Spectrum Management System for Developing Countries (SMS4DC)

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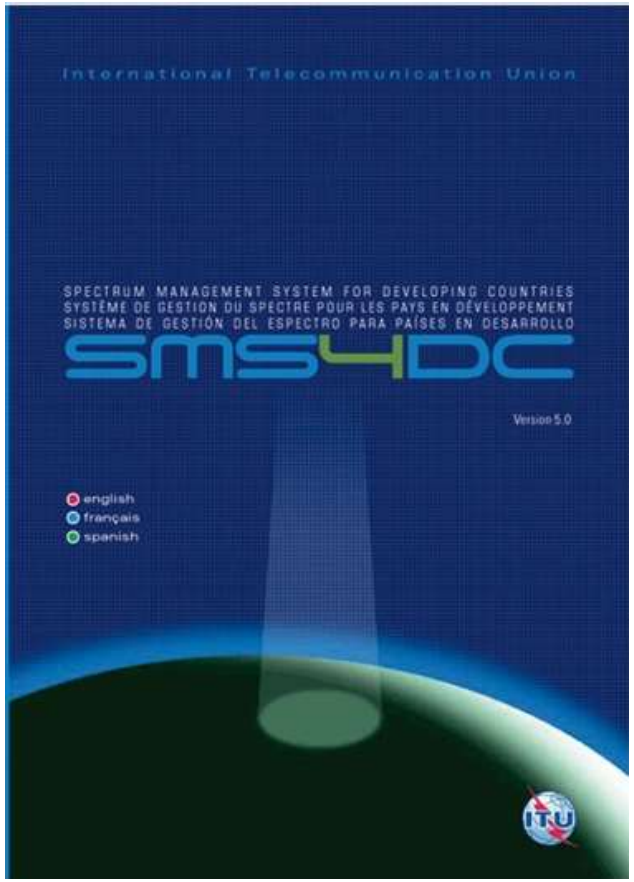
CELEBRATING 25 YEARS OF ACHIEVEMENTS

ITU Spectrum Management System for Developing Countries (SMS4DC)

- SMS4DC is software designed by ITU based on ITU recommendations
- Developed to assist the administrations of developing countries to undertake their spectrum management responsibilities more effectively;
- SMS4DC covers terrestrial fixed, mobile, sound and television broadcasting services in the bands above 30 MHz, including GE-06 as well as frequency coordination of Earth stations



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SMS4DC Development Cycle

- **2007:** *SMS4DC Version 1.0*
- **2008:** *SMS4DC Version 2.0 (Addition of Digital TV planning tools (GE06))*
- **2009:** *SMS4DC Version 3.0 (Addition of Google Earth and monitoring interface)*
- **2012:** *SMS4DC Version 4.0 (link to ESMERALDA monitoring software of Thales and additional enhancements*
- **2014:** *SMS4DC Version 4.1 (Update of Article 5 according to WRC12, import from new BRIFIC & interface with appendix 7)*
- **2015:** *SMS4DC Version 5.0 (Revised propagation models based on the latest version of P.452, P.530 and P. 1812, P.1546 + 11343).*
- **2017: SMS4DC Version 5.1**
  - *Results of WRC-15*
  - *Revision of the Radio Regulations Article 5 module and update of the international frequency allocation*
  - *HCM*
  - *Spectrum Fee Calculation Example*

SMS4DC subscribers

V.5.0 V.4.1 V.4.0

Until Dec 2016

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Key Functions of SMS4DC

- **Comprehensive database (MS Access) of user/license details, with data fields in accordance with ITU recommendations;**
- **Provides complete process from: frequency application, frequency assignment, licensing, ITU plans and Bilateral frequency coordination procedures;**
- **Imports coordination data from ITU BRIFIC & SRS CD-ROM database;**
- **Producing electronic notices, print license, invoice & spectrum fee**
- **Security features:** *The designated system administrator can define an individual account for each SMS4DC user up to 6 levels of access to the different processes (e.g. licensing, assignment etc). Each user account is named and password protected.*

SMS4DC Configuration

Single user

Workstation

-Main application
-Database
-Reports
-Maps

Multi user

-Database
-Reports
-Maps

Server

Workstation B

-Main application

Workstation A

-Main application

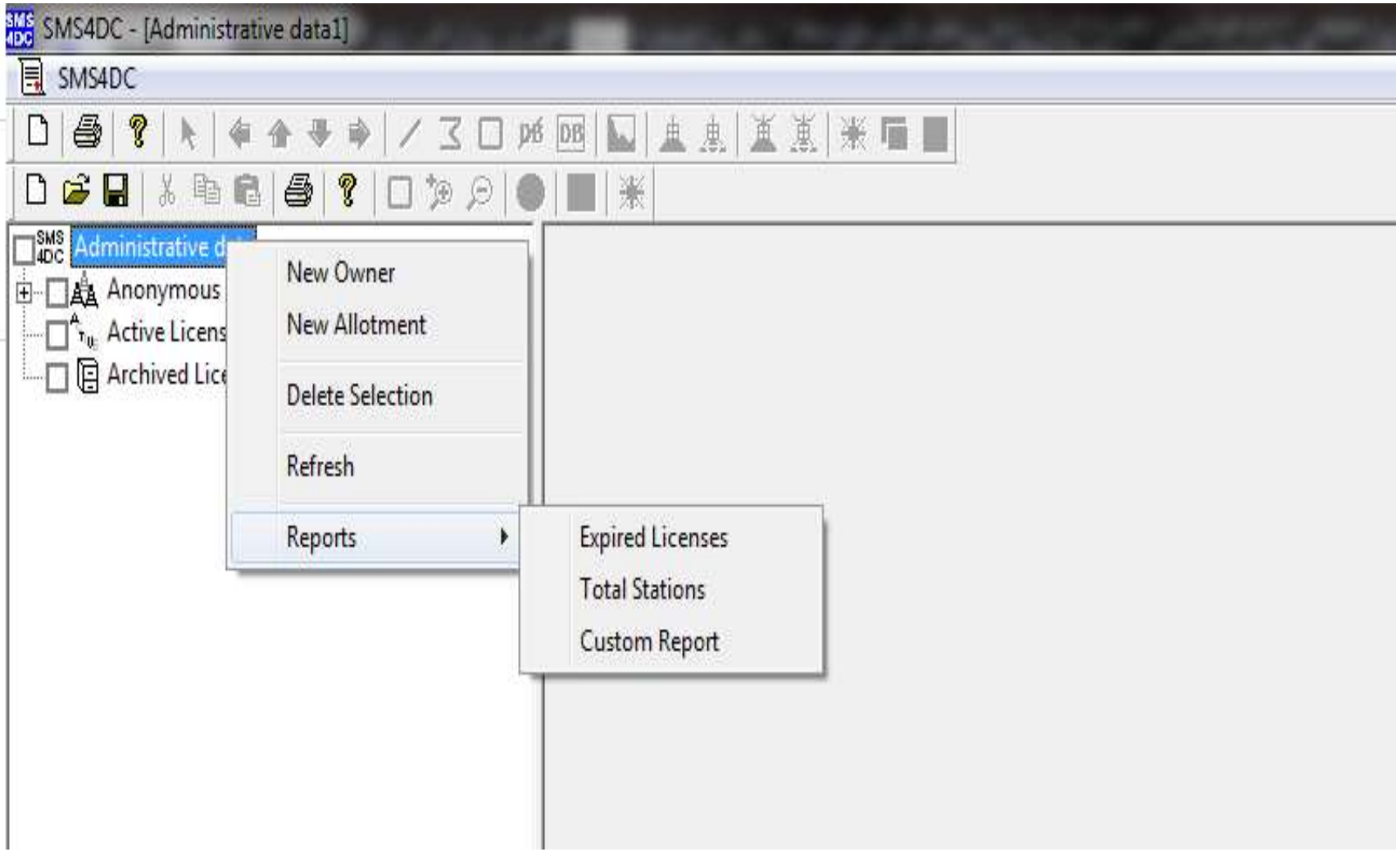
Administrative Functions of SMS4DC

- **Administrative Functions**
  - *Comprehensive database (MS Access) of user/license details, with data fields in accordance with ITU recommendations;*
  - *Provides complete process from: frequency application, frequency assignment, licensing, ITU plans and Bilateral frequency coordination procedures;*
  - *Imports coordination data from ITU BRIFIC & SRS CD-ROM database;*
  - *Producing electronic notices, print license, invoice & spectrum fee*
  - *Security features: The designated system administrator can define an individual account for each SMS4DC user up to 6 levels of access to the different processes (e.g. licensing, assignment etc). Each user account is named and password protected.*

- **Graphical User Interface Functions (including Map Displays)**

- **Engineering Analysis Functions**

SMS4DC License Database GUI



Easy generation of customizable reports for Licenses and their status

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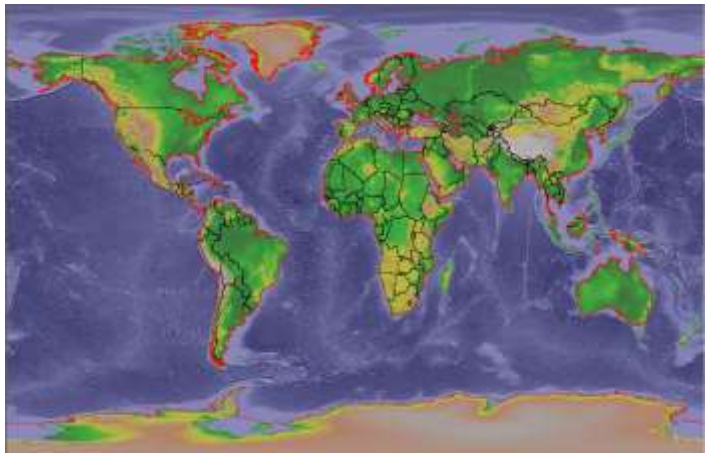
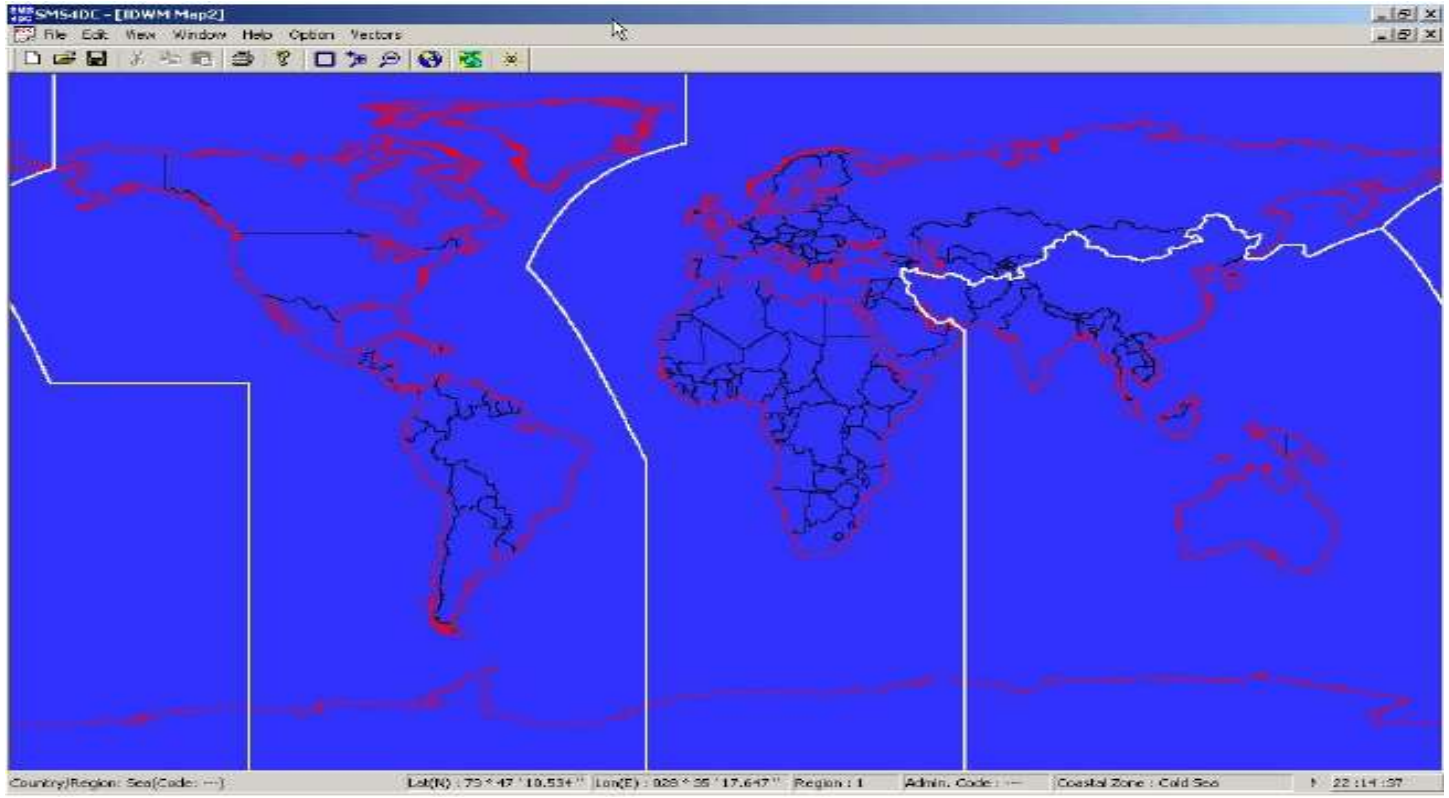
GIS Functions of SMS4DC

- **User friendly interface with text menus and icon-tool bars;**
- **Display views**
  - *International Digital World Map (IDWM)*
  - *Digital Elevation Map (DEM) (2-D and 3-D)*
- **Data entry/Assigning of new stations on DEM by mouse point-and-click**
- **Export of maps, overlays and vectors to Google Earth Searching and displaying stations on DEM**

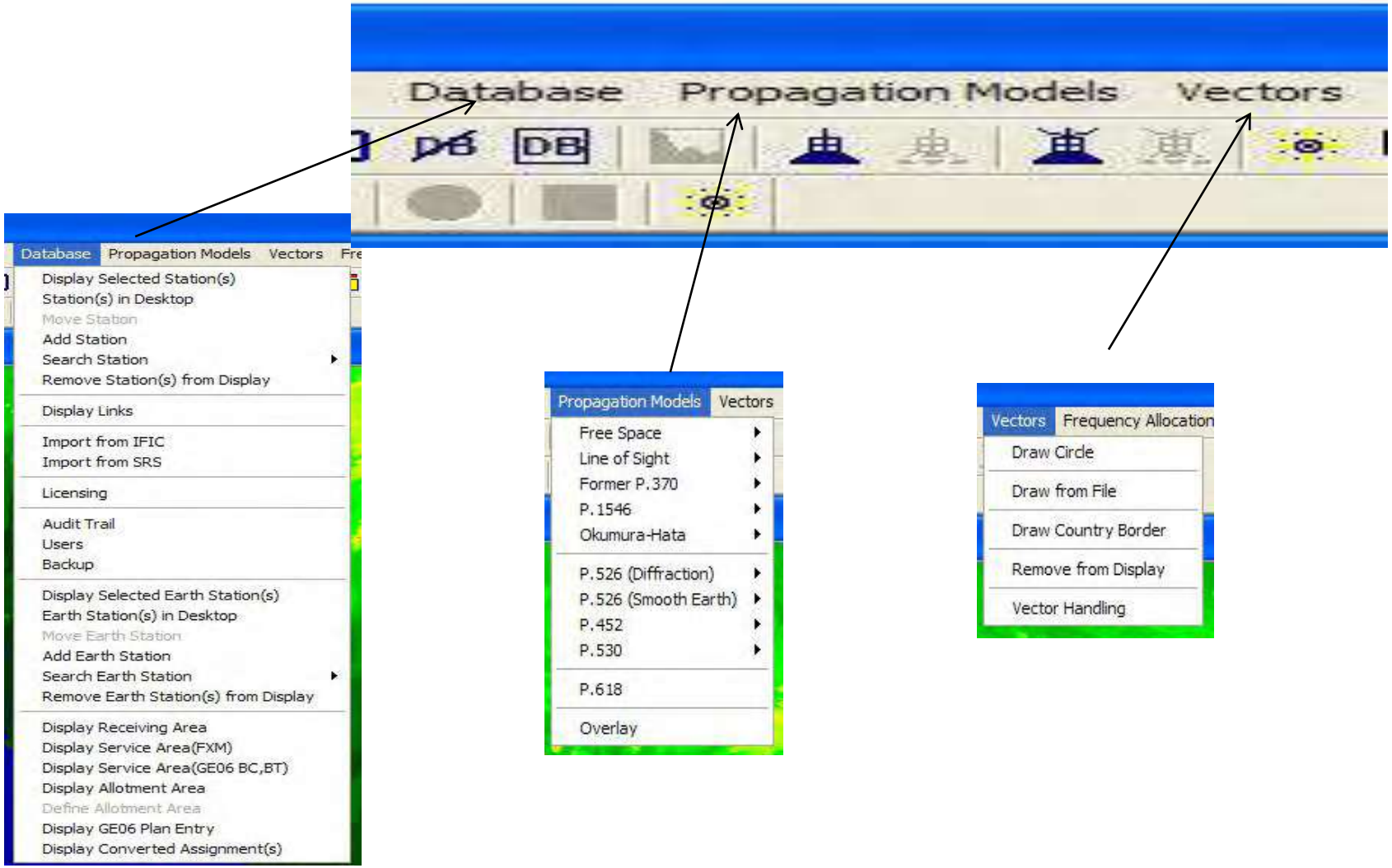


GIS Functions of SMS4DC

IDWM Menu: *The IDWM is used to draw political boundaries of countries on the desktop of SMS4DC*

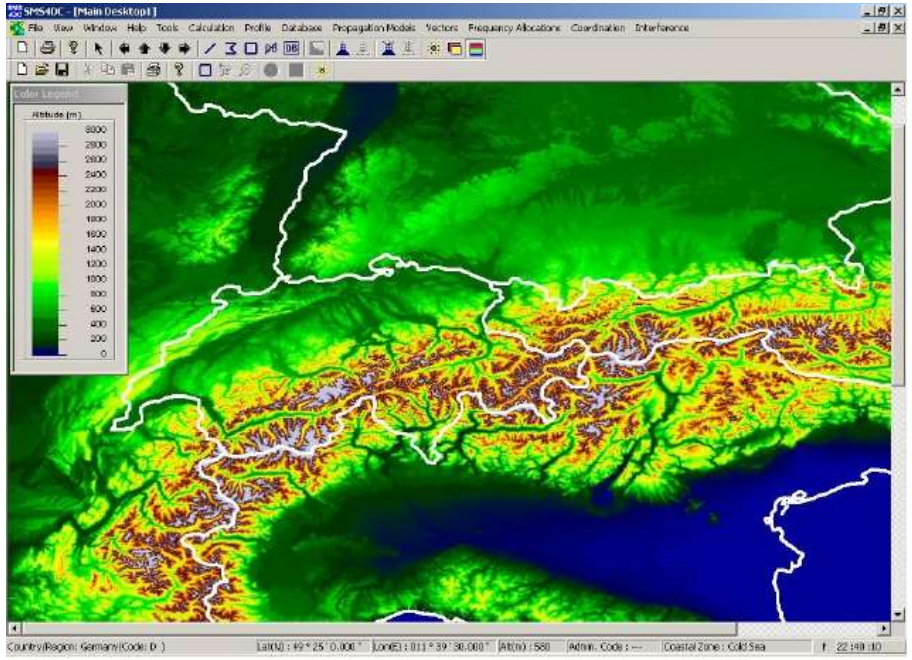


GIS Functions of SMS4DC

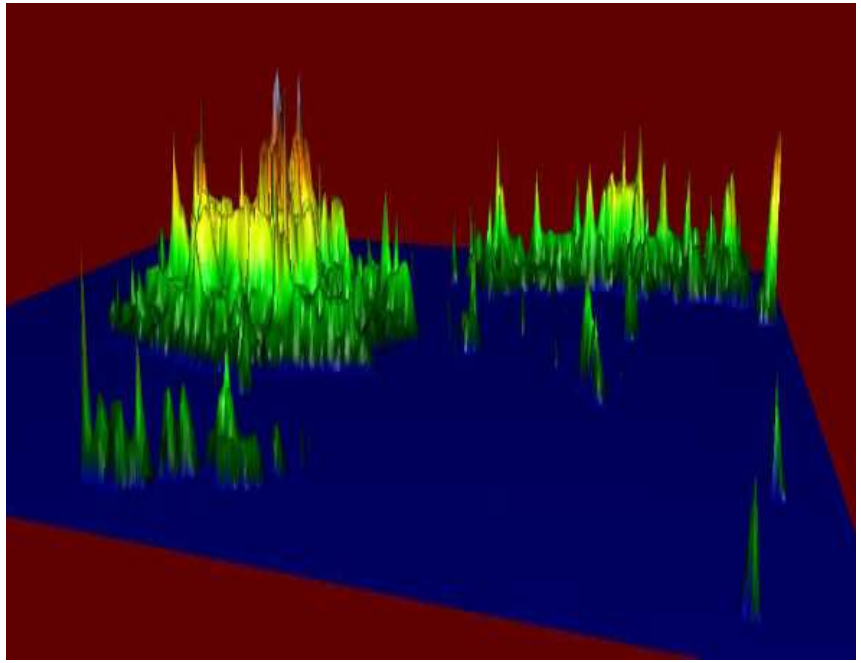


Digital Elevation Model (DEM) Menu

GIS Functions of SMS4DC



Digital Elevation Model (DEM) 2D and 3D views



Map Display in 3D

Based on the Global Land One- kilometer Base Elevation model (GLOBE)

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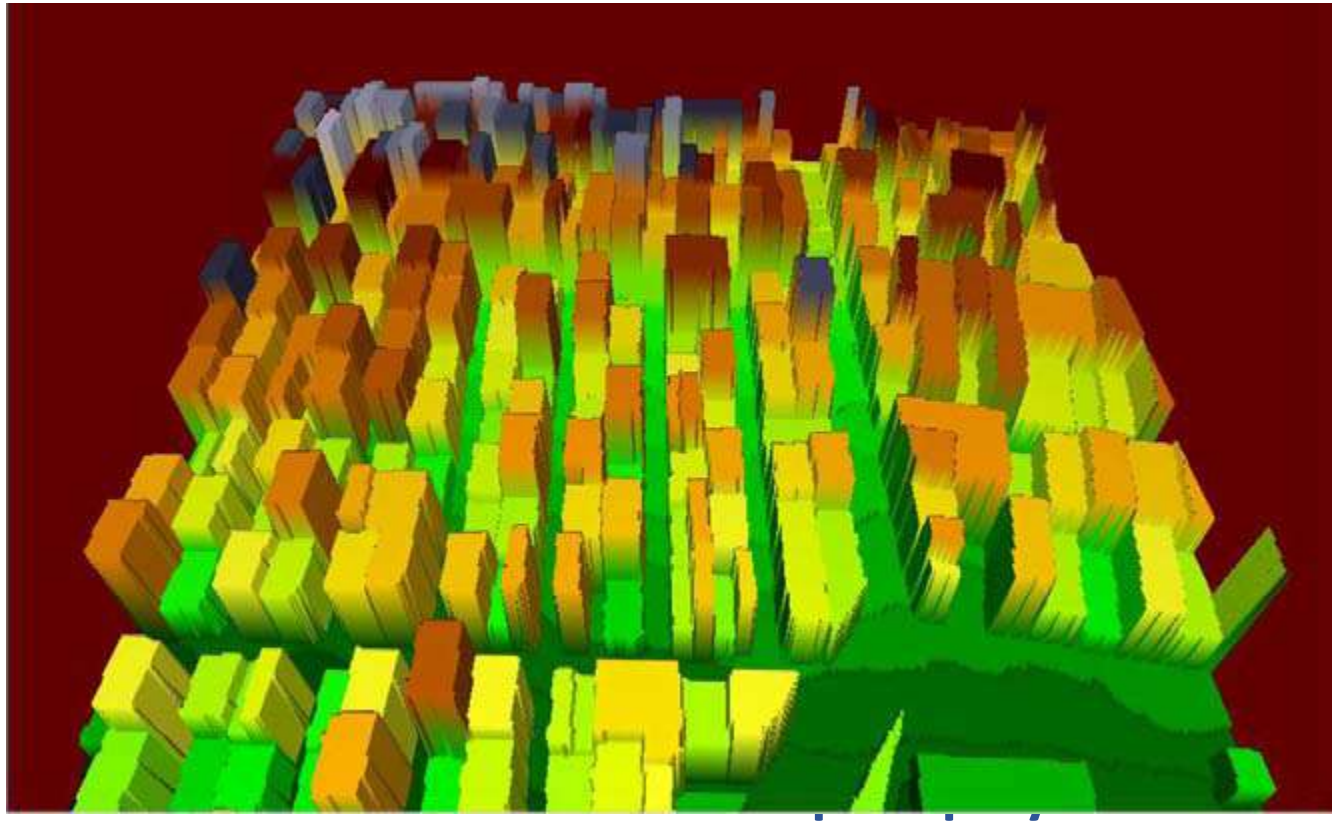
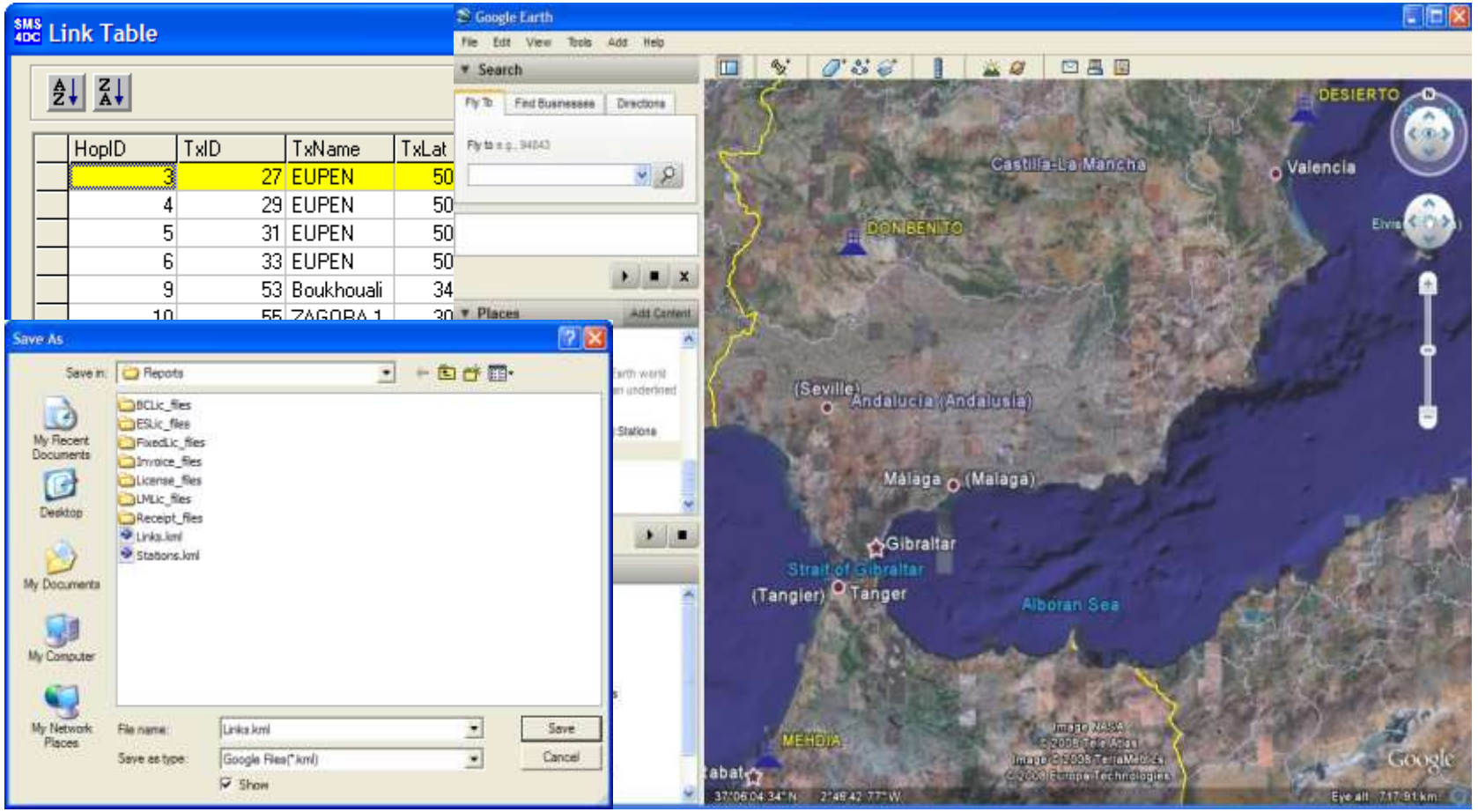
GIS Functions of SMS4DC



Raster Map 1m resolution

GIS Functions of SMS4DC



Export of maps, overlays and vectors to Google Earth Searching and displaying stations on DEM)

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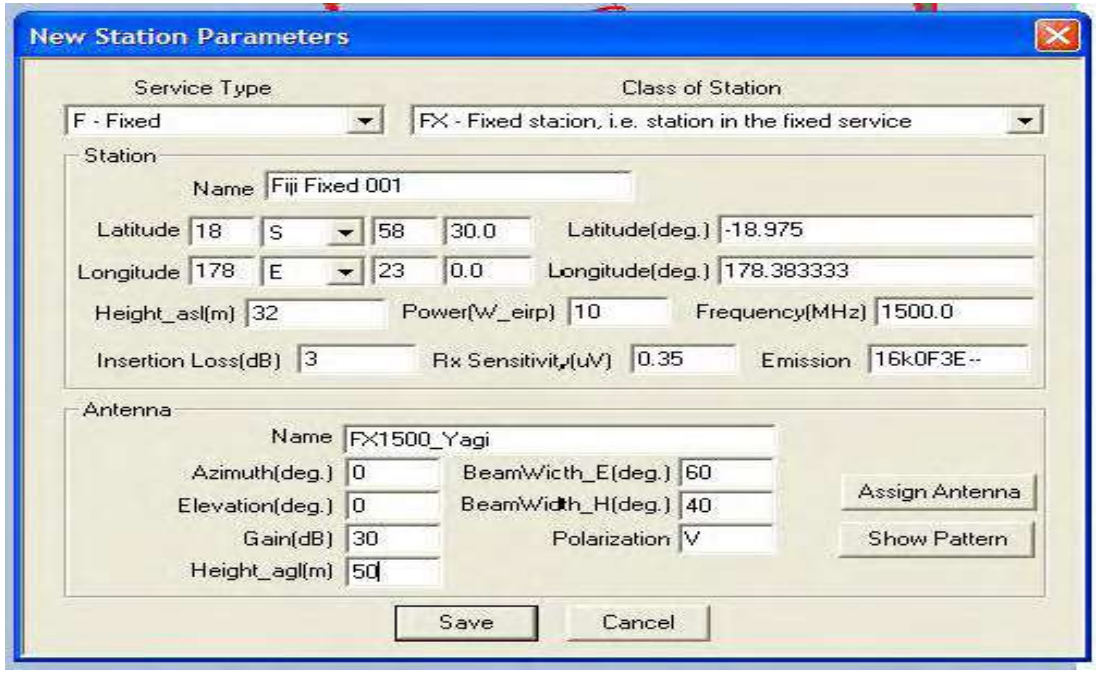
Engineering Analysis Functions of SMS4DC

Enhanced analysis tools to assist a spectrum engineer in frequency assignment, national and international frequency coordination and interference calculation for the Land Mobile, Fixed and Broadcast services and satellite Earth Station coordination;



New Radio station parameters in-line with ITU coordination requirements

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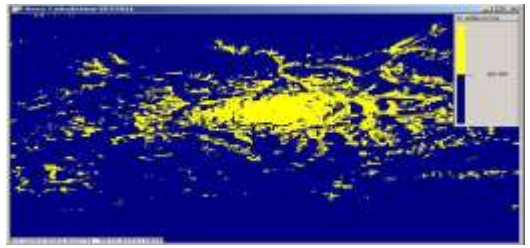
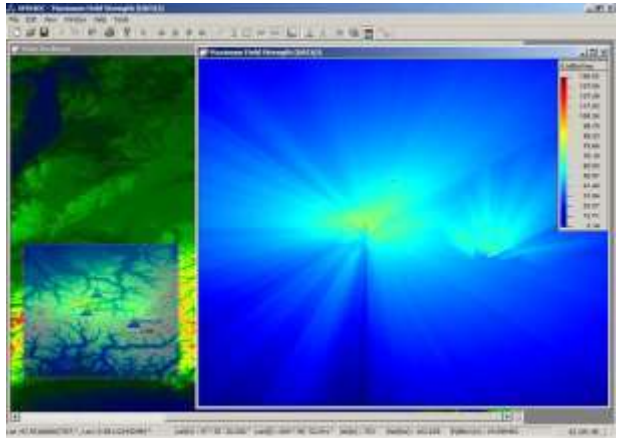
Engineering Analysis Functions of SMS4DC

Calculation of coverage area, field strength, field strength contour, network coverage and best server calculations



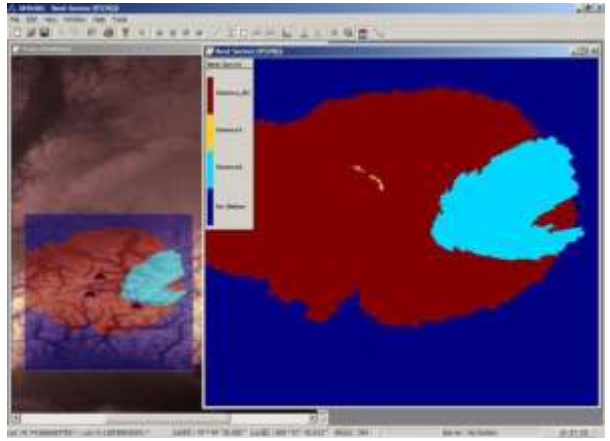
Coverage area

Item to calculate area in km2 Where inside the area, the field strength value is higher than a threshold value.



Maximum Field Strength

Item to calculate and visualize the maximum values produced by more than one transmitting stations at any point inside a predefined rectangular area.



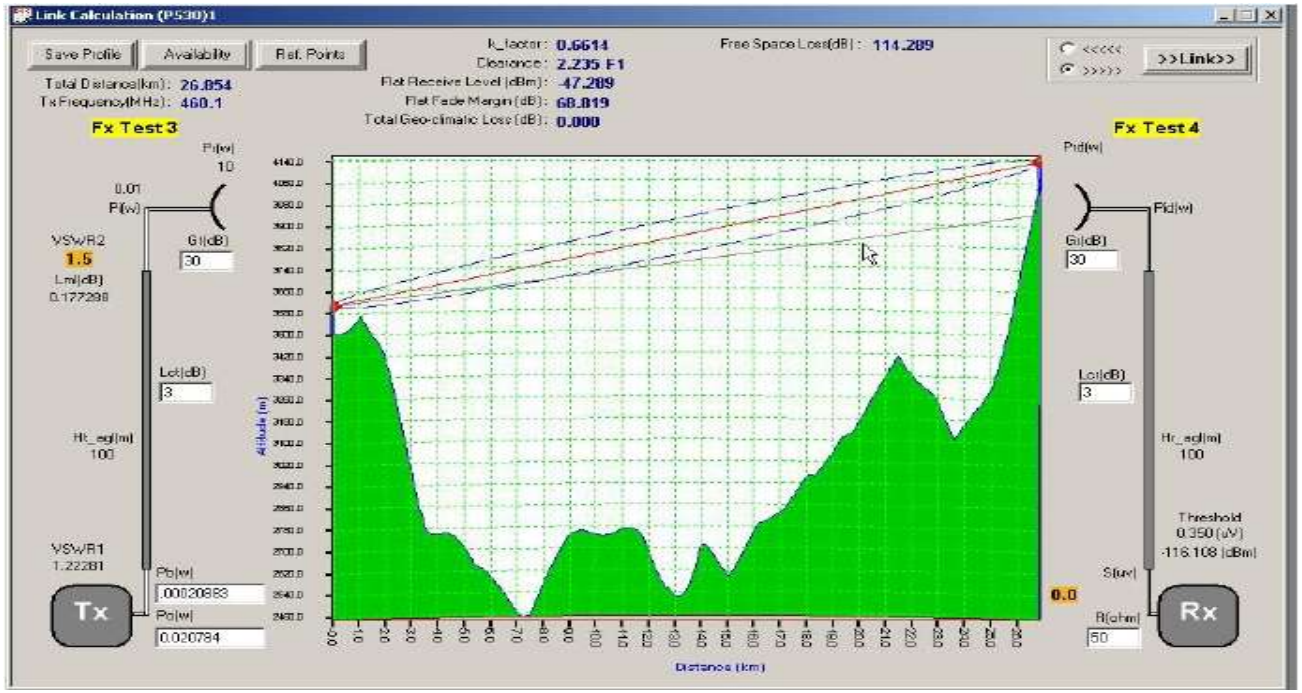
Best Server

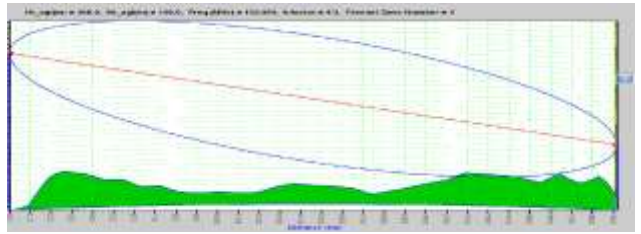
Item to calculate and visualize the best serving station at each point among various stations inside a predefined rectangular area.

Engineering Analysis Functions of SMS4DC

For fixed service (point-to-point radio links):

- *Link budget calculations*
- *Link availability*
- *Path profiles*
- *Fresnel zone clearance*





Fresnel Zone:

- *Measure for multipath effect*
- *Mostly used for Aperture antenna*
- *Number of zone each one represents*
- *degree of out phase reflect signal from the LOS signal*
- *First Fresnel Zone includes 90% of radiation pattern (LOS component).*

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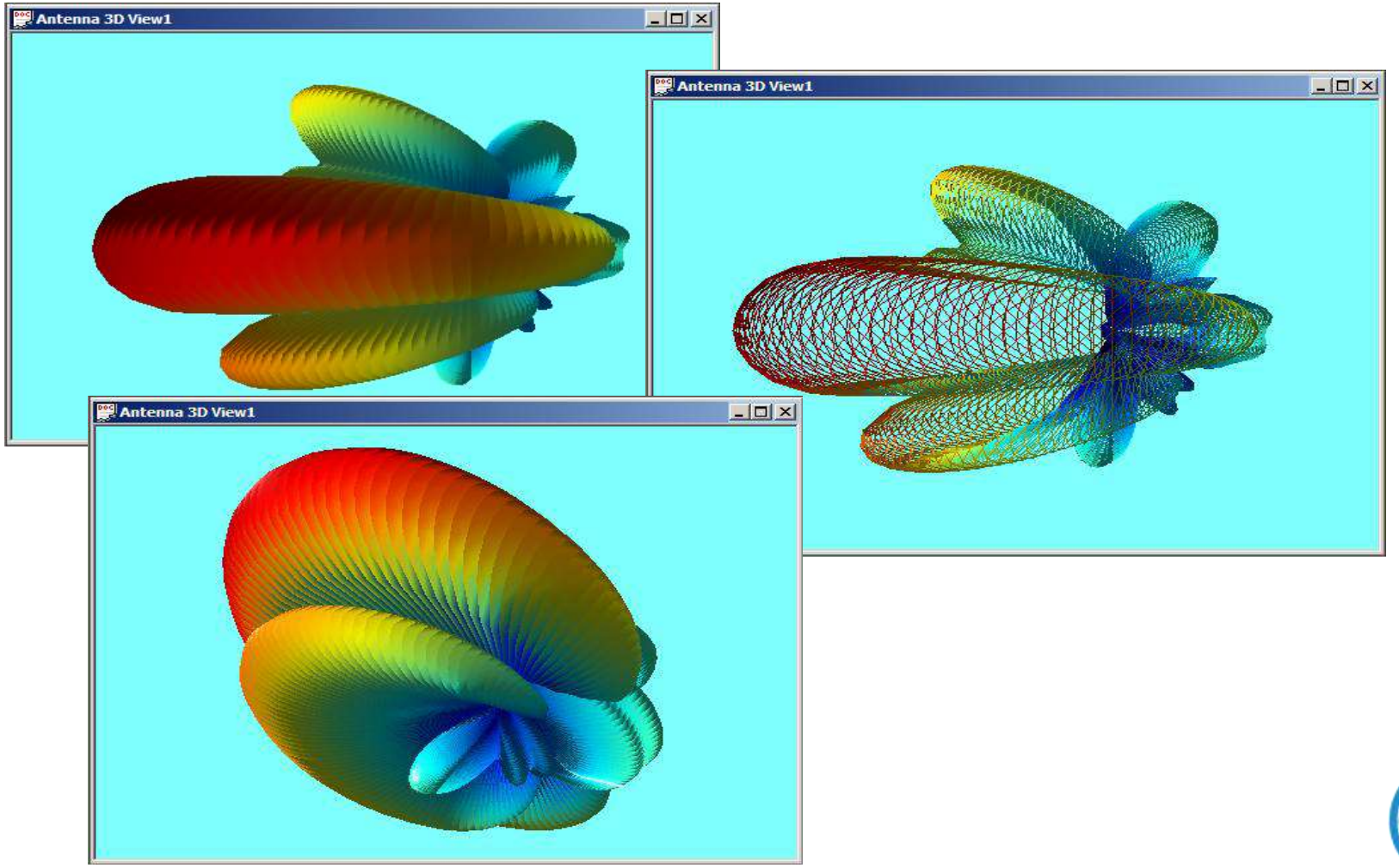
ITU-D 1992 2017

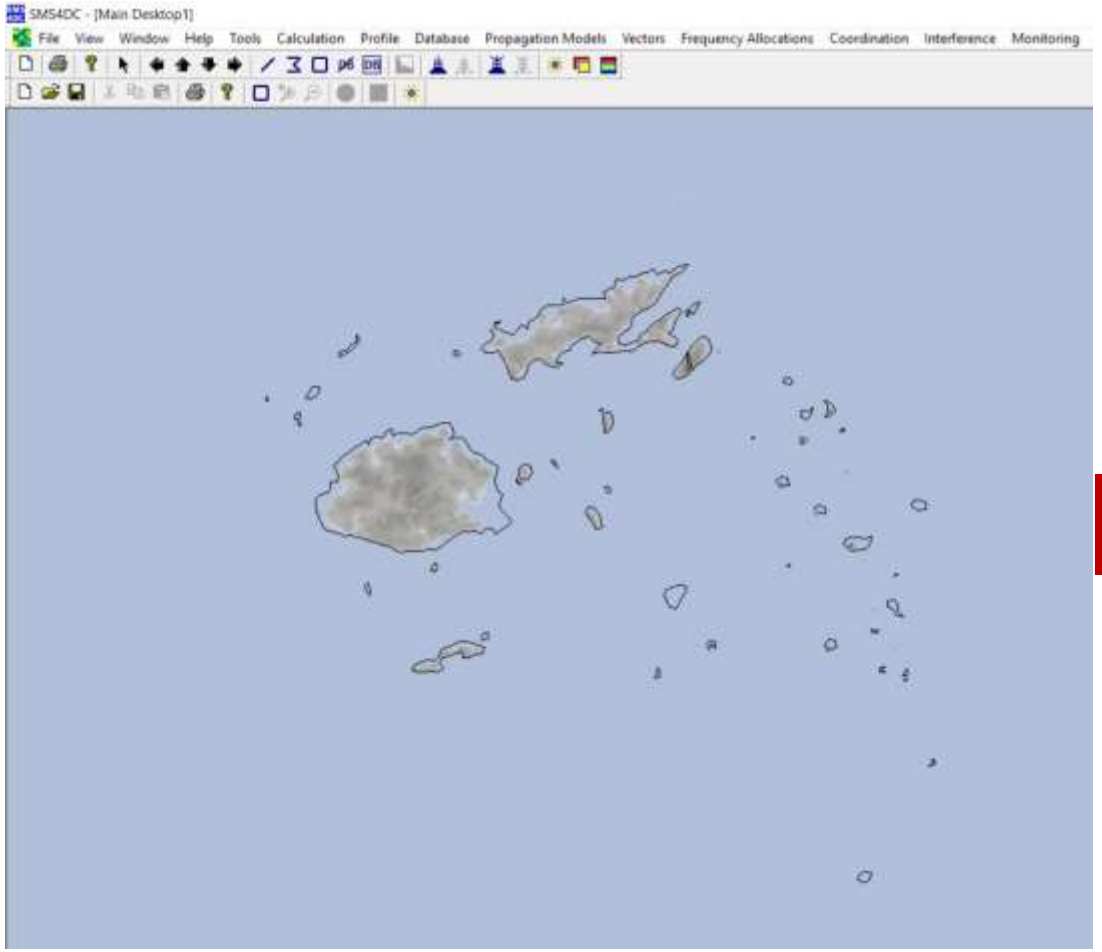
Engineering Analysis Functions of SMS4DC

3D radiation Patterns

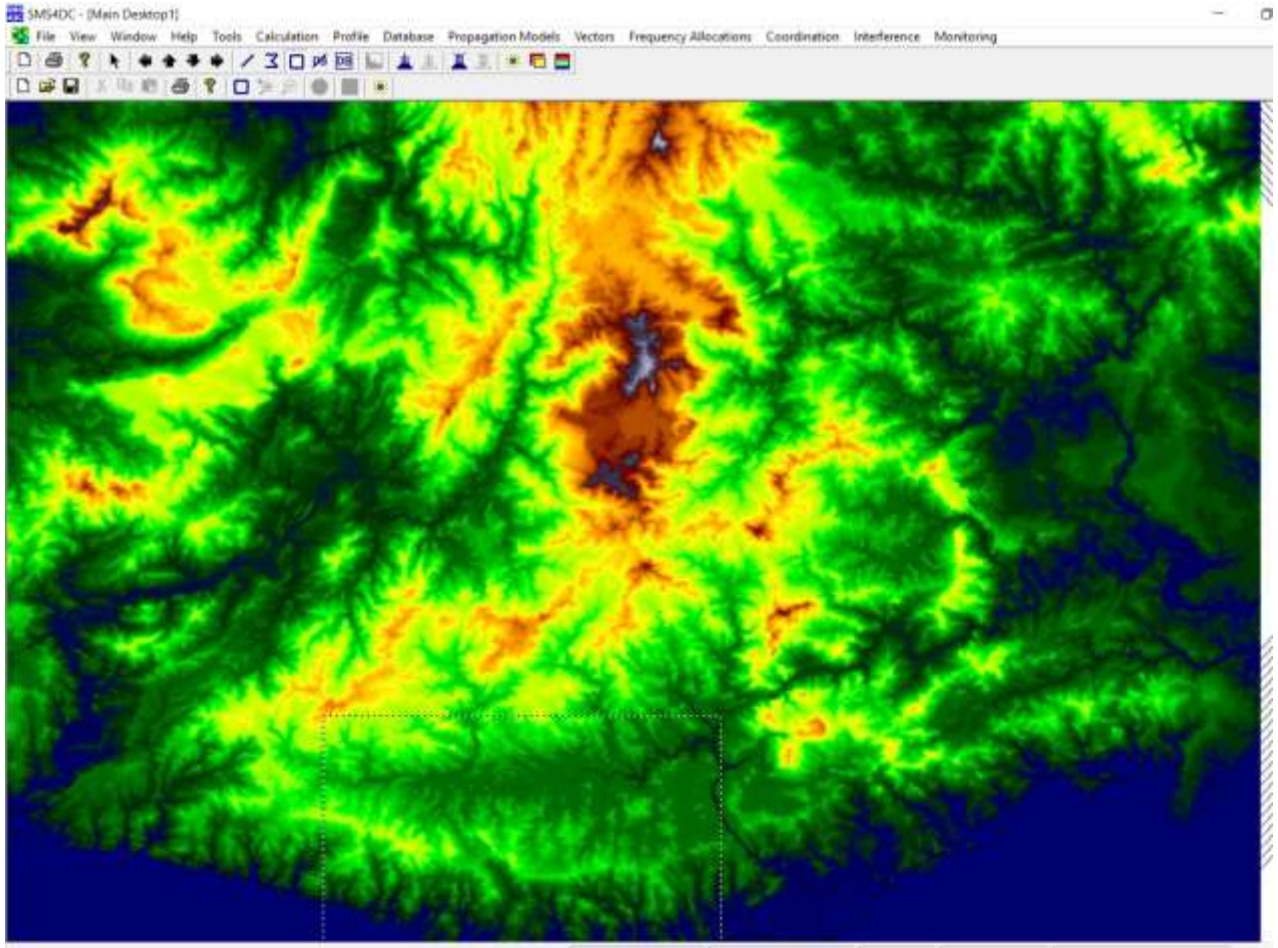


Higher Resolution DEMs

Results after new maps



Fiji



Default DEMs

High Res. DEMs

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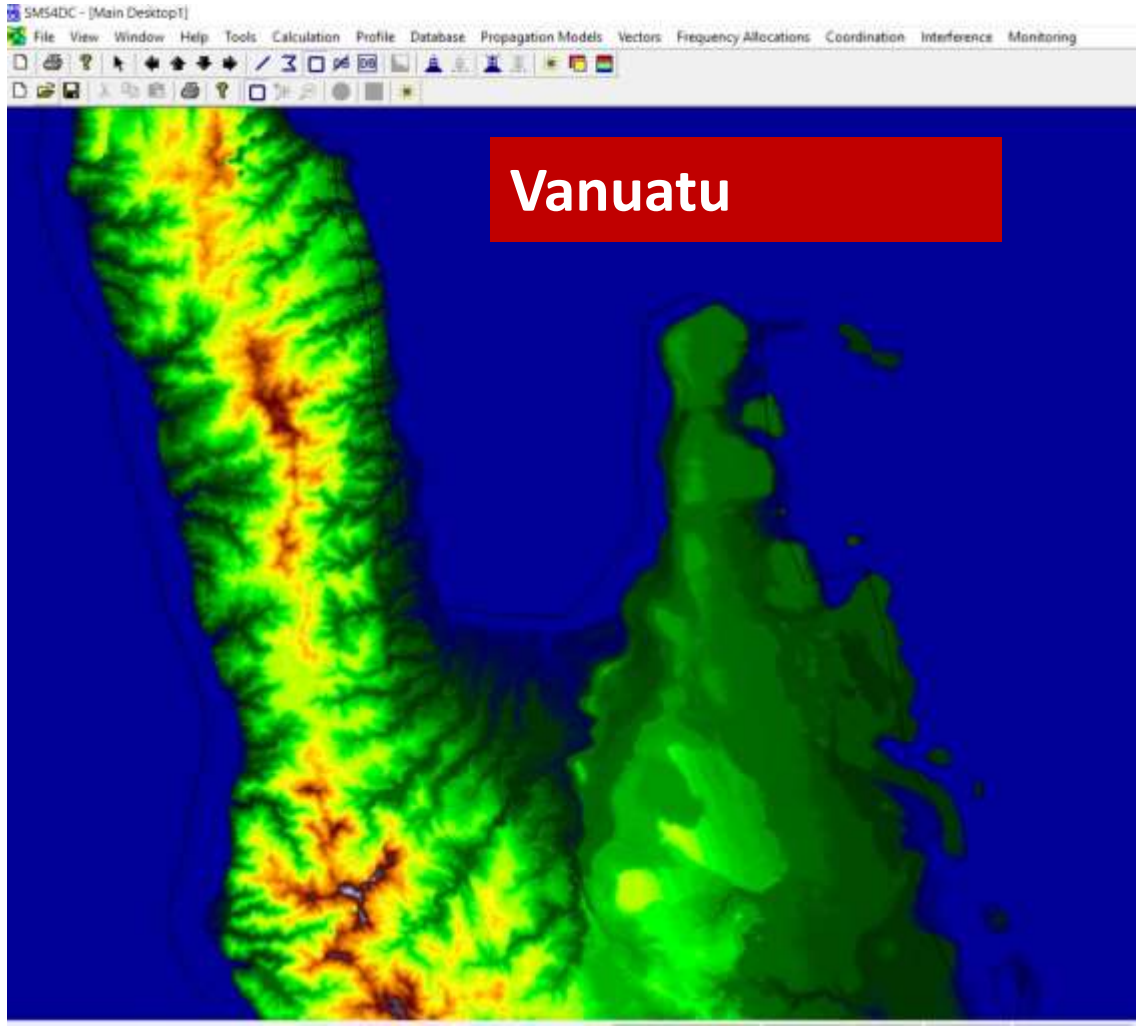
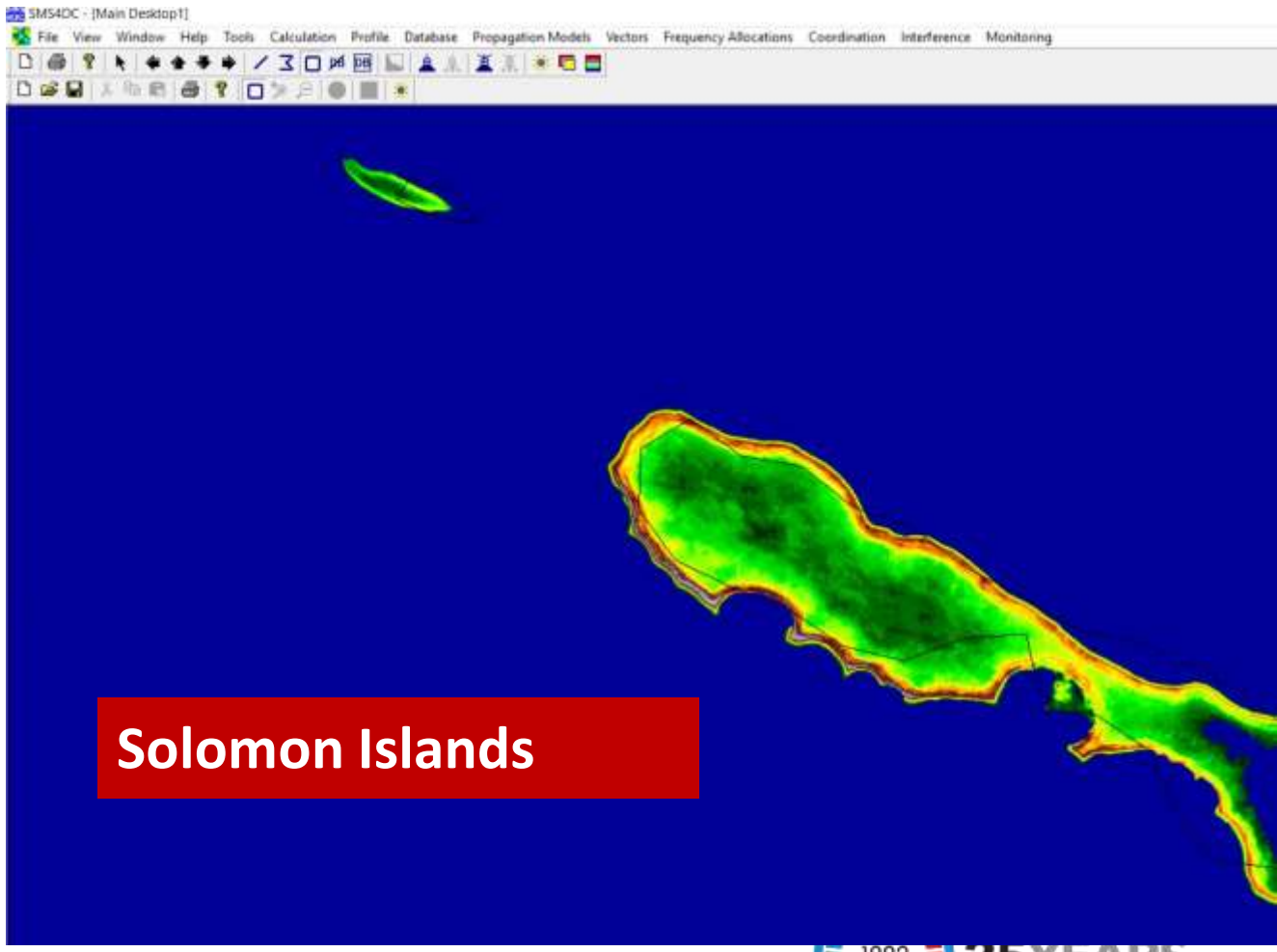
Results after new maps





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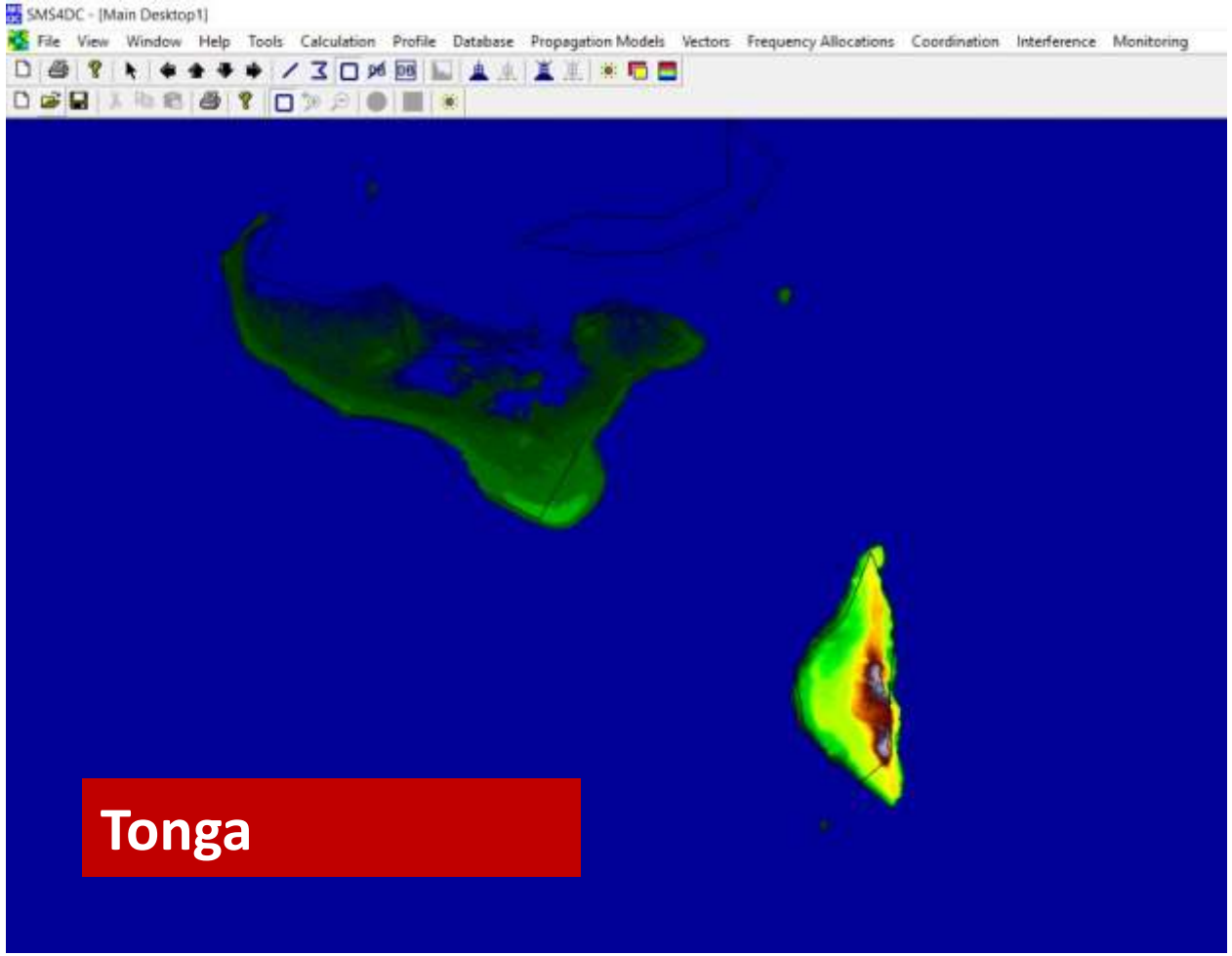

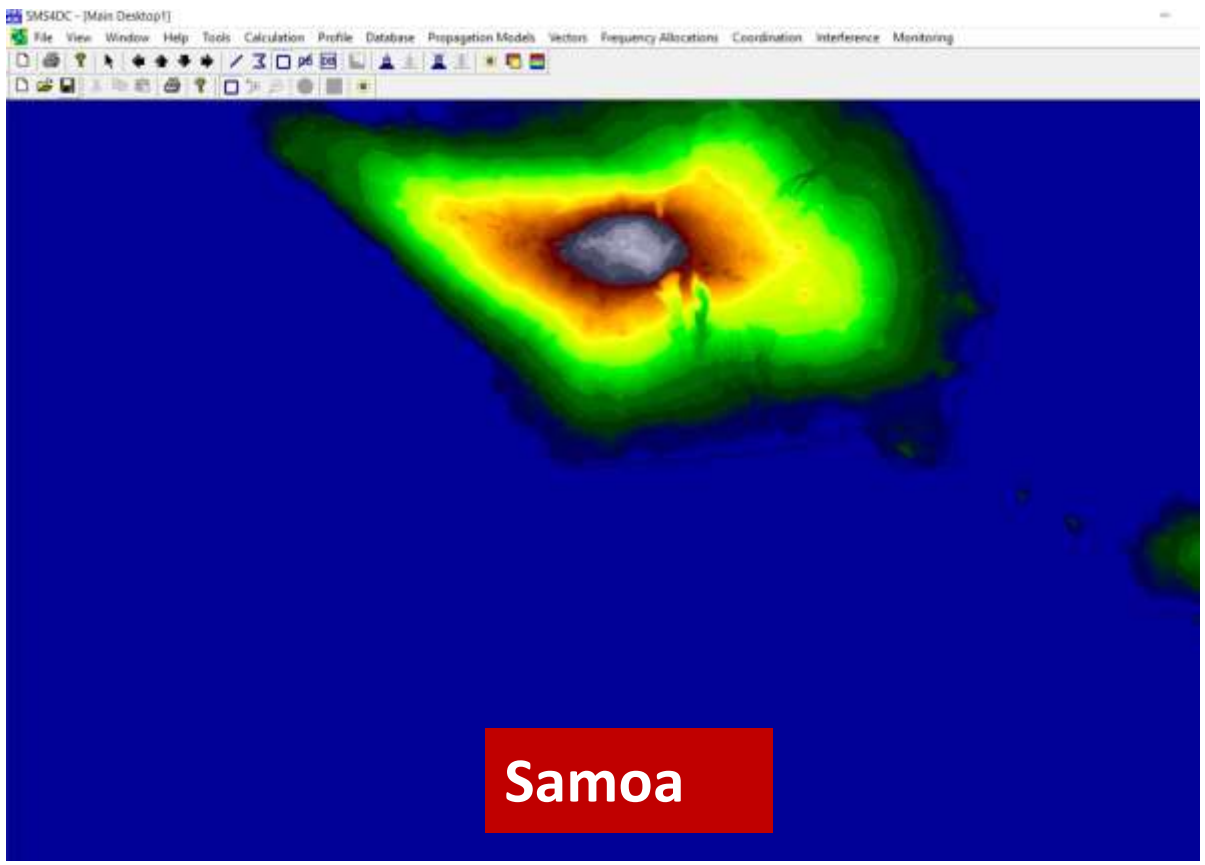

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Installation steps

1. Copy the text file **(USERMAP1.txt)** in the Texts folder of your SMS4DC installation (usually in drive c:).

2. Create a sub-folder under SMS4DC named "MAP-PACIFIC".

3. Unzip the **PacificTiles.zip** into MAP-PACIFIC folder.

About 8 GB of free space is needed on C: drive

Accessing the Maps steps

1. Run SMS4DC you can access this new map through the menu of

Tools->Map Layers->User Map1

In order to navigate to an area you should first in IDWM map select a small area on an island in the region (e.g. Solomon Islands) and then click on the DEM view button. Then again a small area should be selected in the DEM view and the menu of Tools->Map Layers->User Map1 should be selected.

I Thank U

"Committed to
connecting the WORLD"

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