(U) GEOTRANS 3.0 Release Notes

December 2009

(U) GEOTRANS Overview

- (U) Coordinate conversions between the following coordinate systems:
  - (U) Geodetic coordinates
  - (U) Geocentric coordinates
  - (U) Local Cartesian coordinates
  - (U) Twenty-eight different types of map projection-based coordinates
  - (U) Military Grid Reference System (MGRS)
  - (U) United States National Grid (USNG)
  - (U) Global Area Reference System (GARS)
  - (U) World Geographic Reference System (GEOREF) grid coordinates
- (U) Datum Transformations between global or local horizontal datums
  - (U) WGS 84, WGS 72, and 228 local datums
- (U) Conversions between ellipsoid heights and geoid (MSL) heights
  - (U) EGM96 & EGM84 using various grids and interpolation methods

(U) Migration from GEOTRANS 2.4.x to 3.0

- (U) GEOTRANS 2.4.x (legacy) & 3.0 (MSP) code baselines have been kept in synch
  - (U) Identical functionality
  - (U) As much common source code as possible
- (U) User Interfaces
  - (U) Application GUI – Interactive and Batch Coordinate Conversion
    - (U) No significant differences (Windows/C++ vs. Java implementations)
  - (U) Coordinate File Format – Batch Coordinate Conversion
    - (U) No differences
- (U) Application Programmer Interface (API)
  - (U) Migration from C to C++ allowed significant improvements to API
  - (U) Object-oriented API via Coordinate Conversion Service class
  - (U) Far fewer functions in API (~165 In v2.4.x vs. ~22 In v3.0)
  - (U) Fewer steps required in coordinate conversion operations
  - (U) Errors reported via exception handling
  - (U) Thread safe implementation

(U) GEOTRANS 3.0 Fixes & Enhancements

- (U) An error was corrected in the MGRS module that had allowed polar format MGRS coordinate strings beginning with the letters C or D to be accepted.
- (U) The MGRS, UTM, and UPS modules were updated to correct several reported problems; these involved the following three issues:
  - (U) MGRS coordinates are now truncated rather than rounded; this has eliminated problems resulting from rounding up to various boundaries,
  - (U) Conversions along the boundaries of the polar regions (84°N and 80°S),
  - (U) Conversions in and on the boundaries of the irregular MGRS zones 31V and 31-37X in the north Atlantic.
- (U) The precision of the supported ellipsoid parameters has been improved based on input from NGA.
- (U) A second variant of the Polar Stereographic projection is now supported which specifies the scale factor at the pole as a parameter. The UPS module has been updated to use this variant of the Polar Stereographic projection.
- (U) A second variant of the Mercator projection is now supported which specifies the scale factor at the equator as a parameter.
- (U) It is now possible specify the order of geodetic coordinates (latitude-longitude or longitude-latitude) in coordinate files, using a new header keyword (COORDINATE ORDER) and new radio buttons in the file processing GUI.
- (U) Heights can be included in input coordinate files containing map projection coordinates; these are passed through without change to the output coordinate file.

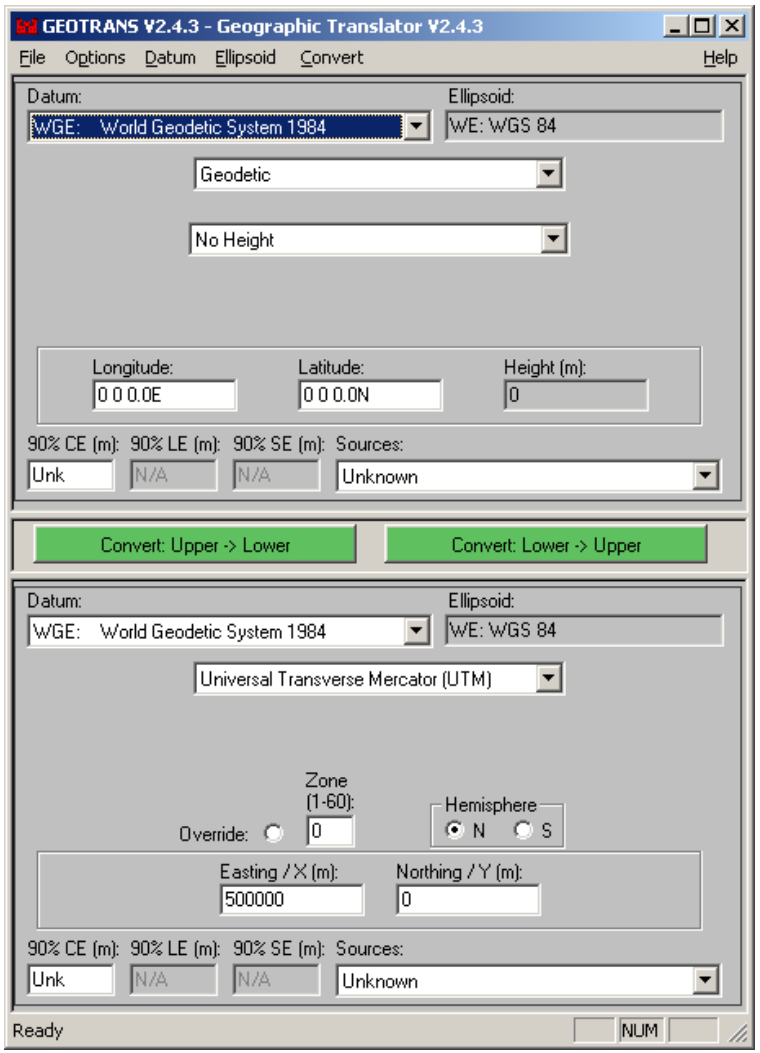
(U) GEOTRANS 3.0 Programming Environment

- (U) The GEOTRANS software was developed and tested using the Microsoft Windows XP operating system, Sun Solaris 8 UNIX, and Red Hat Enterprise 4 LINUX.
  - (U) It should also work on all later versions of these operating systems.
- (U) The GEOTRANS Coordinate Conversion Service was developed in C++.
  - (U) The Windows version was built using Microsoft Visual C++ .Net 2003.
  - (U) The UNIX versions was built using the Sun Forte Workshop 6 Update 2 compiler.
  - (U) The LINUX versions was built using the GNU C++ compiler (gcc, version 3.4.6).
- (U) The GEOTRANS application GUI was developed in Java and requires the Java Runtime Environment (JRE) 1.5 or later to execute
  - (U) MSP recommends using JRE 1.5 Update 18 or later that addresses all of the vulnerability issues in earlier versions of JRE.

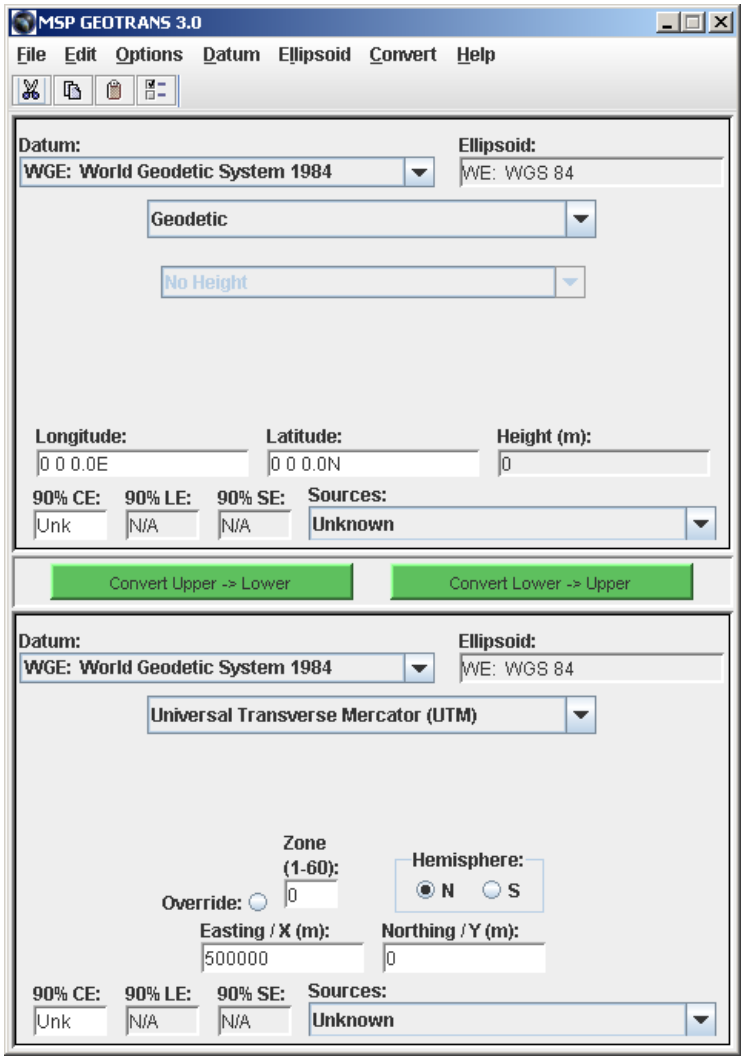
(U) Application GUIs

The figures below are UNCLASSIFIED in their entirety

(U) GEOTRANS 2.4.x



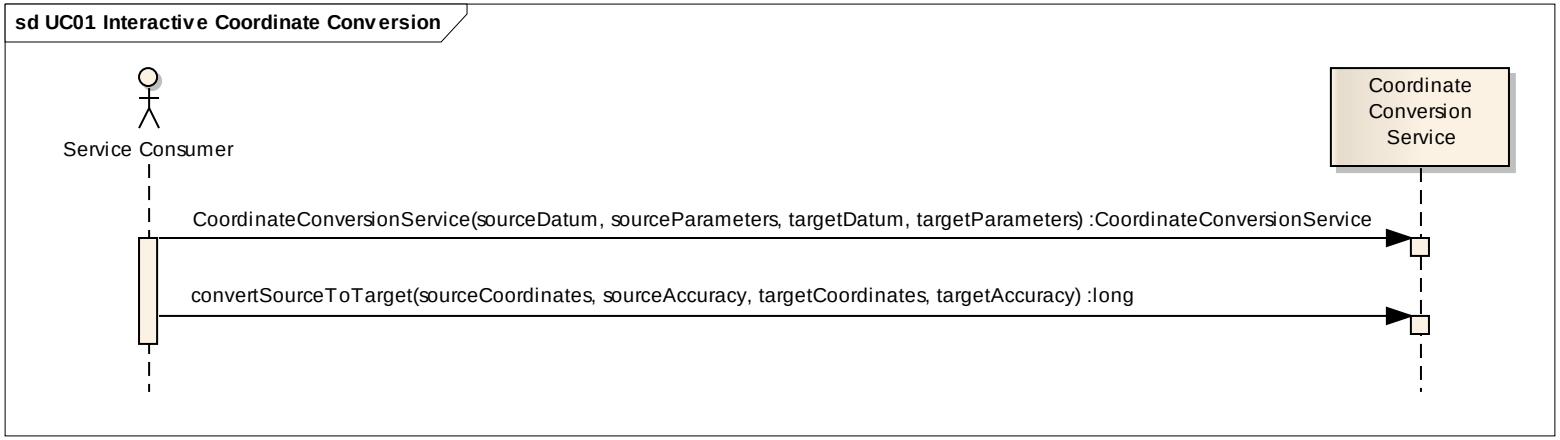
(U) GEOTRANS 3.0



(U) Coordinate Conversion Sequence

1. (U) Construct a Coordinate Conversion object, specifying:
   a. (U) source datum,
   b. (U) source coordinate system, including parameters, if any,
   c. (U) target datum,
   d. (U) target coordinate system, including parameters, if any.
2. (U) Convert Source to Target, specifying:
   a. (U) source coordinates,
   b. (U) source coordinate accuracy,
   c. (U) target coordinates to be returned,
   d. (U) target coordinate accuracy to be returned,
   e. (U) coordinate conversion status to be returned.

The figure below is UNCLASSIFIED in its entirety



(U) GEOTRANS 3.0 API

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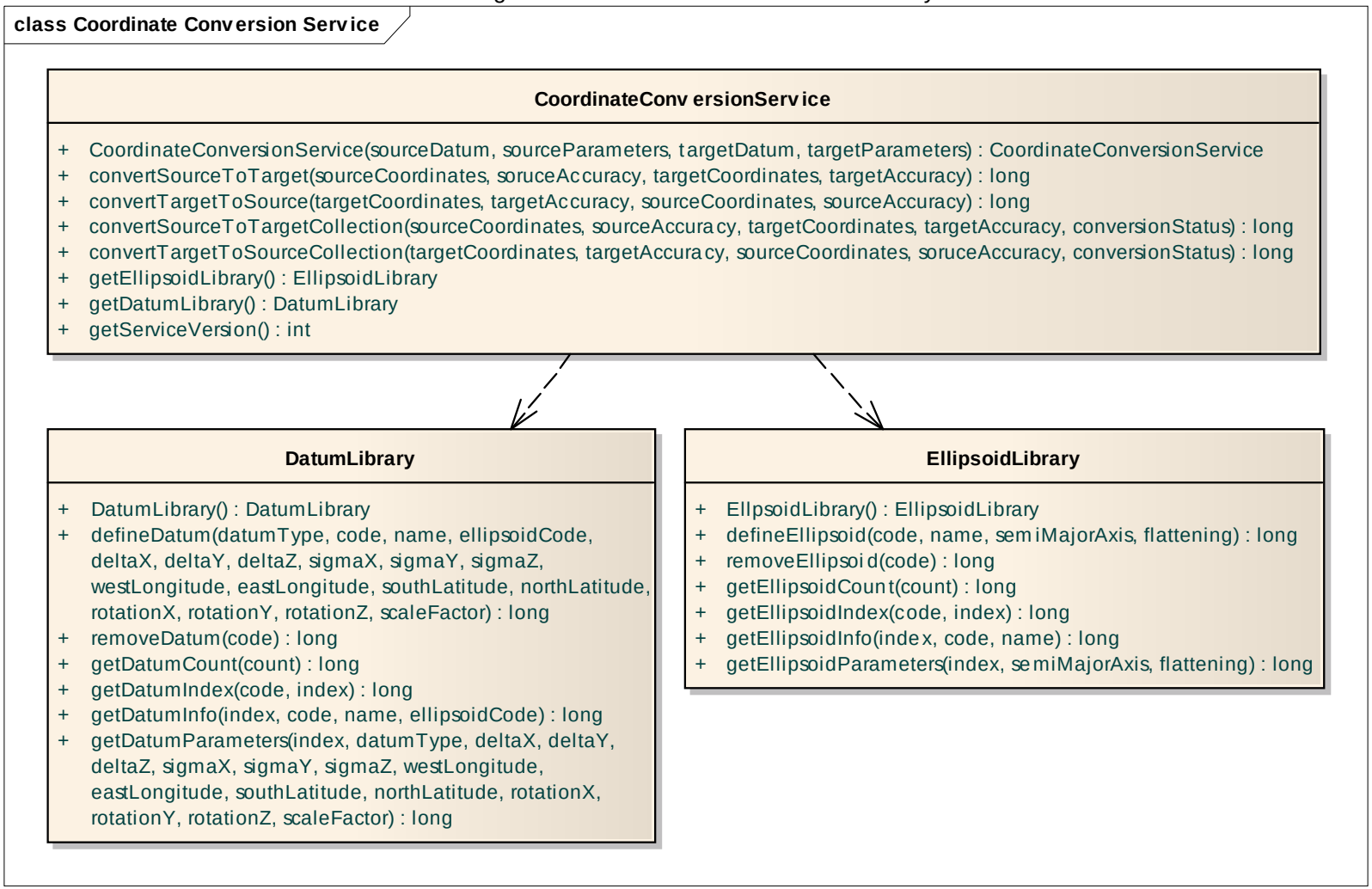

(U) GEOTRANS 3.0 API (cont'd)

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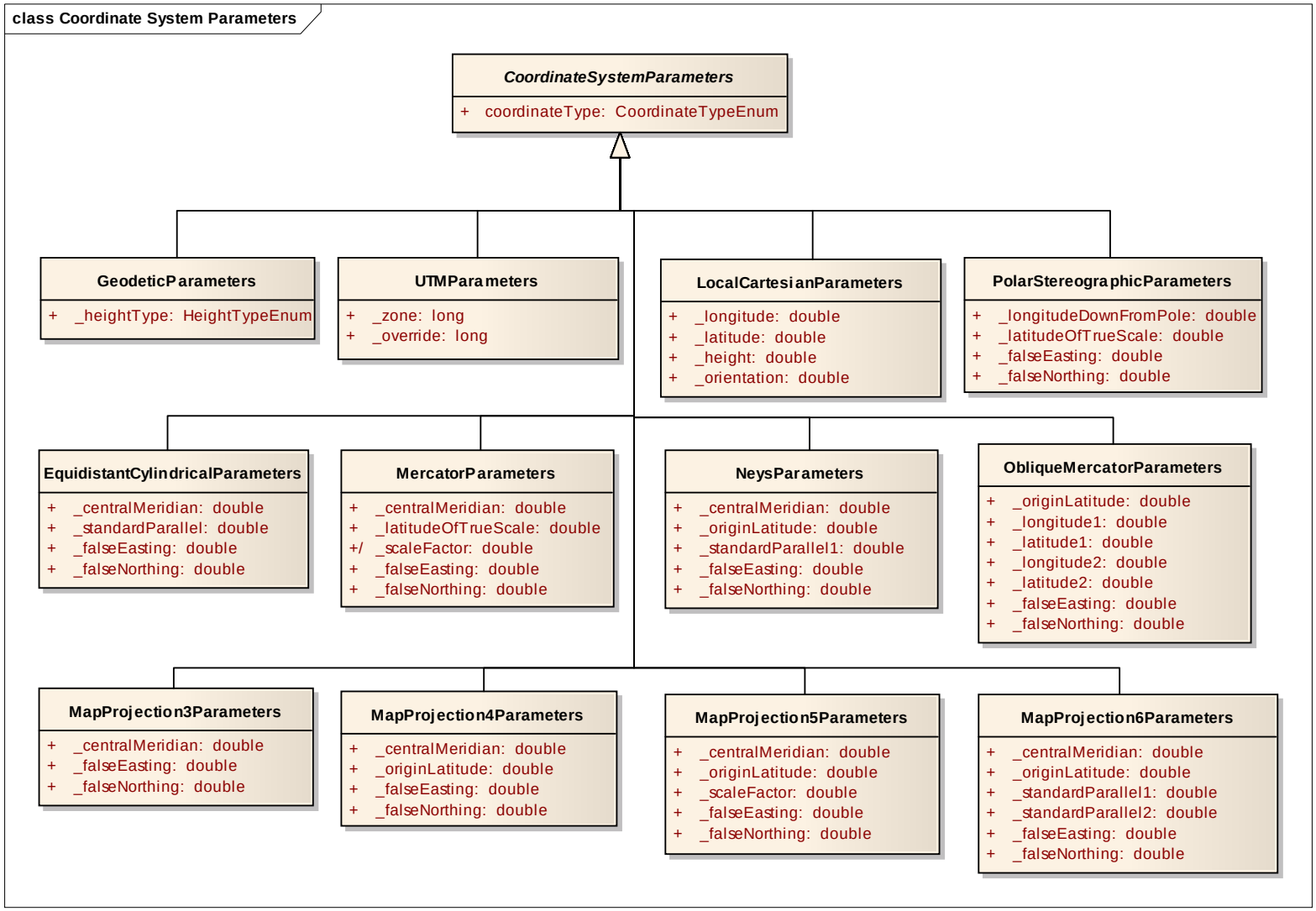

(U) GEOTRANS 3.0 API (cont'd)

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