SEDRIS 201
Using SEDRIS Software and Tools

www.sedris.org

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SEDRIS 201 - Using SEDRIS Software and Tools

The tutorial will show how the SEDRIS SDK is used to create applications and libraries that can read and write SEDRIS transmittals. The presentation will demonstrate the process of obtaining and setting up the appropriate SEDRIS component SDKs, depending on the needs of the application.

The tutorial will also show how the SEDRIS tools are used to convert and integrate databases to/from such data formats as Shapefile, GeoTIFF, CTDB, and others. The presentation will cover aspects of verifying the SEDRIS transmittals for conformance to the syntax and rules of the SEDRIS data representation model (DRM), and steps for creating and integrating databases using the Focus tool.

Prerequisites: General knowledge of SEDRIS concepts and components, familiarity with software development and its use in environmental data generation and consumption.

Tutorial Organization

- Overview of the SEDRIS SDKs
- Using the SEDRIS SDK
  - Contents of the release package
  - Compiling the SDK with Visual Studio 2010
  - Creating and compiling user applications
  - Sample Data, Documentation, Getting Help
- Working with SEDRIS Tools
  - Tools Overview
  - Using Converters
  - Using Focus to View/Edit STF files
  - SEE-IT, EDCS Query Tool
- Demos

Overview of the SEDRIS SDKs

- Five technology components:
  - Data Representation Model (DRM)
  - Environmental Data Coding Specification (EDCS)
  - Spatial Reference Model (SRM)

Used to express the semantics and representational schema of environmental data

  - Application Program Interfaces (API)
  - SEDRIS Transmittal Format (STF)

Used to exchange environmental data

- SDKs: EDCS, SRM, SEDRIS (integration of the 5 components for interchanging environmental data sets)
- All technology components are defined in 8 ISO/IEC standards
  - 3 of the standards are extensible through online registries

Overview of SEDRIS SDKs (cont.)

- Latest SDKs available from www.sedris.org/sdk
  - EDCS SDK: 4.4.0
  - SRM SDK: 4.1.4, 4.4 (with advanced features)
  - SEDRIS SDK: 4.1.4
- Zip and tgz files, in source and binary releases
- Support for Windows, Linux, Solaris, SGI IRIX
- Visual Studio support
- Makefiles for Unix systems
- Static and dynamic libraries

Overview of SEDRIS SDKs (cont.)

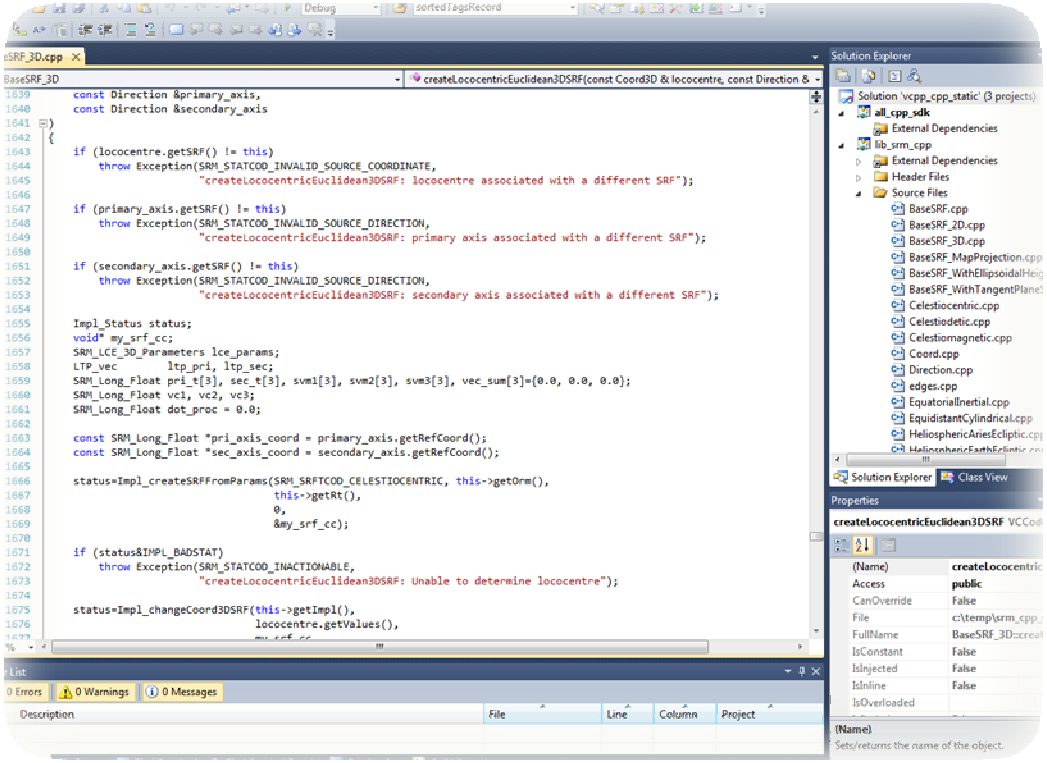
- EDCS SDK:
  - Implementation of the International Standard ISO/IEC 18025, Environmental Data Coding Specification (EDCS)
  - Provides a mechanism to specify the environmental "things" that a particular data model construct is intended to represent
  - C API release
  - EDCS Registry at edcsreg.sedris.org
  - More info on the EDCS at www.sedris.org/edcs

- SRM SDK:
  - Implementation of the International Standard ISO/IEC 18026, Spatial Reference Model (SRM)
  - Spatial reference frames, coordinate conversions
  - C, C++, and Java API releases
  - SRM Registry at srmreg.sedris.org
  - More info on the SRM at www.sedris.org/srm

Overview of SEDRIS SDKs (cont.)

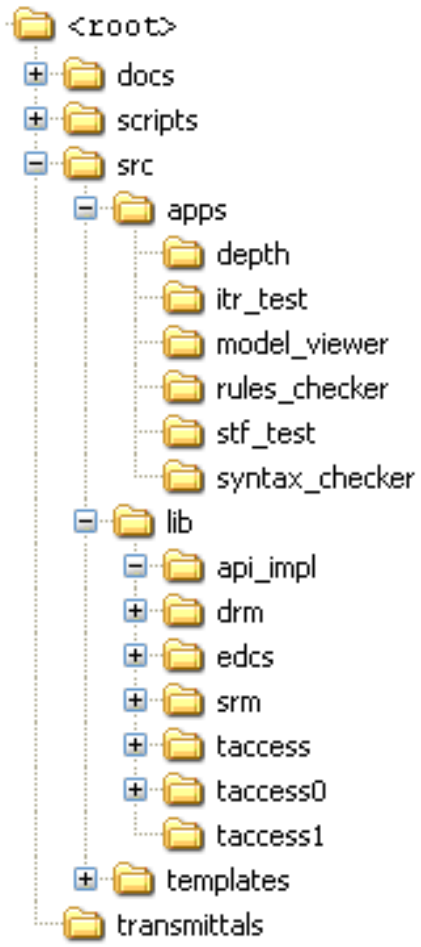
- SEDRIS SDK:
  - Implementation of the International Standard ISO/IEC 18023, SEDRIS – Part 1: Functional specification
  - Read/Write/Edit SEDRIS STF transmittals
  - Includes the EDCS and SRM SDKs
  - Documentation, example applications, and sample data
  - C and C++ API releases
  - SEDRIS Registry at sedrisreg.sedris.org
  - More info on the DRM at www.sedris.org/drm
  - More info on the SEDRIS API at www.sedris.org/api_desc.htm

Using the SEDRIS SDKs



Contents of the SDK release package

- Makefiles and Visual Studio Solution files
- Documentation
- Migration scripts
- Source for libraries
- Source for core and example applications
- Sample transmittals



Compiling the SDKs with Visual Studio 2010

- Extract the source package release (e.g. SEDRIS C++ SDK)
- Run the “win32_headers.bat” file (creates “include” directory with combined header files)
- If compiling the Model Viewer app, see next slide
- Open the solution file (e.g. “vcpp_static.sln”) with Visual Studio
  - Solutions files are 2003 versions, let VS 2010 perform the conversion
- Select Debug or Release mode
- Right-click the “all_sdk” project and choose “Build” (compilation takes a few minutes)
- Application binaries are in the “bin” directory, libraries in “lib”

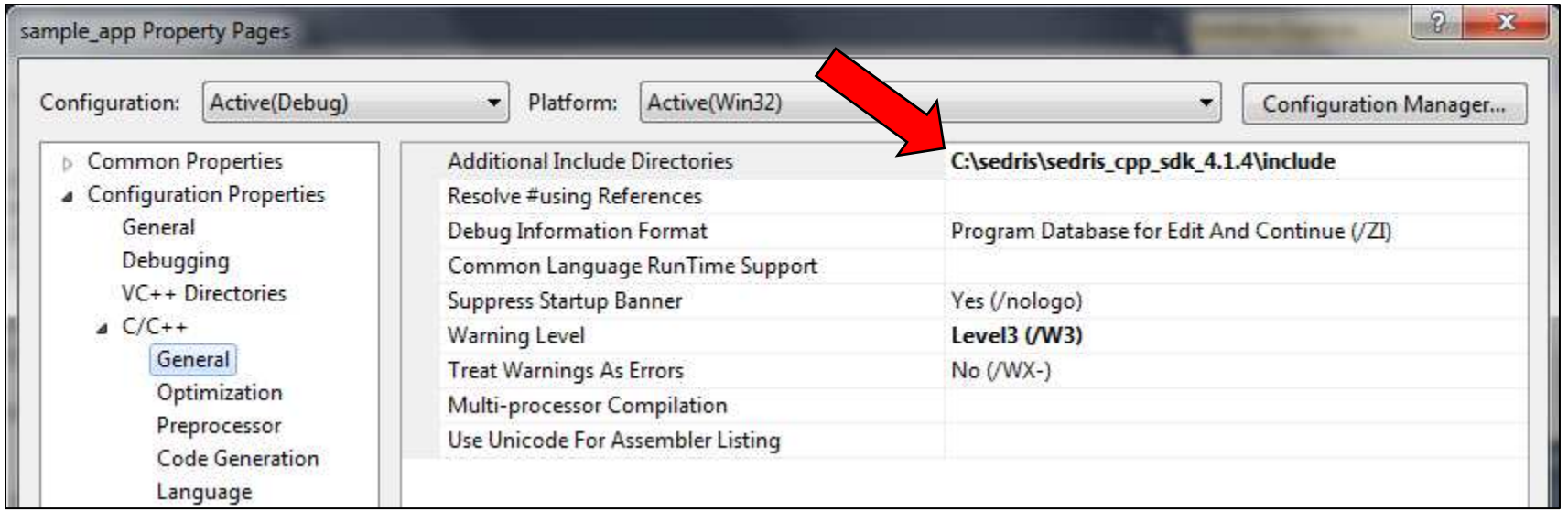
Compiling the SDKs with Visual Studio 2010 - GLUT

- The Model Viewer sample application uses OpenGL and GLUT for 3D viewing
- Currently uses GLUT 3.7.6, available from www.idfun.de/glut64/ (for 32 and 64 bit Windows)

- To install GLUT, extract the GLUT package and place:
  - "glut.h" in "C:\Program Files (x86)\Microsoft Visual Studio 10.0\VC\include\GL" (create folder)
  - "glut32.lib" and "glut64.lib" in "C:\Program Files (x86)\Microsoft Visual Studio 10.0\VC\lib"
  - "glut32.dll" and "glut64.dll" in "C:\Windows\SysWOW64" (for Windows 7 64-bit)

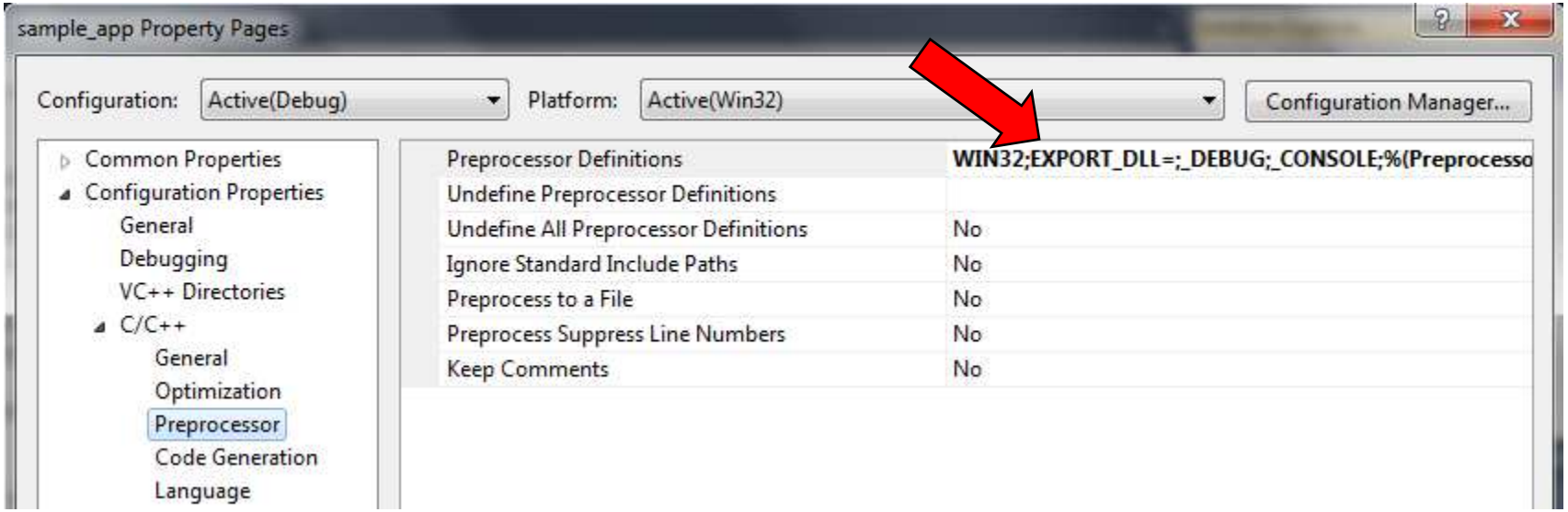
Creating and compiling user applications

- Add a new project to the solution, or create a new separate project (e.g. “Win32 Console Application”)
- In the “C/C++” properties setting, add a reference to the SEDRIS “include” directory



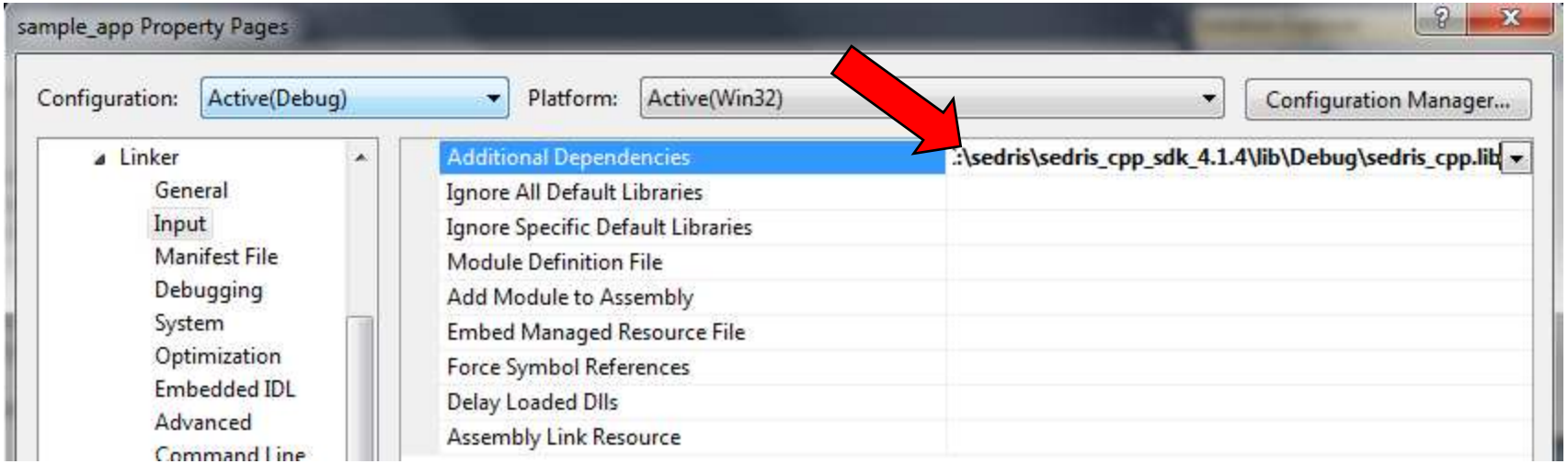
Creating and compiling user applications (cont.)

- If using a Static build, add the macro “EXPORT_DLL=“ to the “Preprocessor” definitions in the “C/C++” settings



Creating and compiling user applications (cont.)

- In the “Linker” properties setting, add a reference to the SEDRIS “lib\[Configuration]\sedris_cpp.lib” file



- Build and test

Sample Code – Open Transmittal

- Include header files:

```
#include "seWorkspace.h"
#include "seTransmittal.h"
```

- Declare the SEDRIS namespace:

```
using namespace sedris;
```

- Use an seWorkspace to open the transmittal:

```
seWorkspace wksp;
seTransmittal xmtal;

wksp.openTransmittalByFile(argv[1], xmtal);
```

Sample Code – List Model Names

```
seDRMTransmittalRoot root_obj;
seDRMModelLibrary model_lib_obj;

xmtal.getRootObject(root_obj);

if (root_obj.getComponent(model_lib_obj))
{
    seIterator iter;
    seDRMModel model_obj;

    model_lib_obj.getComponentIterator(iter, SE_CLS_DRM_MODEL);

    while ( iter.getNext(model_obj) )
    {
        if ( model_obj.get_name().characters )
            cout << "Model = " <<
                        model_obj.get_name().characters << endl;
        else
            cout << "Model = NO NAME" << endl;
    }
}
```

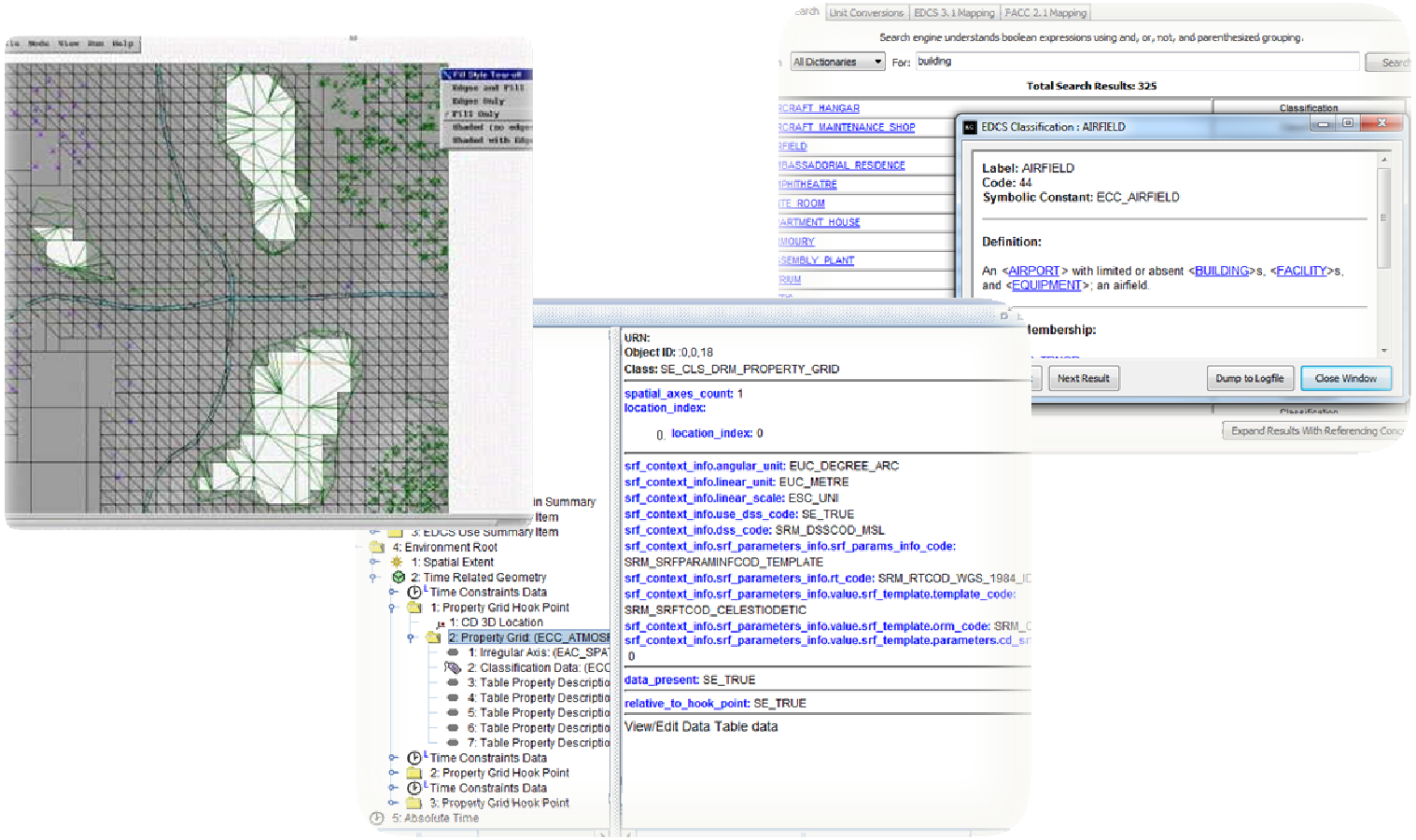
Sample Data, Documentation, Getting Help

- Sample Data in STF is available from data.sedris.org
  - Sample models
  - DEMs
  - Large city areas (*Town Square, Anywhere*)
  - Weather data samples

- Documentation and help files:
  - Guide to the Build Kit (sample app)
  - Windows Help File (chm) with SEDRIS C++ SDK docs
  - “docs” directory in SDKs

- SEDRIS Help Line at help@sedris.org

Working with SEDRIS Tools

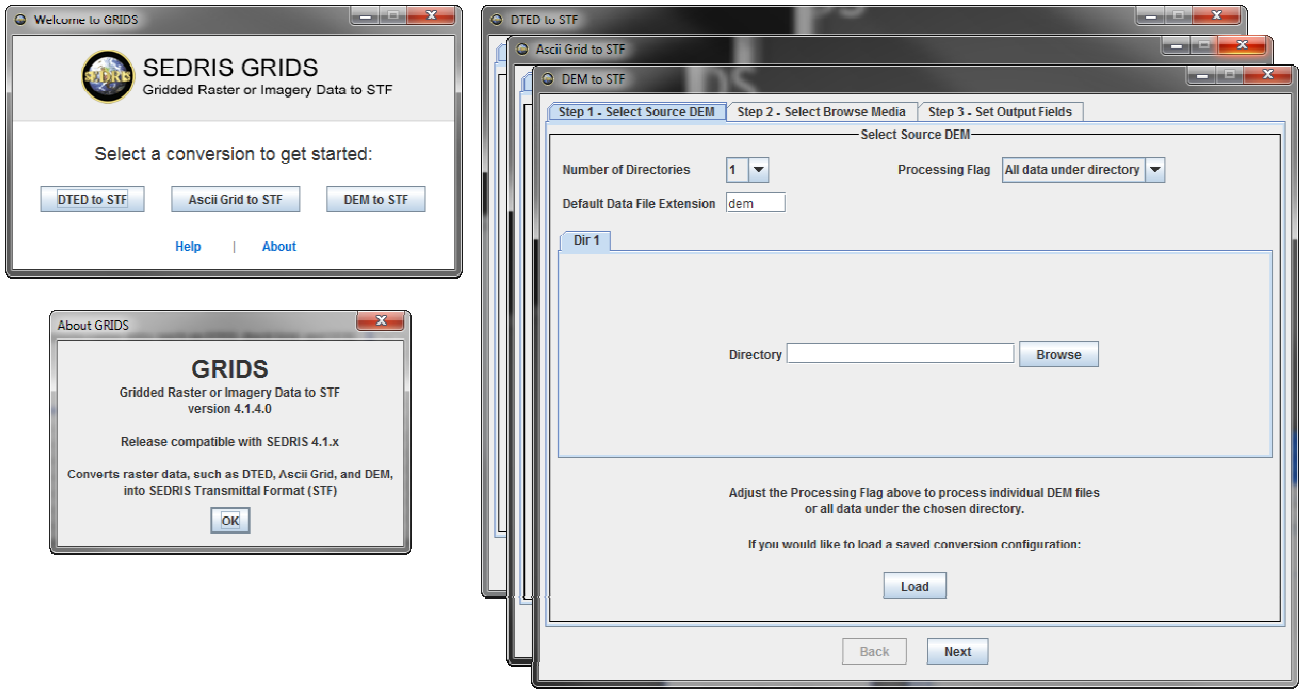


Tools Overview

- Download from tools.sedris.org
- **Converters**:
  - Move data to/from STF files, such as Shapefile, DTED, ASCII Grid, CTDB, GeoTIFF
  - Convert from older STF versions
- **Editors**:
  - View, create, edit STF transmittals (Focus)
- **Visualization**:
  - 2D and 3D visualization (SEE-IT, Model Viewer, Side-by-Side Viewer)
- **Verification**:
  - View an ASCII listing of transmittal content (Depth)
  - Verify DRM compliance (Syntax Checker and Rules Checker)
  - Verify data consistency and issues (SEE-IT)
  - Verify transmittal content meets specific criteria (XTCRS Checker)
- **Other**:
  - SRM coordinate converter integrated with Google Maps (iPhone/iPad)
  - EDCS Query Tool (search for EDCS terms)

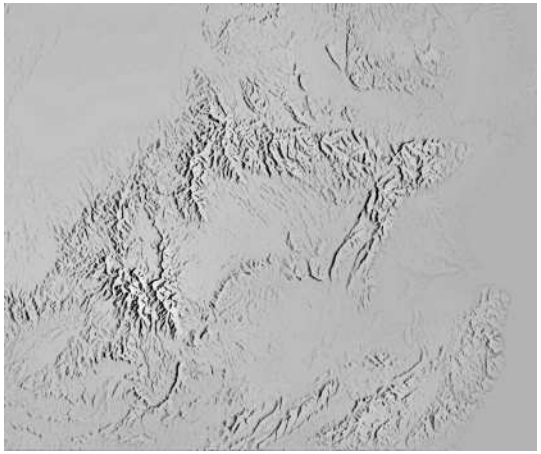
GRIDS

- Converts gridded raster data to STF:
  - NGA DTED
  - USGS DEM
  - ArcInfo ASCII Grid



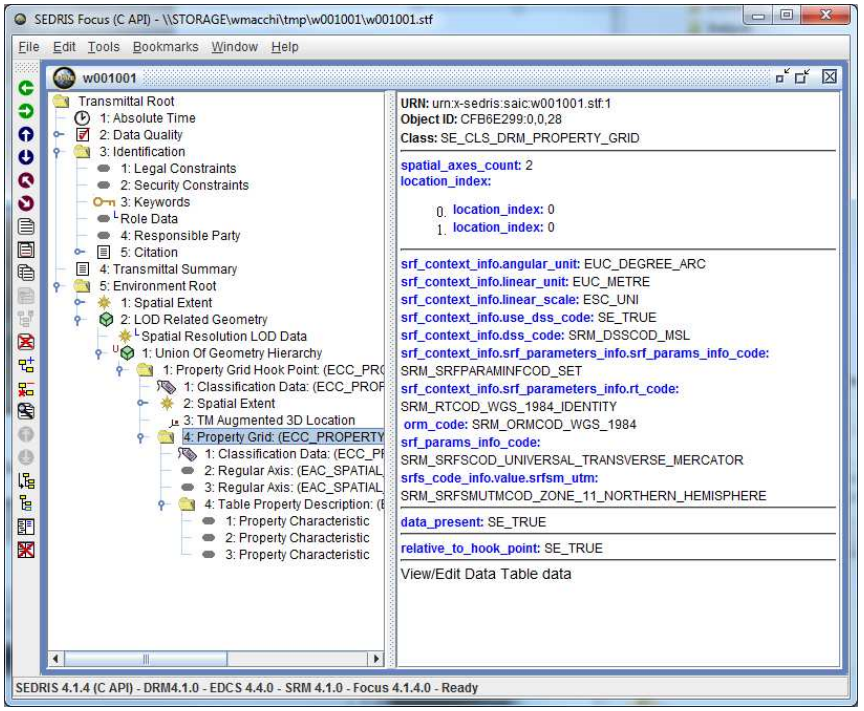
GRIDS (cont.)

w001001.asc



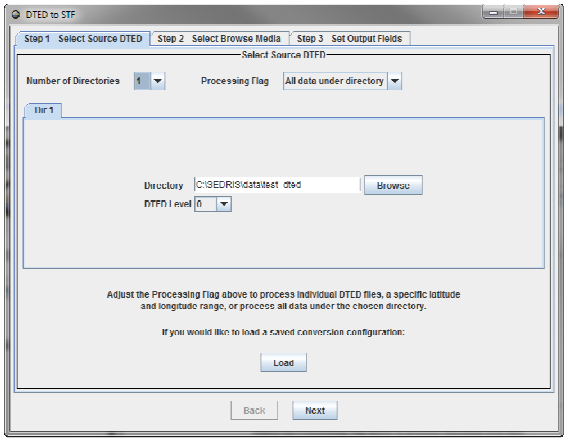
GRIDS

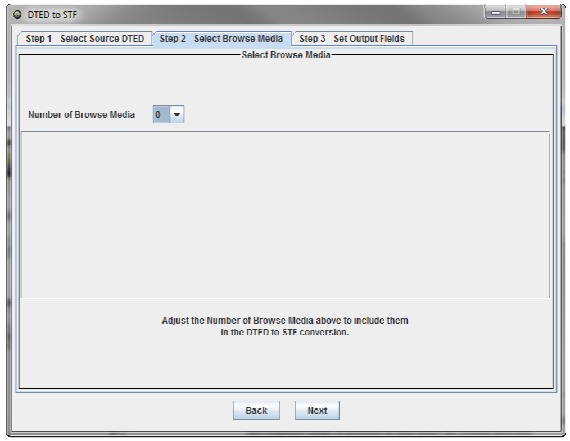
w001001.stf
w001001_00000.stf

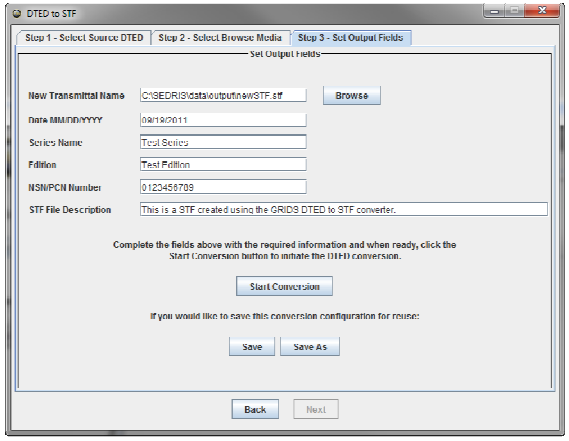


GRIDS (cont.)

- Example conversion
  - Step 1: Select Source DTED data
    - Choose a directory containing source DTED data
    - Choose the appropriate DTED Level
  - Step 2: Select Browse Media (Optional)
    - If appropriate, select desired browse media
  - Step 3: Set Output Options
    - Choose a name and desired location for the new Transmittal
    - Enter any desired “metadata” to be included (source, edition, series, etc.)
    - Click the “Start Conversion” button to perform the conversion

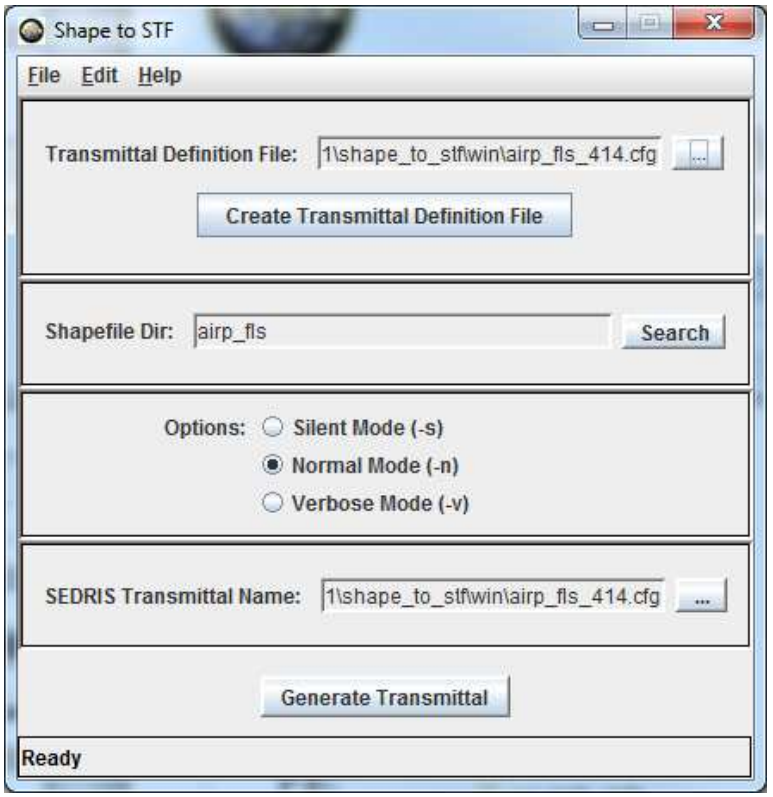






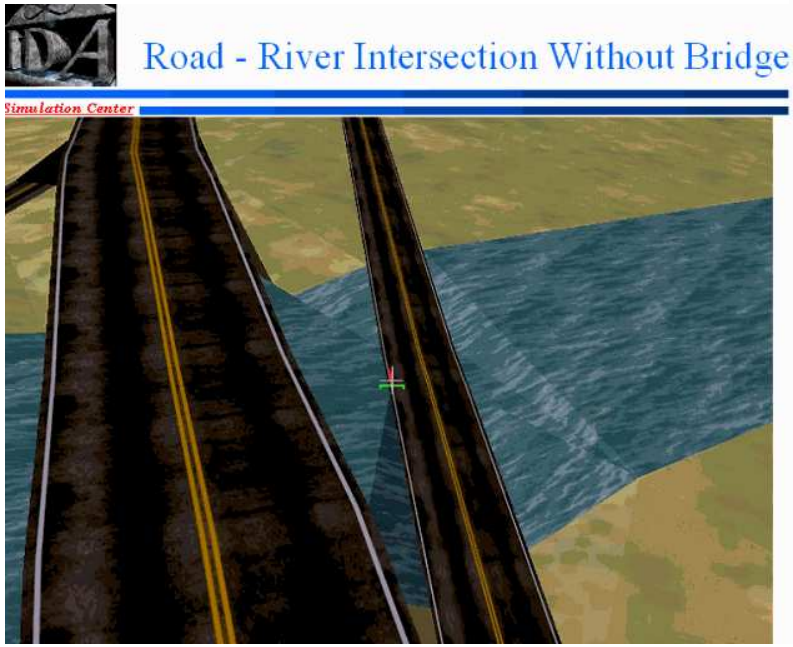
Shape to STF

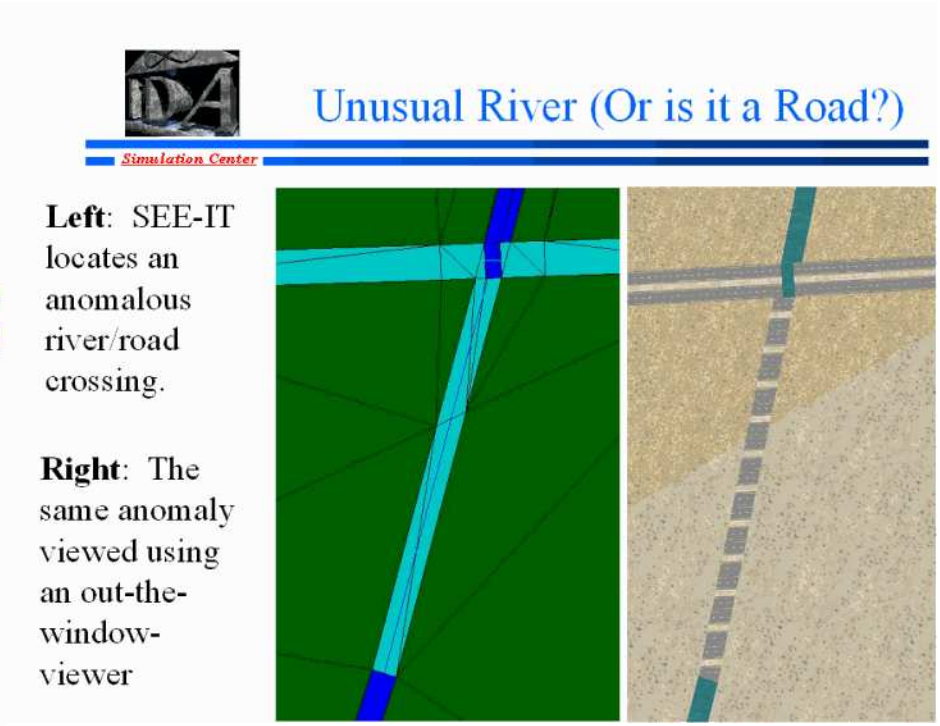
- Converts ESRI Shapefiles to SEDRIS transmittals
- Uses DIGEST FACC 2.1 to EDCS 4.x Mapping library to create Classification Related Features
- First column of Shapefile's DBF file should be named FCODE, F_CODE, FEATURE_AT, FEATURE, or FEATURE_NA
- Can read the associated projection (".prj") file to determine coordinate reference system
- Other feature attributes are converted to Property Values (as text values).
- An Area of Interest can be specified (features at least partially within the bounds are processed)



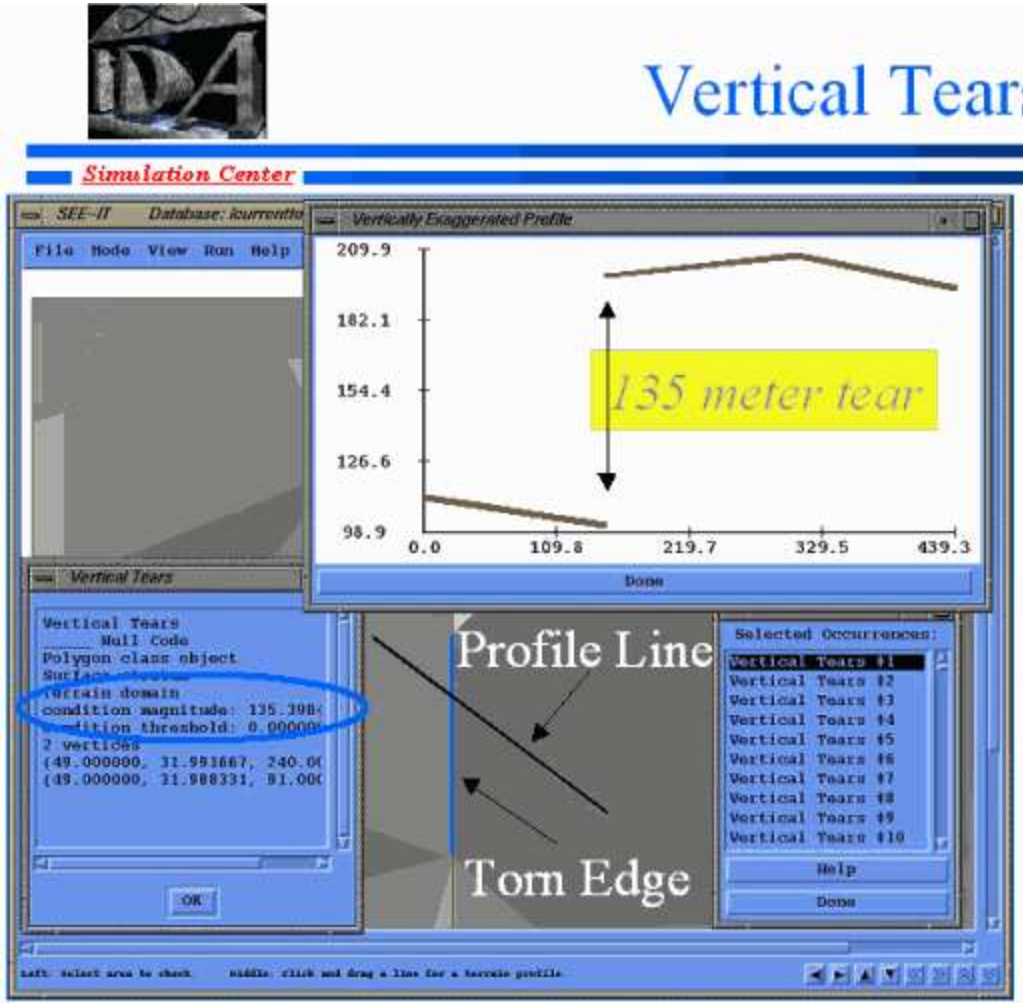
SEE-IT

- Checks for conditions that may be inaccurate descriptions of the physical environment, and it finds conditions that can lead to anomalous behaviors by entities operating in the simulated world





SEE-IT (cont.)

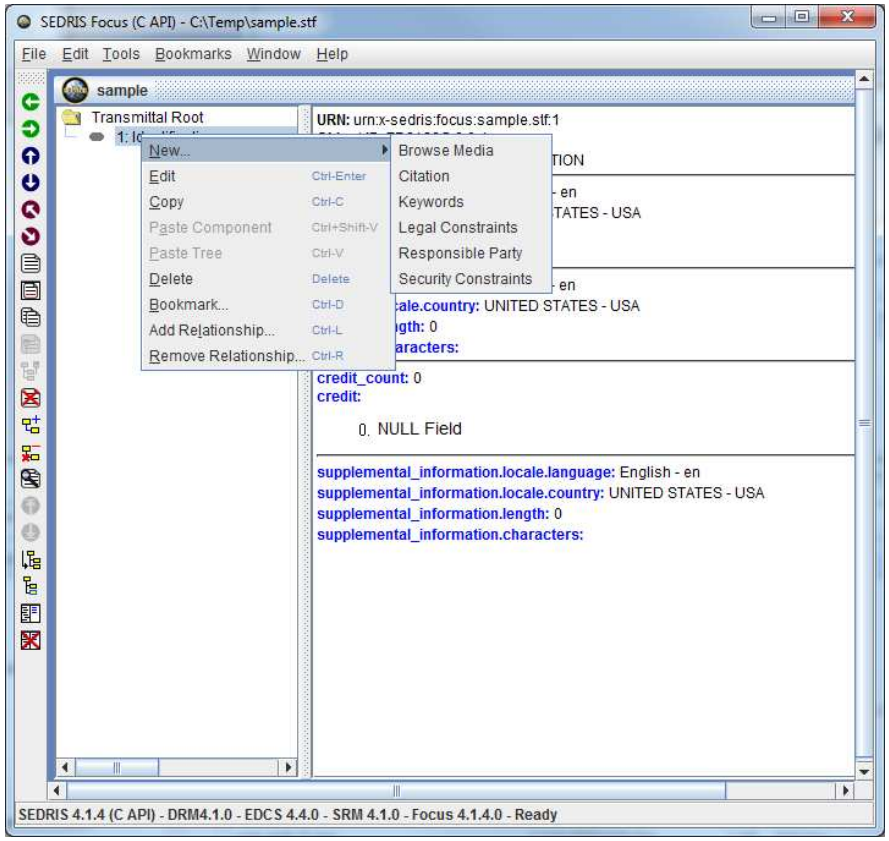


The images to the left show SEE-IT locating and sorting a list of vertical tears.

The most extreme tear, of magnitude 135m, is described, and a terrain profile through the area containing it is shown.

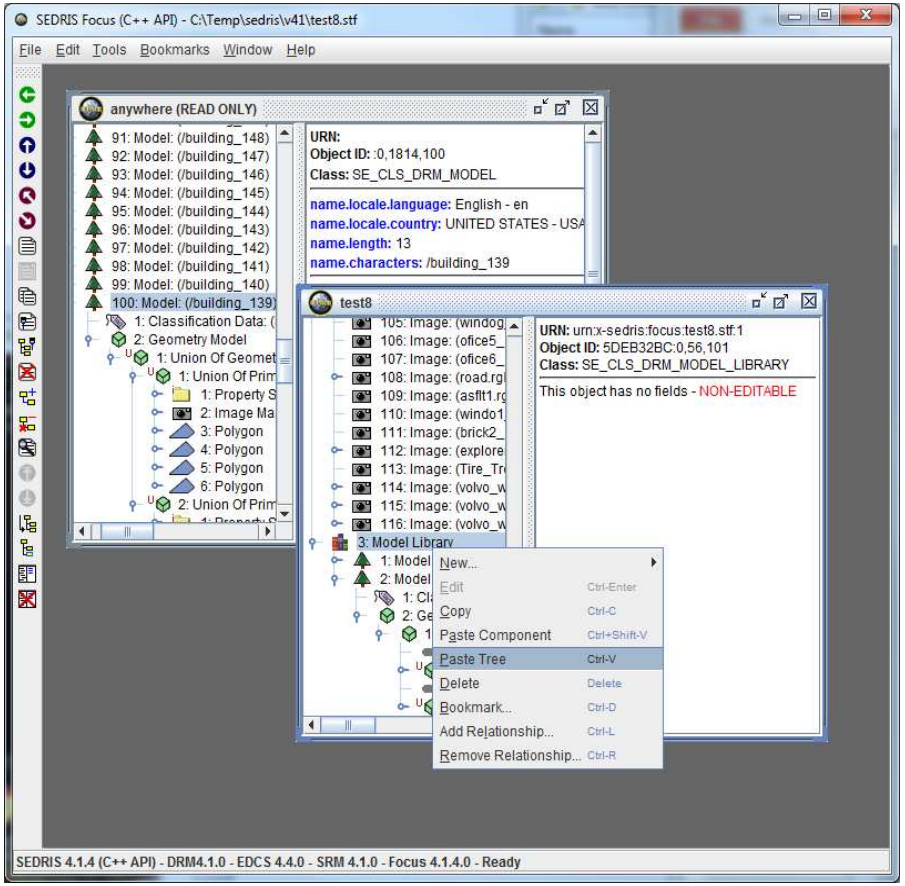
Focus

- Examine, create, and edit SEDRIS transmittals
- Edit SEDRIS transmittals:
  - Create/delete DRM objects
  - Edit DRM fields
  - Copy objects and object trees (including from other transmittals)
  - Add/remove object relationships
  - View/edit Data Table Data
- Find objects by DRM class or Object ID
- Bookmark hierarchy locations for easier browsing



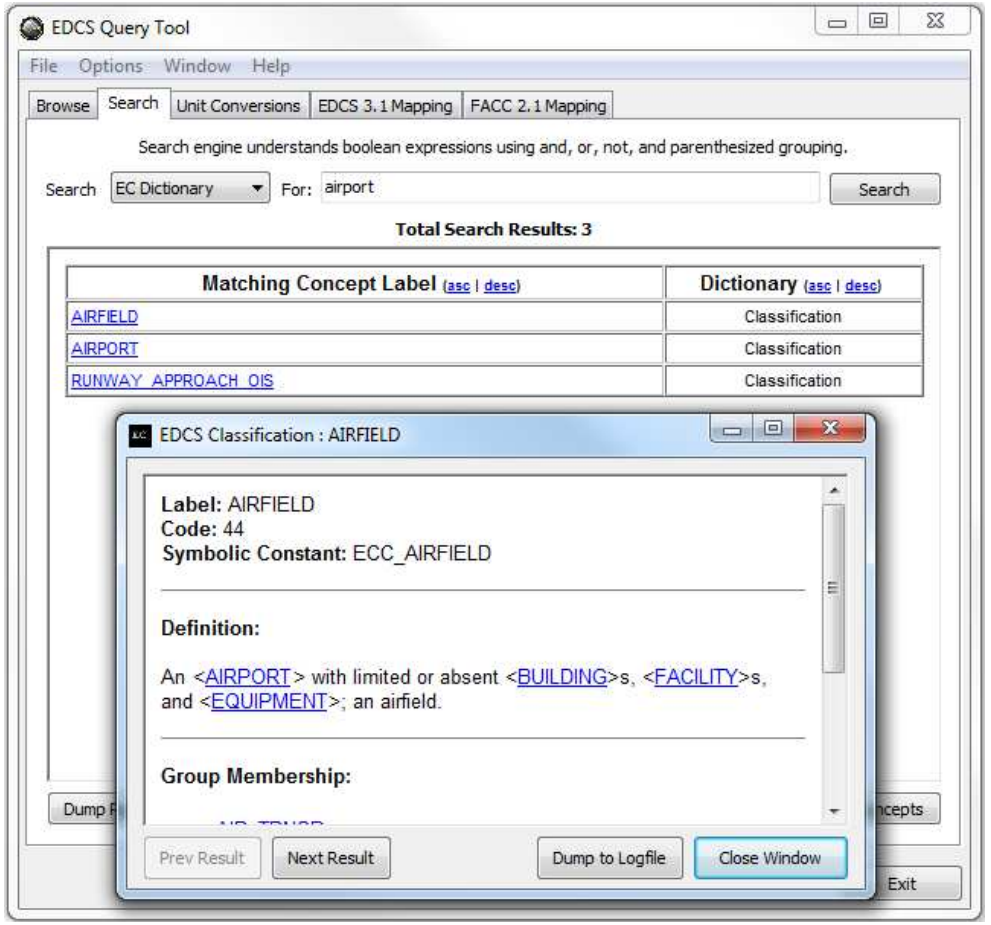
Focus (cont.)

- Run SEDRIS utilities from within Focus:
  - **Depth**: Text output for a section of the transmittal
  - **Rules Checker**: Verifies the structural semantics of a given SEDRIS transmittal against the DRM constraints
  - **Syntax Checker**: Verifies the syntactic correctness of a given DRM hierarchy
  - **Model Viewer**: Displays 3D models and images



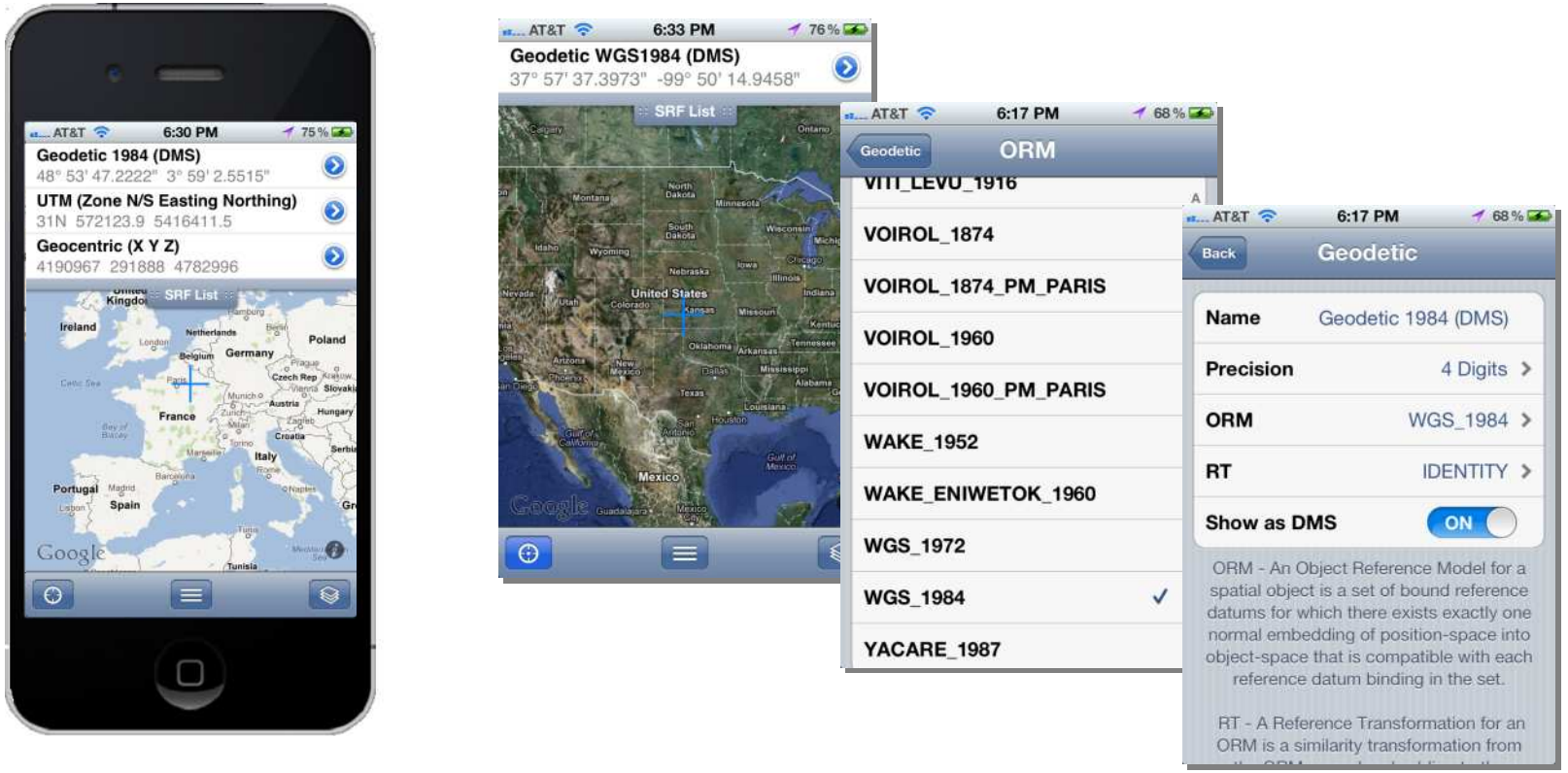
EDCS Query Tool

- Browse and query the EDCS
- Perform Unit Conversions within EDCS Units
- Map FACC 2.1 concepts to EDCS



SRM-based iPhone/iPad App

- Created using Xcode



SEDRIS Tools

Demos

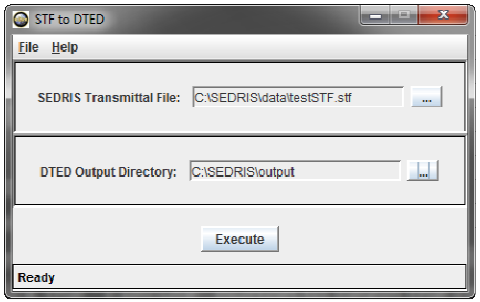
Backup Slides

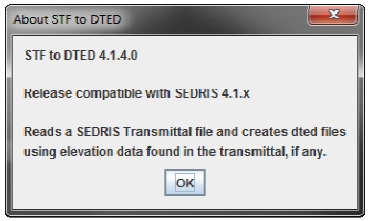
Additional Converter Tools

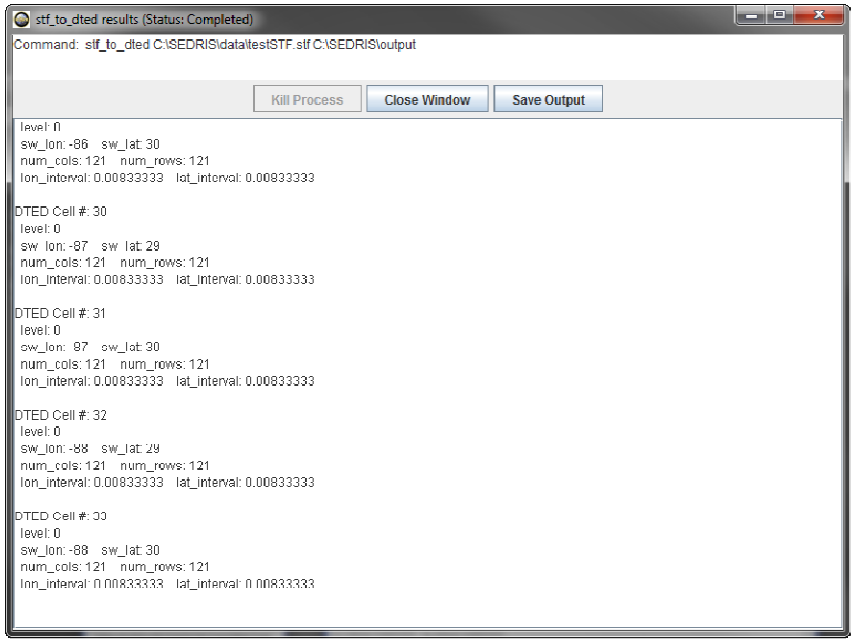
STF to DTED

- Extracts gridded terrain elevation data from a SEDRIS Transmittal and produces NGA DTED data files

- Example conversion
  - Step 1: Choose the source Transmittal
  - Step 2: Choose the desired directory for the converted DTED data
  - Step 3: Click the “Execute” button to perform the conversion



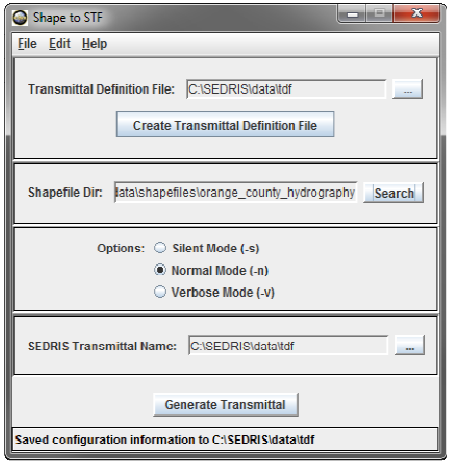


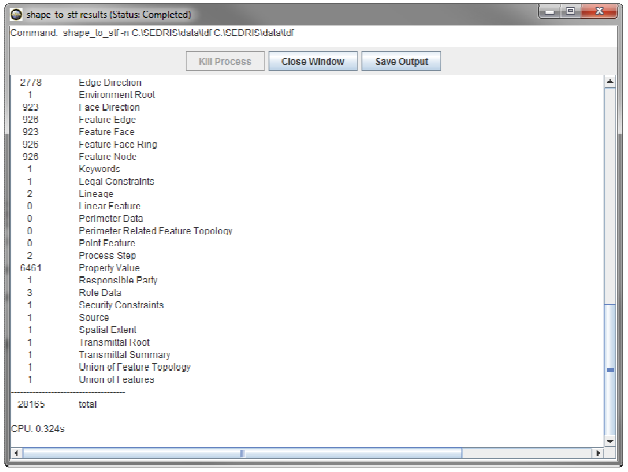


Shape to STF

- Converts objects from ESRI Shape files into a SEDRIS Transmittal

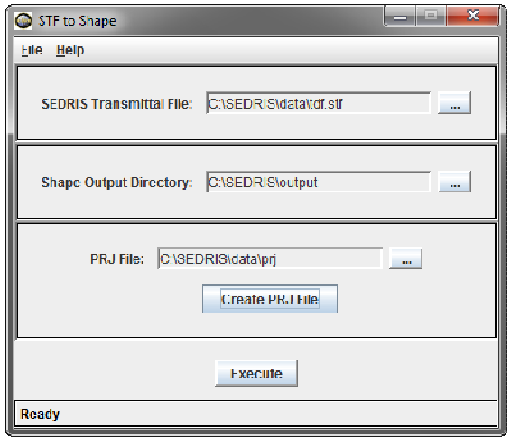
- Example conversion:
  - Step 1: Create a Transmittal definition file to specify the appropriate spatial reference frame, mandatory STF meta data, and area of interest
  - Step 2: Choose the directory containing the source Shape file data
  - Step 3: Choose a name and desired location for the new Transmittal
  - Step 4: Click the “Generate Transmittal” button to perform the conversion

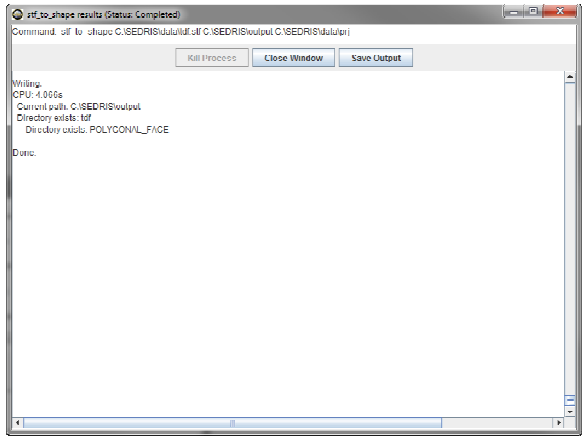




STF to Shape

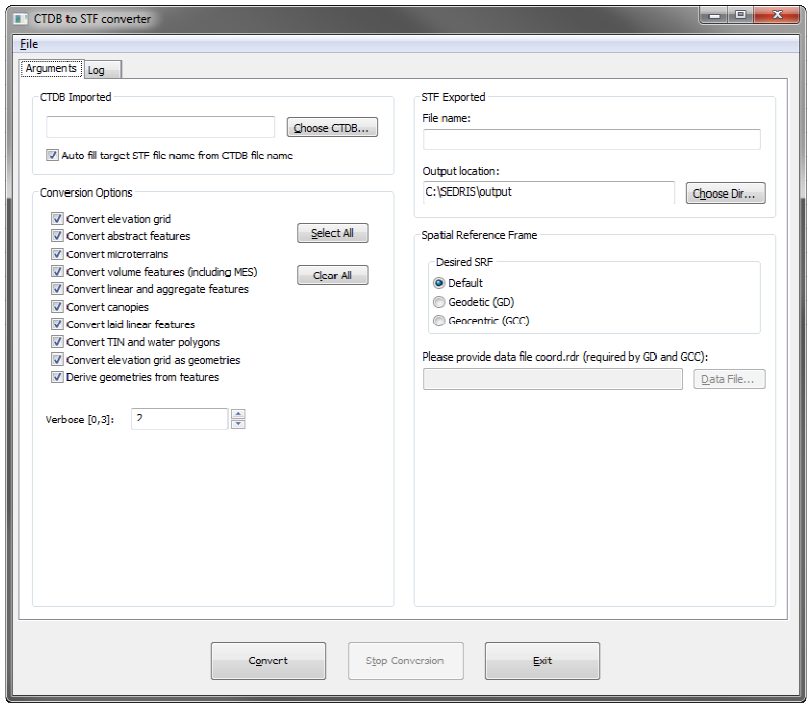
- Extracts features from a SEDRIS Transmittal and creates ESRI Shape files
- Example conversion
  - Step 1: Choose the source Transmittal
  - Step 2: Choose the desired directory to place the converted Shape files
  - Step 3: Create a Projection File, providing projections for the new Shape files
  - Step 4: Click the “Execute” button to perform the conversion





CTDB to STF

- Converts from the Compact Terrain Database format to a SEDRIS Transmittal

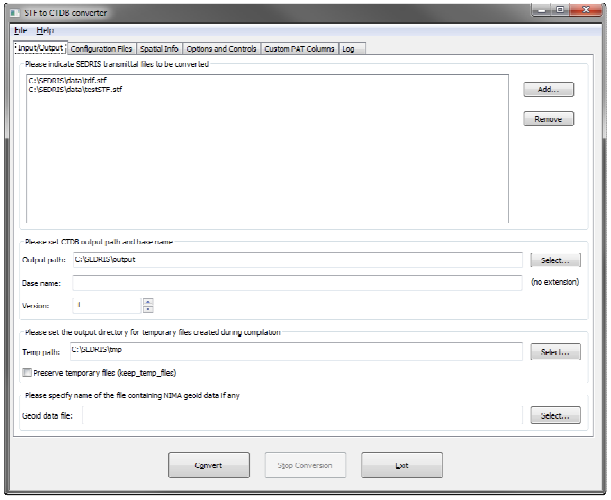


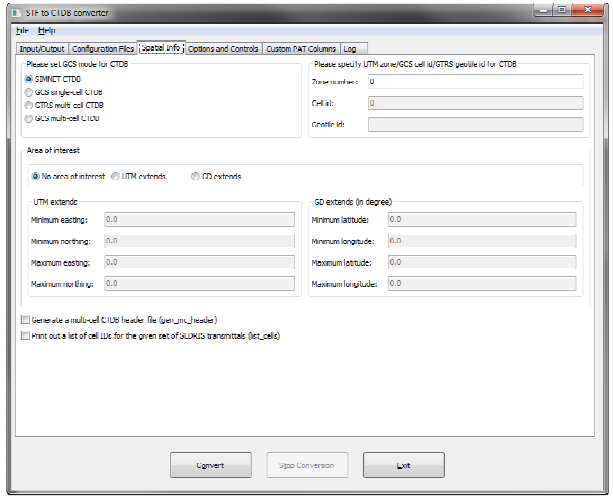
CTDB to STF

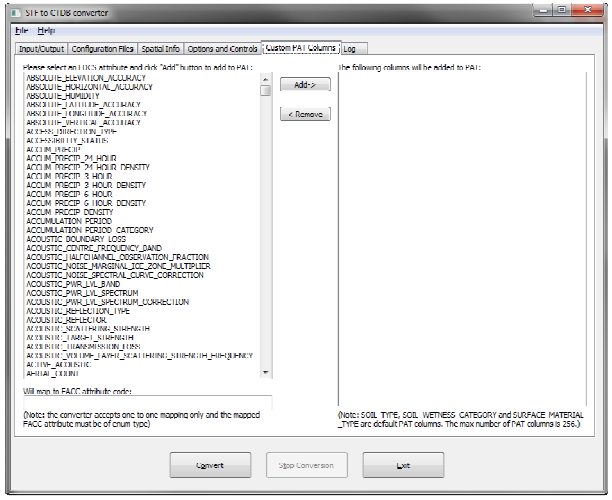
- Example conversion
  - Step 1: Choose the source CTDB to convert
  - Step 2: Choose any desired conversion options
  - Step 3: Choose a name and desired location for the new Transmittal
  - Step 4: Choose relevant Spatial Reference Frame
  - Step 5: Click “Convert” to perform the conversion

STF to CTDB

- Converts data from a SEDRIS Transmittal to the Compact Terrain Database format





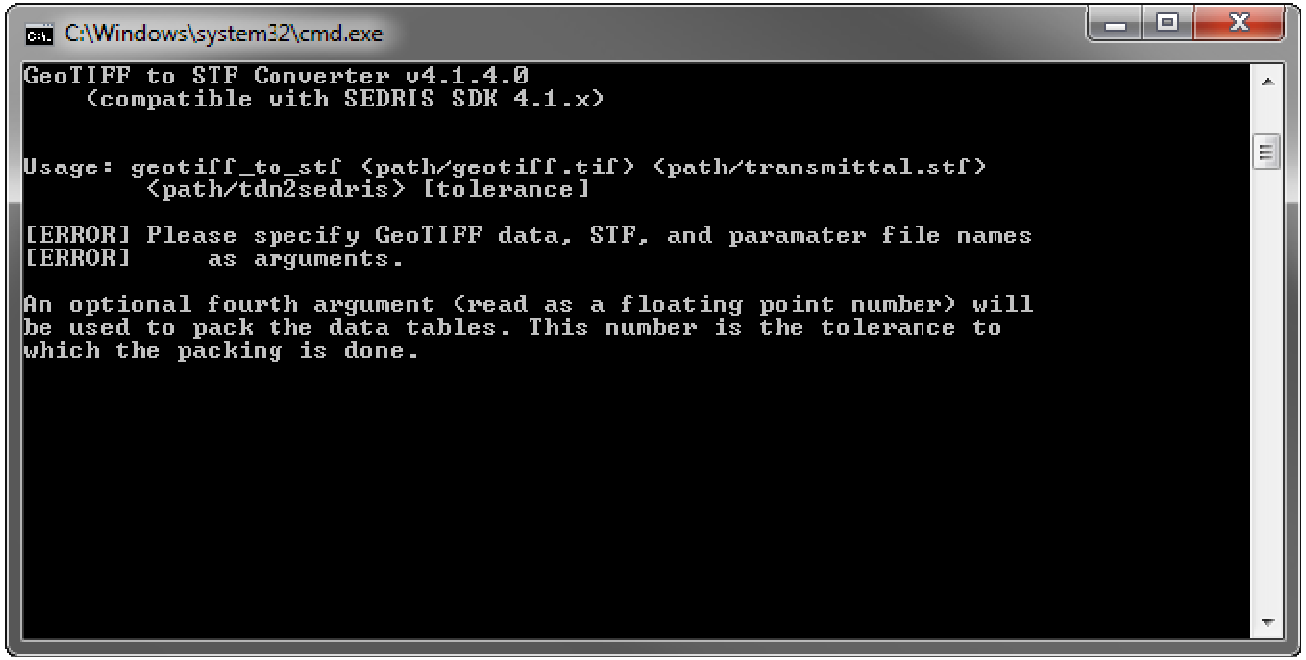


STF to CTDB

- Example conversion
  - Step 1: Choose the source Transmittal
  - Step 2: Choose a name and desired location for the CTDB file
  - Step 3: Choose the configuration files for the converter to use
  - Step 4: Choose relevant Spatial Reference Frame options
  - Step 5: Choose any general program options and controls
  - Step 6: Create the desired Custom PAT Columns using the EDCS Attribute list
  - Step 7: Click “Convert” to perform the conversion

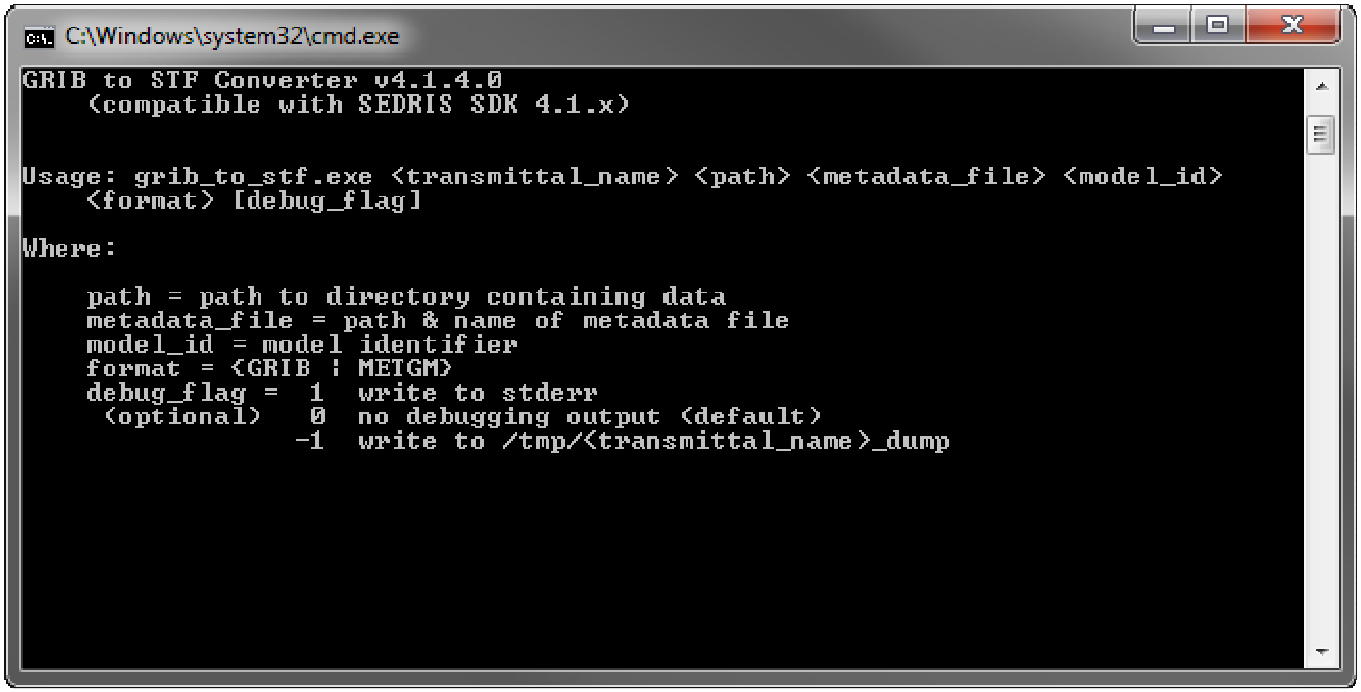
GeoTIFF to STF

- Converts GeoTIFF digital elevation models to a SEDRIS Transmittal
- Example conversion (using a sample included with the tool)
  - Step 1: Create or modify a template mapping file with desired settings
  - Step 2: From a command prompt or Unix shell, run the command:
    `geotiff_to_stf test/dem_10m_w108470_n35430.tif newTransmittal.stf test/tdm2sedris`



GRIB to STF

- Creates SEDRIS Transmittals from
  - World Meteorological Organization GRIB (Gridded Binary)
  - NATO METGM (meteorological grid format)

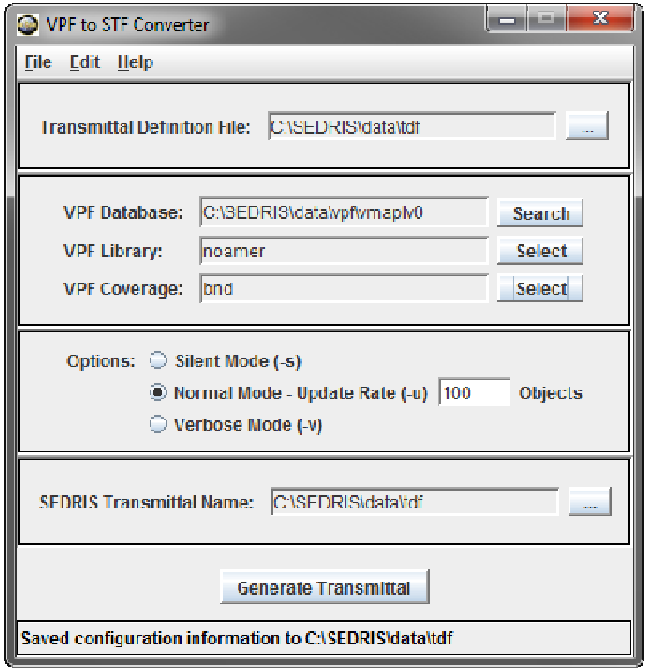


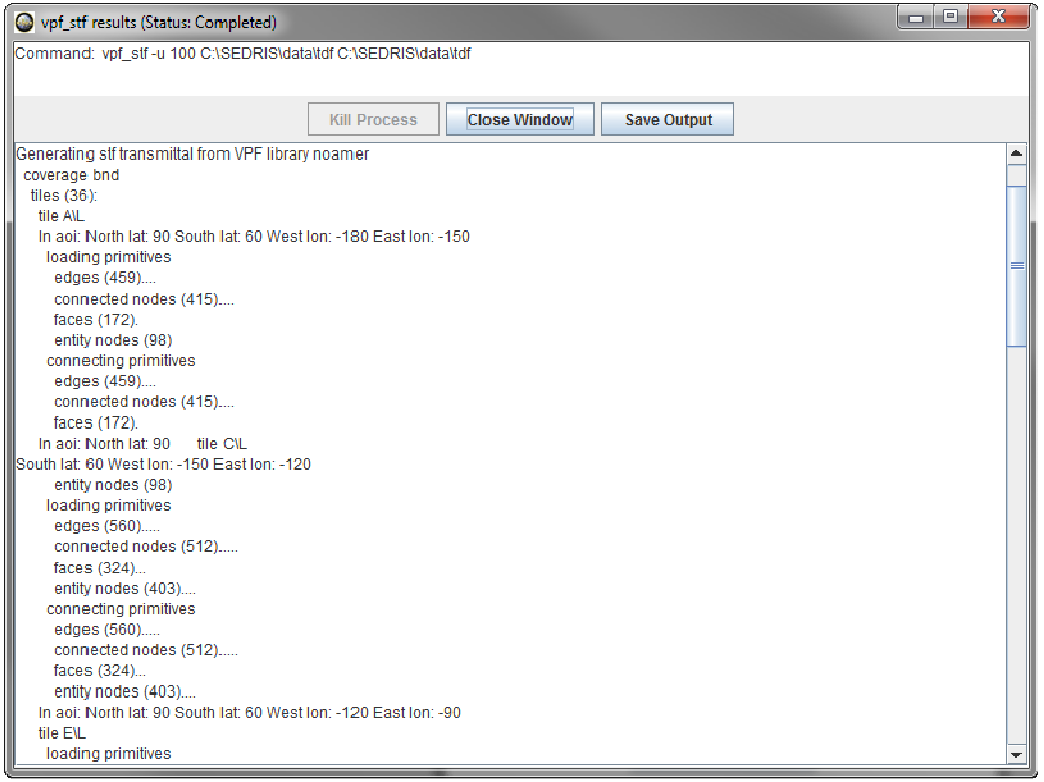
GRIB to STF

- Example GRIB to STF conversion (using sample data included with the tool)
  - From a command prompt or Unix shell, run the command:
    ```
    grib_to_stf example_1.stf Data/GRIB1 Data/GRIB1/coamps.meta COAMPS GRIB
    ```
  - General Syntax:
    ```
    grib_to_stf <stf_name> <data_path> <metadata_path> <model> <format>
    ```
    - *<stf_name>* = the name of the STF to be created
    - *<data_path>* = path to location of the data files
    - *<metadata_path>* = path, with file name, to location of the metadata file
    - *<model>* = name of the model used to create the data in the data files
    - *<format>* = format of data files (*GRIB* or *METGM*)

VPF to STF

- Converts NGA feature data in Vector Product Format (VPF) to a SEDRIS Transmittal





VPF to STF

- Example VPF to STF conversion
  - Step 1: Create a Transmittal definition file to provide the area of interest and required “metadata” for the Transmittal
  - Step 2: Choose the source VPF data to convert, and the VPF Library and Coverage to use for the conversion
  - Step 3: Choose a name and desired location for the new Transmittal
  - Step 4: Click the “Generate Transmittal” button to perform the conversion

STF to STF Converter

- Creates a new SEDRIS Transmittal (using the current SEDRIS SDK) from an existing Transmittal created with a previous version of the SEDRIS SDK

- Example STF conversion
  - From a Command Prompt or Unix shell, run the command:

    `stf_convert [options] <source_transmittal> <target_transmittal>`