**RSTT\_NOGS stands for Regional Seismic Travel Time \_ NOde Get and Set**

***Summary:***

RSTT\_NOGS are UNIX command-line programs that allow users to get and set velocity profiles at RSTT tessellation nodes. Usage for RSTT.GetNodes and RSTT.SetNodes is returned if no arguments are provided. RSTT.GetNodes returns velocity profiles for either nodes within a latitude, longitude box or nodes specified by integer ID. RSTT.SetNodes updates velocity profiles using a formatted flat file.

***Code Lineage***

RSTT\_NOGS is a java code written by me at Lawrence Livermore National Laboratory. RSTT\_NODES makes use of the Seismic Location Baseline Model (SLBM) code developed by Sandy Ballard at Sandia National Laboratories.

***Supporting Files:***

I have provided kml files that display nodes for the na1010pn (ca. Oct 2010) model and the RSTT2.3 model (ca. Jan 2012) in GoogleEarth. Clicking on a node will show that latitude, longitude, and nodeID.

***Installation:***

Installation is as easy as untarring the RSTT\_NUGS.tar file. The RSTT\_NOGS codes are in the RSTT\_NUGS/RSTT\_NOGS.jar file. The source codes are provided for transparency and to provide a tutorial if users who want to write their own codes that utilize the SLBM code base.

*Path Configuration:*

This is the trickiest part of using the code. First, you need to install the Sandia SLBM\_Root code (current version is SLBM\_Root\_2.8.2). Compilation of the code (simple make command) will produce the following files in SLBM\_Root\_2.8.2/lib: slbmjni.jar, libslbmjni.jnilib, and libslbm.dylib. You will need to set the following paths in your UNIX environment so that java will link to SLBM (C++/JNI) libs:

setenv SLBM\_HOME <full path to SLBM\_ROOT>

setenv DYLD\_LIBRARY\_PATH ${DYLD\_LIBRARY\_PATH}:${SLBM\_HOME}/lib

Of course the command will be something like export SLBM\_HOME=… for the bash environment. Then I recommend setting the java CLASSPATH on the command line. e.g.

java -cp “<path to RSTT\_NOGS>/RSTT\_NOGS.jar:$SLBM\_HOME/slbmjni.jar" RSTT.GetNodes

java -cp “<path to RSTT\_NOGS>/RSTT\_NOGS.jar:$SLBM\_HOME/slbmjni.jar" RSTT.SetNodes

I recommend putting these commends in individual, executable csh files. Java errors including “java.lang.NoClassDefFoundError” are typically related to the CLASSPATH.

**Notes on The Velocity Model Profiles**

Output for each node has the following format:

node <node number, global tessellation> <node number, selected nodes> <lat> <lon>

0 <depth to top of layer> <P-wave velocity> <S-wave velocity>

1 <depth to top of layer> <P-wave velocity> <S-wave velocity>

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7 <depth to top of layer> <P-wave velocity> <S-wave velocity>

8 <depth to top of layer> <P-wave velocity> <S-wave velocity> <P-wave velocity gradient> <S-wave velocity gradient>

<node number, selected nodes> is omitted if a single node is selected.

The output for a single node looks like this:

node 8237 -25.975 -65.854

0 -1.95 1.50 0.00 // Water layer. Zero thickness in this example

1 -1.95 3.81 1.94 // Sediment 1. Zero thickness in this example

2 -1.95 2.50 1.20 // Sediment 2. Surface layer in this example

3 -1.17 4.00 2.10 // Sediment 3

4 -0.59 6.11 3.56 // Upper crust

5 17.05 6.51 3.70 //Middle Crust

6 17.05 6.20 3.50 //Middle Crust used for Pg/Lg horizontal slowness

7 35.62 7.21 3.96 // Lower Crust

8 40.76 8.11 4.66 0.00012 0.00035 // Moho

Rules:

1. Velocity must increase with depth, unless layer thickness is zero. Updating the model will fail if this velocity does not increase with depth.
2. Velocity gradient in the mantle must be greater than or equal to zero.
3. The depths of layers 5 and 6 must be the same. Layer 5 velocity is used for ~vertical-ray travel time for Pn/Sn. Layer 6 velocity is used for ~horizontal–ray travel time for Pg/Lg.

Best Regards

Steve Myers, LLNL, October 2012

Update: 17 September 2015

SetNodes now write an updated model to a single file (geotess format).