に分析したところ，溶食形態や鍾乳石・堆積物の分布と，鍾乳洞全体の形状に関係が見られた．

キーワード: 鍾乳洞, 3D レーザースキャナー, 地形
Keywords: Limestone cave, 3D laser scanner, Topography