A Geographical Information Based Multimedia Information System Development for Nuclear Control

,   ,   ,   ,

150

.

,

.

.   ,   ,   .

.   ,   ,   ,

.   NIMA (National Imagery and Mapping Agency)   DTED (Digital Terrain Elevation Data) Level 0   .
2000
.   2   .
.

Abstract

Current information technology is centered on the Internet and changes our daily working pattern, particularly with multimedia information. Rapid development of information processing hardware and software has enabled us to deploy multimedia information management system of low hit counts and small amount of information volume on the desktop computer and publish multimedia information directly to the workgroup intranet with no particular additional hardware and software. Success of the timely development of the information system depends on the adoption of the proper direction and scale of information technology. The nuclear control mainly consists of safeguards, physical protection and export/import control. This paper provides an investigation on the application of openly available multiple media information to the nuclear control information management system. Information system with spatial map, image data including satellite imagery, audio, and video makes users easy to understand the current status and communicate each other easily. The Digital Terrain Elevation Data (DTED) Level 0 of the U.S. NIMA (National Imagery and Mapping Agency) is used as a base map. The multimedia information system is mainly built with Microsoft PowerPoint 2000 and Office Web component. A database with the second normal form was applied to the Office Web component. The importance of the information security was stressed.

1.

40

(IAEA, International Atomic Energy Agency)   (safeguards)
3   . 1997   IAEA
INFCIRC/540   INFCIRC/153
. INFCIRC/153   1970   ,
,   ,   (declare)
. INFCIRC/153   IAEA
(timely detection of diversion of significant quantities of nuclear
material)[1].
. IAEA
. INFCIRC/153
.   1993   , IAEA
. IAEA
(increased access to information)   (increased
access to facilities)   . IAEA   INFCIRC/540
.   ,
IAEA   [2].
.

- •
- •   ,
- •
- •   (short notice inspection)
- •
- •
- •
- •

- •   IAEA

.
INFCIRC/540   70-80%   .
,   ,   ,   ,   .

.

2. Digital Terrain Elevation Data level 0

NIMA (National Imagery and Mapping Agency)
.   NIMA   DTED   Level   0
(http://164.214.2.59/geospatial/products/DTED/dted.html)   1 arc degree x 1 arc degree cell (3.
)   30 arc second   . DTED
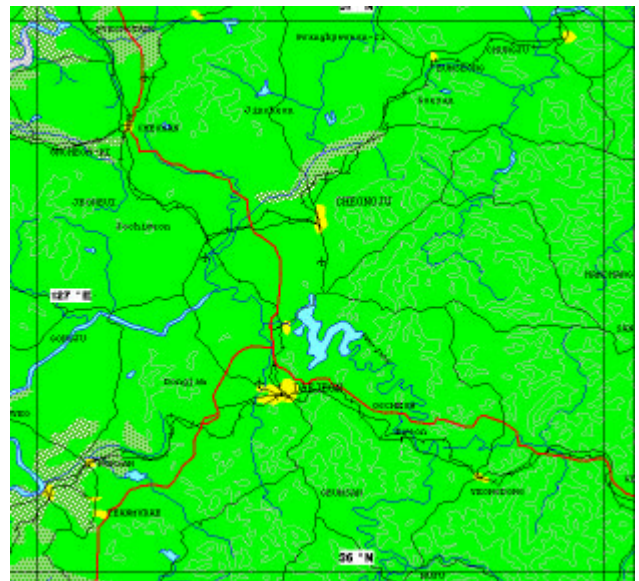Level 0   1   30 arc degree x 30 arc degree cell
hyperlink   2   .   2
3   hyperlink   .
.   3

,   .
DTED Level 0   15 arc minute x 15 arc minute   ,   ,
      ,   DMED (Digital Mean Elevation Data)   .
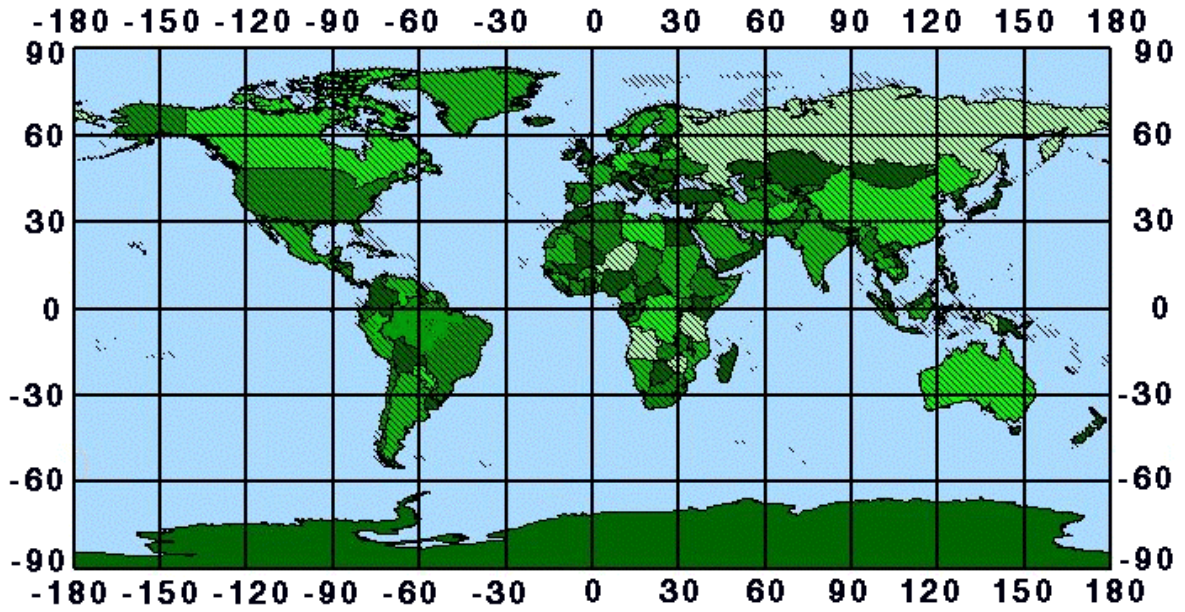
1.
(From DTED Level 0 of the NIMA, U.S.A.)
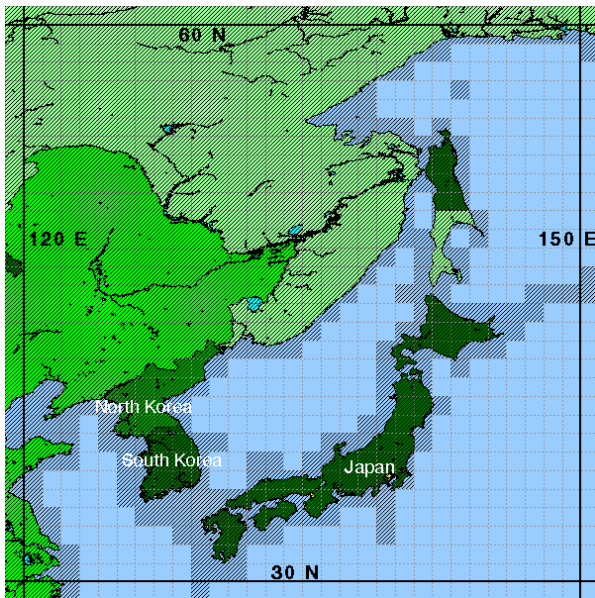
2.
(From DTED Level 0 of the NIMA, U.S.A.)

3.
(From DTED Level 0 of the NIMA, U.S.A.)

3.

([3])
                                                           .
                                    2000   .

Spreadsheet component, PivotTable component, Chart component .
(Excel Lite) .

workbook ,
/ 2000
. 2000

,
[4]. VBA (Visual Basic for Applications) .
VBA
. Excel flat file VBA
.
, , ,
.

3.1
DTED Level 0 , .
. 4 3 (pane)
. ' ' , ' ,
. ' , ' ,
. [ ]
4 3 , [ ]
' ,
. [ ]
. [ ]
.

4. 5.

hyperlink ' '
. ' ',' ','
', ' ', ' ', hyperlink
.

hyperlink
. hyperlink
. htm (pane) (frame)
.
5
hyperlink .
(3 cell) hyperlink .

.

        image map
   hyperlink   .
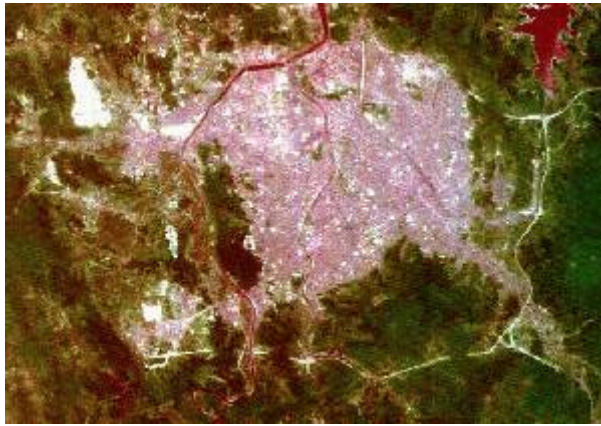
3.2
 IAEA   (Integrated Safeguards)
        [5~6].

              .   2000   1m
                         [5~9].
                  (KAIST SaTRec)   1999   5   26
'   3 '   .   3   (GSD ; Ground
Sample Distance) 13.8m   3   (520-620 nm Red, 620-690nm Green, 730-990nm Near-IR)
CCD   .

6.   3
(KAIST SaTRec, '99.7.7)

7.   1
(KARI, '00.2.29)

               (KARI)   1999   12   21   1
              .   1   (EOC; Electro Optical Camera)
         . EOC   (digital
elevation model)   . EOC   510 ~ 730 nm
    (panchromatic)   ,
     (stereo image)   .   685km   GSD   6.6 m
(swath) 17km   ,   800km   .
    3   0.9   .

3.3
              (RDB   relational database)   (relation)   (row
  record)   (column   field)   2   . RDB
             . RDB   SQL (Structured Query
Language)   .
         (normalization)   .
   1   :   Field uniqueness:
              field
                   (non-

repeating) .

2 : 1 .
Primary key:
record primary key ,
primary key field .
Functional dependence:
Primary field field primary key
.

3 : 2 .
Field independence:
Primary field field
.

.

.

(denormalization) RDB
, .
workbook, worksheet, range, cell . Sheet
range range object .
list . flat-file
. List
VBA (Visual Basic for Applications)
RDB export 3 . Spreadsheet
component 2 . Spreadsheet component
list ,
export .

4.

CPU Pentium 166MMX real memory 128MB . (concurrent
users) 3 , off-line
. MS Windows NT Server 4 Service Pack
6a . ' ,
.

① NetBEUI PC
2000 ' ,

② TCP/IP MS Internet Explorer 5 (disk-based
web) (' ' htm
)

③ TCP/IP MS Internet Explorer 5 (server-based
web) (' ' (publish)
)

③ . ③
[10]. Internet Information Server 4
. FrontPage 2000 FrontPage Server Extensions
.

5.

MS
Windows NT Server IP (Internet Protocol) masking .
firewall
. Windows 2000 Server
Excel list RDB , IP address masking PKI (Public Key Infrastructure)
X.509v3 Certificate Server SSL (Secure Sockets Layer)
[11].

6.

. INFCIRC/153
INFCIRC/540

.

.

.

.

. ,
.

.

.

.

1. IAEA. "IAEA Report 1990-11-21, Safeguards Criteria 1991-1995," 1994
2. IAEA. "INFCIRC/540(Corrected), Model Protocol Additional to the Agreement(s) between State(s) and the International Atomic Energy Agency for the Application of Safeguards," 1998
3. Q. S. Truong, et al. "GIS-based nuclear safeguards information management and reporting", Proceedings of the Institutes of Nuclear Materials Management 40th Annual Meeting, 1999
4. P. Blattner, et al. *Special Edition Using Excel 2000*, p.486, 1999, Que Corporation, A Division of Macmillan Computer Publishing, USA 201 W. 103rd Street, Indianapolis, Indiana 46290
5. Q. S. Truong, et al. "Potential Application of Commercial Imagery in International Safeguards." Journal of Nuclear Materials Management, Volume XXVII, Number 2, Winter, 1999
6. M. Canty, et al. "Wide-area Change Detection: The Use of Multitemporal Landsat Images for Nuclear Safeguards." Journal of Nuclear Materials Management, Volume XXVII, Number 2, Winter, 1999
7. Takashi Hamazaki and Toshibumi Sakata. "Japanese Earth Observation Satellite Program and Its Potential Contribution to IAEA Safeguards Activities." Journal of Nuclear Materials Management, Volume XXVII, Number 2, Winter, 1999
8. Bhupendra Jasani. "Civil Radar Observation Satellite for IAEA Safeguards." Journal of Nuclear Materials Management, Volume XXVII, Number 2, Winter, 1999
9. Sharon Squassoni. "Safeguards and Satellite Imagery: Potential Applications." Journal of Nuclear Materials Management, Volume XXVII, Number 2, Winter, 1999
10. Jim Buyens. *Running Microsoft FrontPage 2000*. Chapter 24 Publishing Your FrontPage Web, Microsoft Press, 1999
11. Microsoft Corporation. *Microsoft Windows 2000 Corporate Preview Program Beta 3,* p.50, 1999