TIDE TOOL – QUICK INFO

For more information, refer to Tide Tool Manual.

OVERVIEW:

The Tide Tool system downloads Pacific sea level data from the NWS Telecommunication Gateway (NWSTG), decodes the data, and displays it. Calculated tsunami travel time contours can also be overlain on the map client to graphically show the propagation of the tsunami from the earthquake epicenter. All stations that PTWC receives are available through Tide Tool. The system consists of 3 scripts (*get_data.tcl, Tide.tcl, Client.tcl*) that run simultaneously on 1 PC. *Tide.tcl* and *Client.tcl (PACIFIC)* are softwares that PTWC uses in their operations.

For other oceans, please replace *PACIFIC* with *INDIAN* (IO), *CARIBBEAN* (CAR), or *ATLANTIC* (ATL) in the Quick Info text. Instructions refer to the generic names of scripts without a version number *(Tide.tcl, Client.tcl, etc).*

CISN may be run on the same PC to monitor seismicity and alert Duty Staff when large earthquakes occur and when Tsunami messages are sent by PTWC or US NTWC (WC/ATWC).

USE:

1. Monitor stations for tsunami confirmation after a large earthquake has occurred.
   To display sea level records (marigrams), use *Tide.tcl* or *Client.tcl* map
   To determine the estimated arrival time, you may:
   - Use *TTT* button in *Tide.tcl* to calculate tsunami travel times using actual earthquake epicenter (this will enable overlay onto *Client.tcl* map)
   - Use PTWC bulletins which give estimated tsunami arrival time at different locations
   - Use *ttt_auto.bat* (double click *ttt_auto* icon on desktop) or *TsuDig* to calculate tsunami travel time map (use either 'bullseye map with your location (e.g., Pago Pago / Apia) as center' or event map using actual earthquake epicenter)
2. Monitor state-of-health of your. Report if out of order.

STARTUP AND TTT CALCULATION / OVERLAY:

1. Start *get_data.tcl.* **Double click *GET_DATA* icon on desktop**. This script downloads data every 200 seconds from the NWSTG. Data are accumulated in a file (in *TideTool_data* (desktop icon) / SR_LOG folder, file srxxxyr.log, where xxx is Julian day and yr equals year. The *GET_DATA* console window that opens should be regularly checked to ensure that data are still being collected.
2. Start *Tide.tcl*. **Double click *TIDE* icon on desktop.** This script looks to see if there is new downloaded data in srxxxyy.log and if yes, decodes the new data and updates the sea level station data file/display.
3. Start *Client.tcl (PACIFIC OCEAN)*. **Double click *PACIFIC* icon on desktop.** Wait until *Tide.tcl* (Tide Tool) completes the decode of the initial file (may take up to 20-30 min if at the end of the Julian Day). To start *Client.tcl* for other regions do the same, double click on icon(s) (ATLANTIC, CARIBBEAN, INDIAN) on desktop.
   When an event occurs, calculate tsunami travel times. **Click *TTT* button in Tide.tcl.** Run *ttt_tidetool.bat* via TTT button to calculate Tsunami Estimated Times of Arrival (ETA) and create a map to overlay on Client.tcl map (*GET ETAs* and *TTT* in *Tide.tcl*, *PLOT TTs* in *Client.tcl* to overlay).

L. Kong, T. Fukuji, May 2010 - July 2017

IMPORTANT CHECKS DONE BY EACH DUTY SHIFT:

1. PC on GMT time. This is needed for correct time decoding.
2. *get_data.tcl* is running. Check *GET_DATA* console window to see if the last download is current (e.g., 5 minutes ago). If not, then data are not being collected. Restart programs.
   a. Close the inactive *WIZE* and start the *get_data.tcl* again. Refer to 1. in STARTUP
   b. Check to see if you also need to restart *Tide* and *Client*. If the softwares do not update or are frozen, then close and restart. Exit *Tide* and *Client* window(s) (e.g., PACIFIC OCEAN). Start each program again (refer to 2. and 3. in STARTUP)

Notes:

1. Stations transmit data by satellite (generally GOES, MTSAT, EUMETSAT) at different intervals (every 3-60 min) and different times (in a given hour). Therefore, before deciding on the tsunami threat, sometimes you may have to wait until the next transmission if only part of the tsunami wave has arrived.
2. Stations have sensors that 'damp' the signal (see IOC Manual on Sea Level Measurement and Interpretation (2006) appendix for sensor types). Therefore, what you measure will probably underestimate the wave height reported by eyewitnesses. Coastal signals also depend on the gauge location and local features, e.g., some stations always amplify signals.
3. DART stations are located in the deep ocean (not on land). Therefore, signals measured will be much smaller (few cm / 10s of cm, or inches to 1-3 feet) than signals on coastal (land) gauges. When DART waves hit shallow water (the coast), tsunami wave physics says that wave height increases – therefore, a small DART wave in the deep ocean could end up as a large wave when it hits land. Tsunami modeling must be used to forecast what is expected at the coast.

TIPS FOR EFFICIENT USE:

1. View individual sea level stations using *Tide* window (choose station using 4-letter station code, left mouse click, or use Sea Level Station map hard copy), or *Client* window (choose dot on map, left mouse double click). Choices are
   - Sensor type (pressure gauge, encoder, aquatrak, bubbler, radar)
   - *Info* (station and transmission information)
   - *Mess* (actual data download, undecoded)
   - *MAP* showing station location with travel time contours using station location as source
2. Marigram ZOOM widget:
   a. Measure wave height and wave period from an individual station by mouse-selecting (right) time window to expand time series (ZOOM widget), then mouse-select (left) points you want to measure – a time and height difference is automatically calculated if you select 2 points.
   b. You can record the picks made using the *REC* tab; picks are recorded to the file *Tide_Tool_LOG* in in the *TideTool_data* folder.
   c. Choosing *MIN MAX* in *REC* auto-picks the minimum and maximum height in the selected window; to then record the picks, click on the *Peak to Peak REC* menu item.

d. Marigram data can be written to a file by clicking *WRITE* tab (data are time, height including tide, height with tide removed); file is located in the in the *TideTool_data/PLOTS* directory.

3. Fast viewing of stations in a region is done using the *Client* – mouse-outline (right click & drag) a box of interested stations, and then Show *Tile or Strip* to display all stations.
   The *Strip* feature allows many stations to be displayed simultaneously, similar to a seismic record section. If *ttt_tidetoolxx.bat* has been run, then the order of the marigrams will be from the closest (1st-arriving tsunami wave) to farthest station from the source.
   The *Tile* feature shows each station as an individual window.
4. Station locations and 4-letter station names are found using the hard-copy maps (*Atlantic_SL_Stations_20170706.pdf, Caribbean_SL_Stations_20170706.pdf, IndianOcean_SL_Stations_20170706.pdf, Pacific_SL_Stations_20170706.pdf*, in *TideTool_data* folder), or by *Disp/Find* button in *Client*
5. Estimated Tsunami Travel Times from the earthquake epicenter can be overlain on the map after running *ttt_tidetool.bat.* TTT button in Tide.tcl is used to run *ttt_tidetool.bat*. It will open a Tsunami Travel Times window to be used to input data to calculate travel times and create map overlay. Latitude and longitude are given at the location of mouse cursor. Origin time (OT) of the earthquake source is also shown.
6. To retain a picture of the screen, options are:
   - Use *Print Plot File Only* option in time series window (postscript plot files found in *TideTool_data/PLOTS* directory, and viewed with Adobe Acrobat).
   - Use *Ctrl+Alt+Print Screen* (individual window) or *Print Screen* (entire display), and then paste in MS Word file

VIEWING ARCHIVED DATA:

Tide Tool can be run in 'archive' mode to view past data (files in folder SR_LOG).

1. Use the correct station metadata file to view archived data. This should be the COMP_META file that was in use when the data was collected; it may not be the most current one. (Replace the current COMP_META file with this file, but be sure to save the current COMP_META file to another filename so you will have it for the real-time version)
2. Run *Tide.tcl.* To run: double click *wize.exe* in the *TideTool_bin* folder on the desktop.
3. Type "wize Tide.tcl H"
4. Enter JD, YR (2 digit), SPAN (1 or 2 corresponding to number of days of SRLOG files)
5. *Tide.tcl* will decode and then display the SRLOG files specified
6. *Client.tcl* (for all regions) can be run. Note that in this mode, all station dots will be red since there is not live data.
7. Once the SR_LOG file(s) have been decoded, station files by JD and sensor are created (in *TideTool_data/Decoded_Data/JD/station.sensor.JD* These time series files are then usable for later station plotting.