# US_PORTS Module
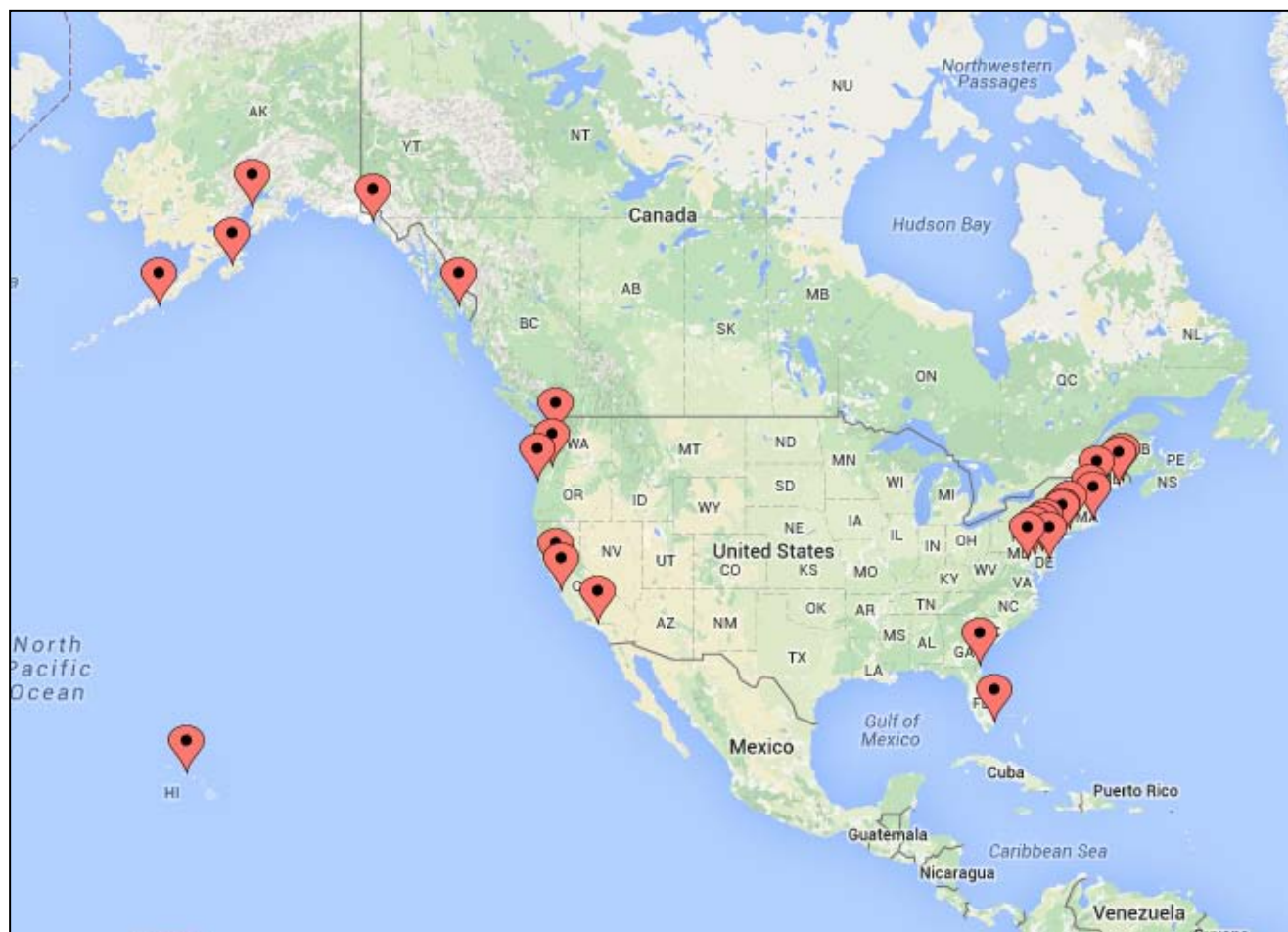
## Harmonic Constituents Database

User's Manual and QRG.



NATIONAL OCEANIC AND
ATMOSPHERIC ADMINISTRATION
UNITED STATES DEPARTMENT OF COMMERCE

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Screen captures taken from V41, Windows-based emulator developed by Warren Furlow.
See www.hp41.org

# HP-41 US PORTS Module
## Harmonic Constituents Database

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# HP-41 US PORTS Module
## Harmonic Constituents Database

<div style="border: 1px solid black; padding: 10px;">

# I.-  INTRODUCTION

</div>

The US Ports Module contains a small database of harmonic constituents used for the calculation of tidal water levels (WL) in a selection of 27 US ports and maritime locations. It is therefore a data repository for the constants used in the formulas for the WL calculations, as published by the National Oceanic and Atmospheric Administration (NOAA) website:

*http://tidesandcurrents.noaa.gov/stations.html?type=Harmonic+Constituents*

This database is meant to be used as a companion for the TIDES ROM – which contains the actual programs for the WL calculation – plus other related functions and FOCAL program as well.  You're encouraged to check the TIDES ROM documentation available at *www.hp41.org*, as well as Jean-Marc's programs on the Tides subject available at:

*http://hp41programs.yolasite.com/tides-accurate.php*

Admittedly the selection of US ports has been rather arbitrary, but should show a balance between east and west coasts – with an emphasis on the Alaska coast for sheer size reasons. You can create your own set of constants in RAM for other locations using the program **LOADHC** in the TIDES ROM. This is a long process, so if you do so make sure to preserve the data in an extended memory file (or even a HEPAX data or HP-IL disk file) after completion!

| | | | |
|---|---|---|---|
| 1 | Aberdeen WA | 15 | Nassauville, Nassau River East FL |
| 2 | Anchor Point, Cook Inlet AK | 16 | New Haven CT |
| 3 | Bar Harbor ME | 17 | Norton Point, Hook Creek, New York NY |
| 4 | Boston MA | 18 | Philadelphia PA |
| 5 | Cape May NJ | 19 | Plymouth, Plymouth Harbor MA |
| 6 | Delaware City DE | 20 | Portland ME |
| 7 | Honolulu HI | 21 | Sand Point AK |
| 8 | Ketchikan AK | 22 | San Francisco CA |
| 9 | Kodiak Island AK | 23 | Seattle WA |
| 10 | Los Angeles CA | 24 | South Beach OR |
| 11 | Long Beach, New York NY | 25 | Vancouver WA |
| 12 | Miami Beach FL | 26 | Washington DC |
| 13 | Milbridge ME | 27 | Yakutat, Yakutat Bay AK |
| 14 | Monterey CA | | |

## Data, data, and more data.

With 75 data points per port, this module holds 2,025 constants. In order to provide an effective storage scheme the data is stored in a custom compact format to save room – designed around the actual constants characteristics.

- Each harmonic constituent has both amplitude and phase, as fractional numbers.
- The Phase typically is less than 400 in value, and may have one decimal digit.
- The Amplitude is always a fractional number with up to three digits with no integer part.

Then a data retrieval routine reads the ROM tables and stores the constants in RAM registers R00 to R74 for each port – ready for the WL routines to use. This process is done by executing the port function – as per the module's FAT: simply run the port's names to populate the data registers with properly decimal values into them, containing the harmonic constituents for the port.

# 2.- PORTS AT A GLANCE
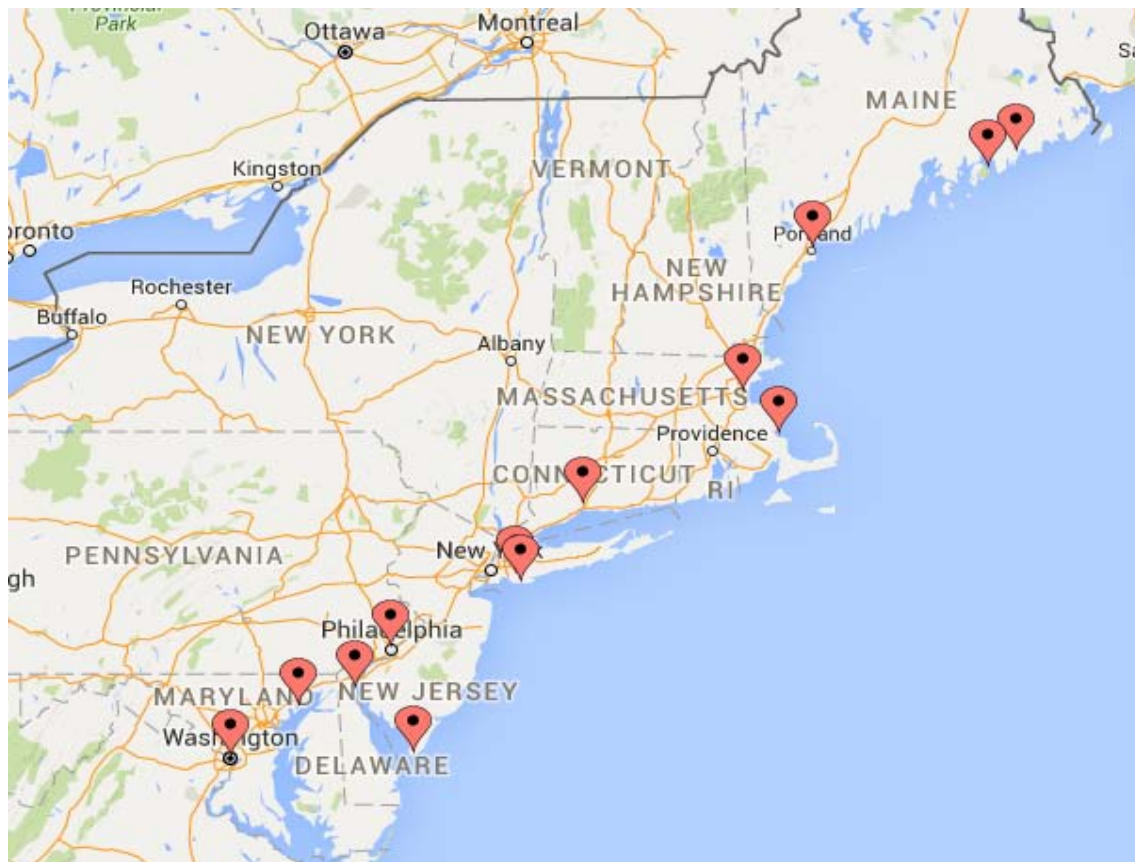

Figure 1: North-Atlantic East Coast Ports

| | | | |
|---|---|---|---|
| 1 | Aberdeen WA | 15 | Nassauville, Nassau River East FL |
| 2 | Anchor Point, Cook Inlet AK | 16 | New Haven CT |
| 3 | Bar Harbor ME | 17 | Norton Point, Hook Creek, New York NY |
| 4 | Boston MA | 18 | Philadelphia PA |
| 5 | Cape May NJ | 19 | Plymouth, Plymouth Harbor MA |
| 6 | Delaware City DE | 20 | Portland ME |
| 7 | Honolulu HI | 21 | Sand Point AK |
| 8 | Ketchikan AK | 22 | San Francisco CA |
| 9 | Kodiak Island AK | 23 | Seattle WA |
| 10 | Los Angeles CA | 24 | South Beach OR |
| 11 | Long Beach, New York NY | 25 | Vancouver WA |
| 12 | Miami Beach FL | 26 | Washington DC |
| 13 | Milbridge ME | 27 | Yakutat, Yakutat Bay AK |
| 14 | Monterey CA | | |

Figure 2: Alaskan Ports
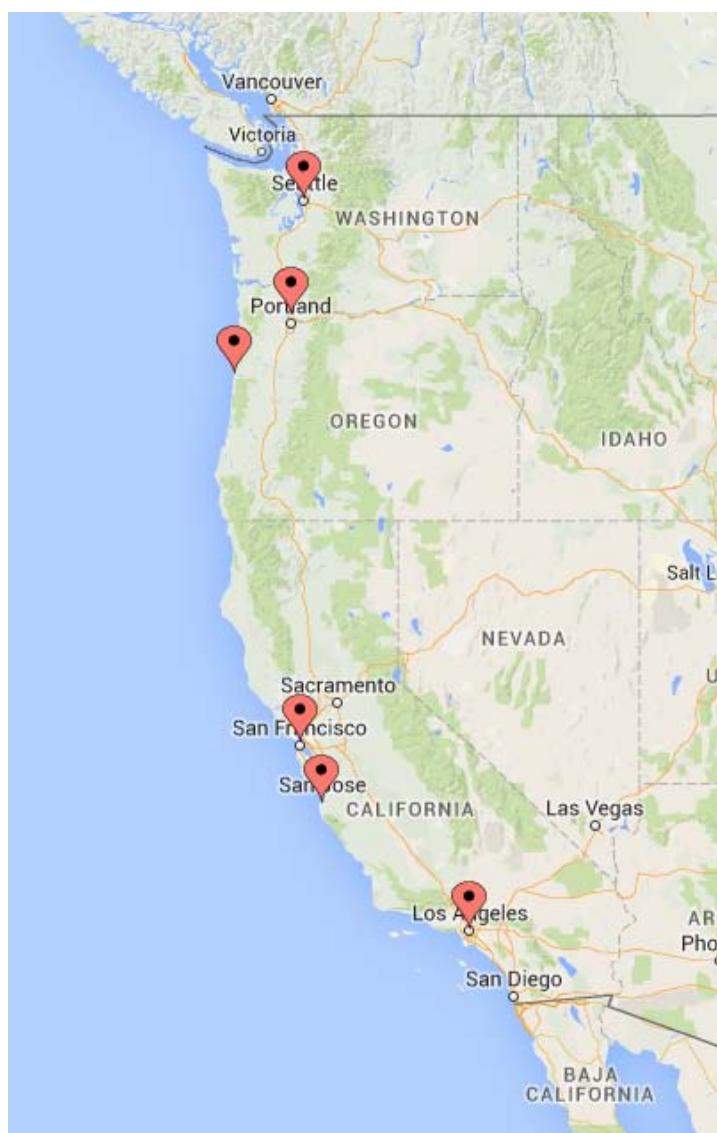


Figure 3: West Coast Ports

# 3.- DATA RETRIEVAL

You can see below the code for [LOADTA], the data retrieval routine. It is executed by all the ports functions to populate the data registers R02 to R74 with the values extracted from the ROM tables. These tables exclude the water sea level and the amplitude of the first harmonic constituent – which data formats are different from all the other 73 data points – and are therefore dealt with separately within each individual port function.

The address of R01 is expected to be in M[S&X] upon initialization. The routine first builds up the address of the data table which must be within the same page. This is done using the value stored in A<5> as marker for the table start. All tables occupy 256 bytes in size, and have an "F4" offset thus their beginning address general format is "pxF4", where "p" is the ROM page and "t" is the table marker stored in A<5>.

A call to [CHKSZ] is made to check for the existence of R75. The execution aborts if the current size is less than 75, and the "SIZE<75" error message is put in the display.

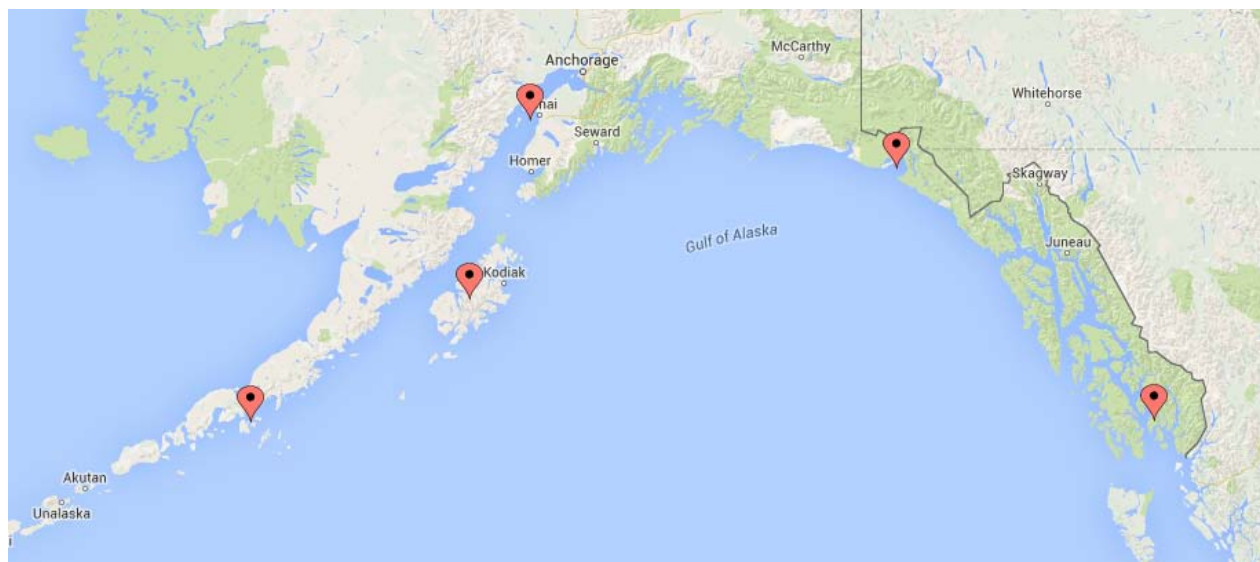| 1 | LOADTA | LOADTA | ABA0 | 198 | C=M ALL | |
|---|---|---|---|---|---|---|
| 2 | LOADTA | | ABA1 | 226 | C=C+1 S&X | pointer to R02 |
| 3 | LOADTA | | ABA2 | 35D | ?NC XQ | |
| 4 | LOADTA | | ABA3 | 000 | ->00D7 | [PCTOC] |
| 5 | LOADTA | | ABA4 | 09C | PT= 5 | |
| 6 | LOADTA | | ABA5 | 0A2 | A<>C @PT | |
| 7 | LOADTA | | ABA6 | 3D4 | PT= PT-1 | |
| 8 | LOADTA | | ABA7 | 3D0 | LD@PT- F | data address |
| 9 | LOADTA | | ABA8 | 110 | LD@PT- 4 | |
| 10 | LOADTA | | ABA9 | 158 | M=C ALL | |
| 11 | LOADTA | | ABAA | 349 | PORT DEP: | Size Check |
| 12 | LOADTA | | ABAB | 08C | XQ | must be >=75 |
| 13 | LOADTA | | ABAC | 135 | ->A135 | [CHKSZ] |

The next section shows the beginning of the main loop [NEXTCT]. Each iteration needs to store two constants (amplitude and phase). The digits for the phase are read in the [LOOP1] section and the final value is stored in RAM.

| 14 | LOADTA | NEXTCT | ABAD | 130 | LDI S&X | |
| 15 | LOADTA | | ABAE | 002 | 002 | as counter |
| 16 | LOADTA | | ABAF | 106 | A=C S&X | counter in A.X |
| 17 | LOADTA | | ABB0 | 198 | C=M ALL | ROM adr in C.ADR |
| 18 | LOADTA | | ABB1 | 31C | PT=1 | |
| 19 | LOADTA | | ABB2 | 02E | B=0 ALL | |
| 20 | LOADTA | LOOP1 | ABB3 | 330 | FETCH S&X | get word |
| 21 | LOADTA | | ABB4 | 0EA | C<>B PT<- | put digits in B |
| 22 | LOADTA | | ABB5 | 0EE | C<>B ALL | source to B, result to C |
| 23 | LOADTA | | ABB6 | 23C | RCR 2 | rotate digits 2 pos |
| 24 | LOADTA | | ABB7 | 0EE | C<>B ALL | source back to C |
| 25 | LOADTA | | ABB8 | 23A | C=C+1 M | next byte adr |
| 26 | LOADTA | | ABB9 | 1A6 | A=A-1 S&X | increase counter |
| 27 | LOADTA | | ABBA | 3CB | JNC -07 | loop back |
| 28 | LOADTA | | ABBB | 1D8 | C<>M ALL | register adr in C.X |
| 29 | LOADTA | | ABBC | 270 | RAMSLCT | select data reg |
| 30 | LOADTA | | ABBD | 226 | C=C+1 S&X | next reg |
| 31 | LOADTA | | ABBE | 106 | A=C S&X | |
| 32 | LOADTA | | ABBF | 198 | C=M ALL | |
| 33 | LOADTA | | ABC0 | 0A6 | A<>C S&X | |
| 34 | LOADTA | | ABC1 | 158 | M=C ALL | update reg counter |
| 35 | LOADTA | | ABC2 | 330 | FETCH S&X | |
| 36 | LOADTA | | ABC3 | 0EA | C<>B PT<- | |
| 37 | LOADTA | | ABC4 | 0EE | C<>B ALL | |
| 38 | LOADTA | | ABC5 | 2F0 | WRTDATA | put in register |

Next the digits for the amplitude are read, including a correction for the proper BCD formatting of the final value (no integer part) and it's also stored in the subsequent data register.

| 39 | LOADTA |       | ABC6 | 013 | JNC +02   |                        |
|----|--------|-------|------|-----|-----------|------------------------|
| 40 | LOADTA |       | ABC7 | 333 | JNC -26d  |                        |
| 41 | LOADTA |       | ABC8 | 198 | C=M ALL   | get pointers           |
| 42 | LOADTA |       | ABC9 | 23A | C=C+1 M   | next byte adr          |
| 43 | LOADTA |       | ABCA | 158 | M=C ALL   | update pointers        |
| 44 | LOADTA |       | ABCB | 130 | LDI S&X   |                        |
| 45 | LOADTA |       | ABCC | 001 | 001       | as counter             |
| 46 | LOADTA |       | ABCD | 106 | A=C S&X   | counter  in A.X        |
| 47 | LOADTA |       | ABCE | 02E | B=0 ALL   |                        |
| 48 | LOADTA | LOOP2 | ABCF | 330 | FETCH S&X |                        |
| 49 | LOADTA |       | ABD0 | 0EA | C<>B PT<- | put digits in B        |
| 50 | LOADTA |       | ABD1 | 0EE | C<>B ALL  | source to B, result to C |
| 51 | LOADTA |       | ABD2 | 23C | RCR 2     | rotate digits 2 pos    |
| 52 | LOADTA |       | ABD3 | 0EE | C<>B ALL  | source back to C       |
| 53 | LOADTA |       | ABD4 | 23A | C=C+1 M   | next byte adr          |
| 54 | LOADTA |       | ABD5 | 1A6 | A=A-1 S&X | increase counter       |
| 55 | LOADTA |       | ABD6 | 3CB | JNC -07   | loop back              |
| 56 | LOADTA |       | ABD7 | 1D8 | C<>M ALL  | register adr in C.X    |
| 57 | LOADTA |       | ABD8 | 270 | RAMSLCT   | select data reg        |
| 58 | LOADTA |       | ABD9 | 226 | C=C+1 S&X | next reg               |
| 59 | LOADTA |       | ABDA | 106 | A=C S&X   |                        |
| 60 | LOADTA |       | ABDB | 198 | C=M ALL   |                        |
| 61 | LOADTA |       | ABDC | 0A6 | A<>C S&X  |                        |
| 62 | LOADTA |       | ABDD | 158 | M=C ALL   | update reg counter     |
| 63 | LOADTA |       | ABDE | 330 | FETCH S&X | read S&X               |
| 64 | LOADTA |       | ABDF | 0EA | C<>B PT<- |                        |
| 65 | LOADTA |       | ABE0 | 0EE | C<>B ALL  | result to C            |
| 66 | LOADTA |       | ABE1 | 006 | A=0 S&X   |                        |
| 67 | LOADTA |       | ABE2 | 2A0 | SETDEC    |                        |
| 68 | LOADTA |       | ABE3 | 246 | C=A-C S&X | decimal math!          |
| 69 | LOADTA |       | ABE4 | 260 | SETHEX    |                        |
| 70 | LOADTA |       | ABE5 | 2F0 | WRTDATA   | put in register        |

The CPU M register is updated and the execution is sent back to the beginning of [NEXTCT] unless all constants have already been stored – which is checked in the final section of the code.

| 71 | LOADTA | ABE6 | 046 | C=0 S&X    |               |
|----|--------|------|-----|------------|---------------|
| 72 | LOADTA | ABE7 | 270 | RAMSLCT    |               |
| 73 | LOADTA | ABE8 | 378 | READ 13(c ) |               |
| 74 | LOADTA | ABE9 | 03C | RCR 3      | R00 adr in C.X |
| 75 | LOADTA | ABEA | 106 | A=C S&X    |               |
| 76 | LOADTA | ABEB | 130 | LDI S&X    |               |
| 77 | LOADTA | ABEC | 04A | CON=74     |               |
| 78 | LOADTA | ABED | 146 | A=A+C S&X  |               |
| 79 | LOADTA | ABEE | 198 | C=M ALL    |               |
| 80 | LOADTA | ABEF | 23A | C=C+1 M    | next byte adr |
| 81 | LOADTA | ABF0 | 158 | M=C ALL    | update pointers |
| 82 | LOADTA | ABF1 | 306 | ?A<C S&X   | is rg# > 74?  |
| 83 | LOADTA | ABF2 | 2AB | JNC -43d   | no, loop back |
| 84 | LOADTA | ABF3 | 3E0 | RTN        |               |

Each port data table is 256 bytes exactly, a remarkable density to store 146 constants. Further improvements could be made to improve on that ratio, such as special-cases for zero value (frequently encountered for non-contributing terms). This could allow for additional port tables to be added to the database in the future.
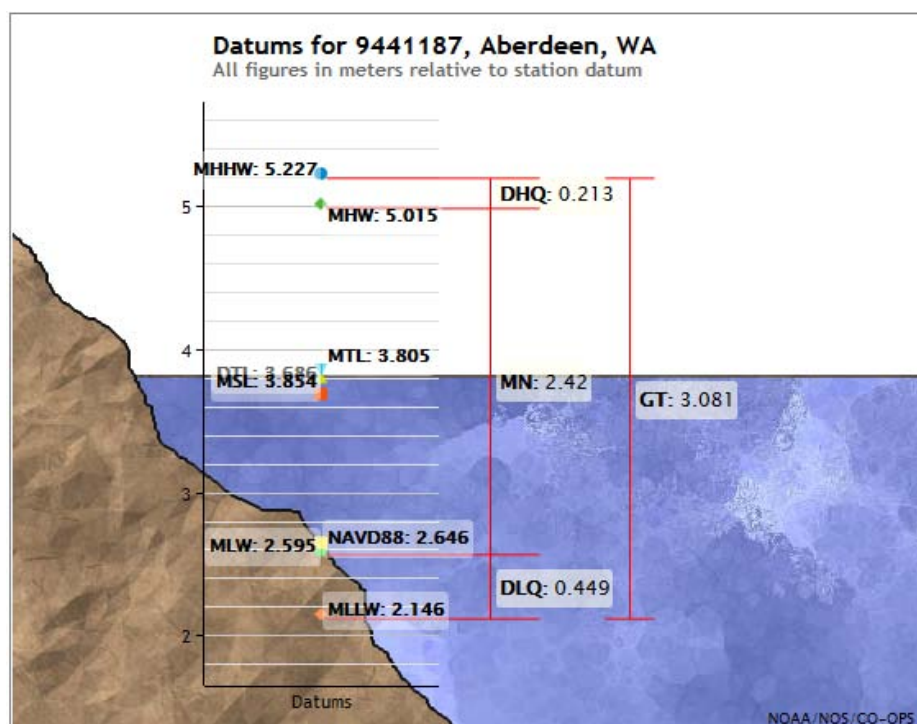
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# 4.-  NOAA DATA

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The remaining pages of this manual list all constants as programmed into the database module. Note that the units are expressed in meters and always referred to the UT (GMT) time zone.



NOAA  NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
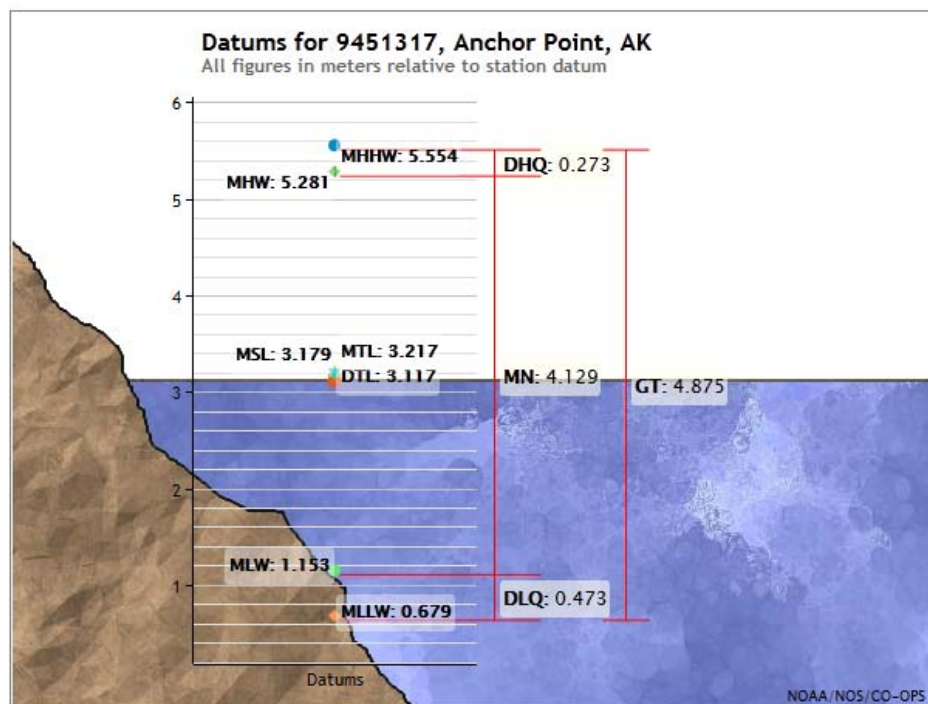UNITED STATES DEPARTMENT OF COMMERCE

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### 3.1. Harmonic Constituents for 9441187, Aberdeen WA

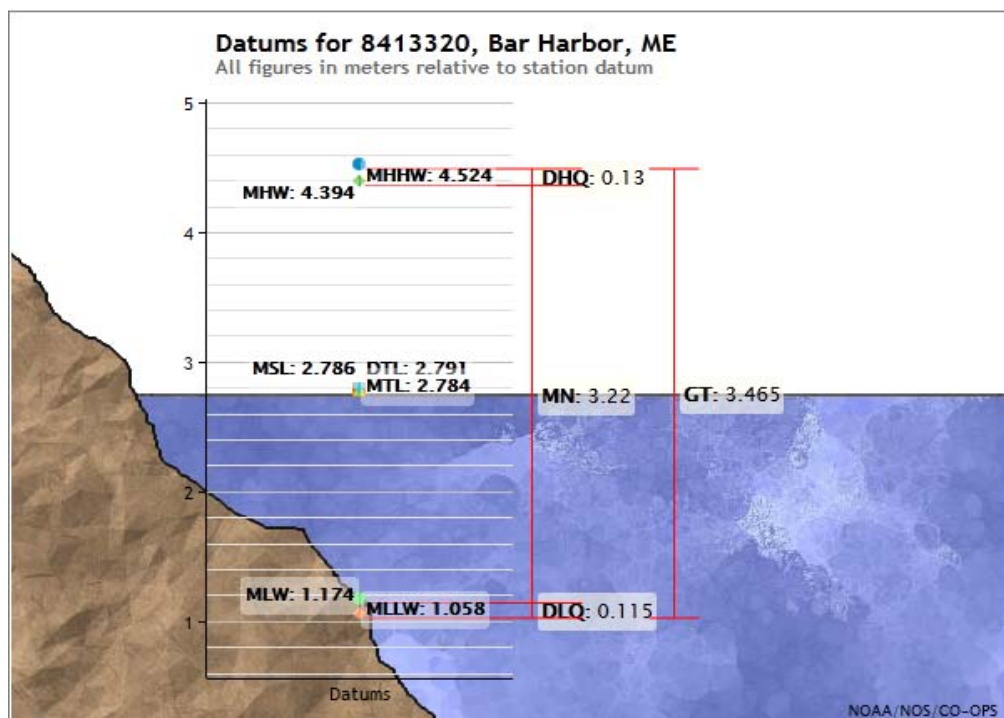| Constituent # | Name | Amplitude | Phase | Speed | Description |
|---|---|---|---|---|---|
| 1 | M2 | 1.115 | 253.6 | 28.984.104 | Principal lunar semidiurnal constituent |
| 2 | S2 | 0.299 | 289.0 | 30.0 | Principal solar semidiurnal constituent |
| 3 | N2 | 0.221 | 234.4 | 2.843.973 | Larger lunar elliptic semidiurnal constituent |
| 4 | K1 | 0.433 | 250.9 | 15.041.069 | Lunar diurnal constituent |
| 5 | M4 | 0.061 | 305.2 | 5.796.821 | Shallow water overtides of principal lunar |
| 6 | O1 | 0.258 | 235.8 | 13.943.035 | Lunar diurnal constituent |
| 7 | M6 | 0.04 | 41.5 | 8.695.232 | Shallow water overtides of principal lunar |
| 8 | MK3 | 0.011 | 314.9 | 44.025.173 | Shallow water terdiurnal |
| 9 | S4 | 0.004 | 54.7 | 60.0 | Shallow water overtides of principal solar |
| 10 | MN4 | 0.021 | 287.6 | 57.423.832 | Shallow water quarter diurnal constituent |
| 11 | NU2 | 0.045 | 230.0 | 28.512.583 | Larger lunar evectional constituent |
| 12 | S6 | 0.0 | 0.0 | 90.0 | Shallow water overtides of principal solar |
| 13 | MU2 | 0.034 | 303.4 | 27.968.208 | Variational constituent |
| 14 | 2N2 | 0.033 | 188.0 | 27.895.355 | Lunar elliptical semidiurnal second-order |
| 15 | OO1 | 0.013 | 293.3 | 16.139.101 | Lunar diurnal |
| 16 | LAM2 | 0.019 | 225.8 | 29.455.626 | Smaller lunar evectional constituent |
| 17 | S1 | 0.005 | 73.0 | 15.0 | Solar diurnal constituent |
| 18 | M1 | 0.013 | 297.5 | 14.496.694 | Smaller lunar elliptic diurnal constituent |
| 19 | J1 | 0.025 | 281.0 | 155.854.435 | Smaller lunar elliptic diurnal constituent |
| 20 | MM | 0.016 | 306.8 | 0.5443747 | Lunar monthly constituent |
| 21 | SSA | 0.016 | 203.9 | 0.0821373 | Solar semiannual constituent |
| 22 | SA | 0.087 | 277.8 | 0.0410686 | Solar annual constituent |
| 23 | MSF | 0.029 | 42145 | 10.158.958 | Lunisolar synodic fortnightly constituent |
| 24 | MF | 0.025 | 164.6 | 10.980.331 | Lunisolar fortnightly constituent |
| 25 | RHO | 0.007 | 234.3 | 13.471.515 | Larger lunar evectional diurnal constituent |
| 26 | Q1 | 0.044 | 235.2 | 13.398.661 | Larger lunar elliptic diurnal constituent |
| 27 | T2 | 0.017 | 296.4 | 29.958.933 | Larger solar elliptic constituent |
| 28 | R2 | 0.007 | 265.9 | 30.041.067 | Smaller solar elliptic constituent |
| 29 | 2Q1 | 0.006 | 210.5 | 12.854.286 | Larger elliptic diurnal |
| 30 | P1 | 0.129 | 248.7 | 14.958.931 | Solar diurnal constituent |
| 31 | 2SM2 | 0.009 | 101.0 | 31.015.896 | Shallow water semidiurnal constituent |
| 32 | M3 | 0.005 | 72.9 | 4.347.616 | Lunar terdiurnal constituent |
| 33 | L2 | 0.036 | 254.5 | 29.528.479 | Smaller lunar elliptic semidiurnal constituent |
| 34 | 2MK3 | 0.014 | 41.0 | 4.292.714 | Shallow water terdiurnal constituent |
| 35 | K2 | 0.084 | 282.5 | 30.082.138 | Lunisolar semidiurnal constituent |
| 36 | M8 | 0.01 | 105.6 | 11.593.642 | Shallow water eighth diurnal constituent |
| 37 | MS4 | 0.034 | 345.8 | 58.984.104 | Shallow water quarter diurnal constituent |



**Datums for 9441187, Aberdeen, WA**
All figures in meters relative to station datum

MHHW: 5.227
DHQ: 0.213
MHW: 5.015
MTL: 3.805
DTL: 3.686
MSL: 3.854
MN: 2.42
GT: 3.081
NAVD88: 2.646
MLW: 2.595
DLQ: 0.449
MLLW: 2.146
Datums
NOAA/NOS/CO-OPS

## 3.2.- Harmonic Constituents for 9455606, Anchor Point, Cook Inlet AK

| Constituent # | Name | Amplitude | Phase | Speed | Description |
|---|---|---|---|---|---|
| 1 | M2 | 2,284 | 335 | 28,984104 | Principal lunar semidiurnal constituent |
| 2 | S2 | 0,81 | 6,9 | 30 | Principal solar semidiurnal constituent |
| 3 | N2 | 0,453 | 307 | 28,43973 | Larger lunar elliptic semidiurnal constituent |
| 4 | K1 | 0,572 | 284,6 | 15,041069 | Lunar diurnal constituent |
| 5 | M4 | 0,057 | 51,9 | 57,96821 | Shallow water overtides of principal lunar |
| 6 | O1 | 0,343 | 269,9 | 13,943035 | Lunar diurnal constituent |
| 7 | M6 | 0,012 | 205,8 | 86,95232 | Shallow water overtides of principal lunar |
| 8 | MK3 | 0 | 0 | 44,025173 | Shallow water terdiurnal |
| 9 | S4 | 0,009 | 123 | 60 | Shallow water overtides of principal solar |
| 10 | MN4 | 0 | 0 | 57,423832 | Shallow water quarter diurnal constituent |
| 11 | NU2 | 0,088 | 310,8 | 28,512583 | Larger lunar evectional constituent |
| 12 | S6 | 0,001 | 312,7 | 90 | Shallow water overtides of principal solar |
| 13 | MU2 | 0,055 | 359,4 | 27,968208 | Variational constituent |
| 14 | 2N2 | 0,06 | 279 | 27,895355 | Lunar elliptical semidiurnal second-order |
| 15 | OO1 | 0,015 | 299,3 | 16,139101 | Lunar diurnal |
| 16 | LAM2 | 0,016 | 349,8 | 29,455626 | Smaller lunar evectional constituent |
| 17 | S1 | 0 | 0 | 15 | Solar diurnal constituent |
| 18 | M1 | 0,024 | 277,3 | 14,496694 | Smaller lunar elliptic diurnal constituent |
| 19 | J1 | 0,027 | 291,9 | 15,5854435 | Smaller lunar elliptic diurnal constituent |
| 20 | MM | 0 | 0 | 0,5443747 | Lunar monthly constituent |
| 21 | SSA | 0 | 0 | 0,0821373 | Solar semiannual constituent |
| 22 | SA | 0 | 0 | 0,0410686 | Solar annual constituent |
| 23 | MSF | 0 | 0 | 1,0158958 | Lunisolar synodic fortnightly constituent |
| 24 | MF | 0 | 0 | 1,0980331 | Lunisolar fortnightly constituent |
| 25 | RHO | 0,013 | 263,6 | 13,471515 | Larger lunar evectional diurnal constituent |
| 26 | Q1 | 0,066 | 262,6 | 13,398661 | Larger lunar elliptic diurnal constituent |
| 27 | T2 | 0,048 | 5,7 | 29,958933 | Larger solar elliptic constituent |
| 28 | R2 | 0,006 | 8,2 | 30,041067 | Smaller solar elliptic constituent |
| 29 | 2Q1 | 0,009 | 255,3 | 12,854286 | Larger elliptic diurnal |
| 30 | P1 | 0,189 | 283,5 | 14,958931 | Solar diurnal constituent |
| 31 | 2SM2 | 0 | 0 | 31,015896 | Shallow water semidiurnal constituent |
| 32 | M3 | 0 | 0 | 43,47616 | Lunar terdiurnal constituent |
| 33 | L2 | 0,064 | 3,1 | 29,528479 | Smaller lunar elliptic semidiurnal constituent |
| 34 | 2MK3 | 0 | 0 | 42,92714 | Shallow water terdiurnal constituent |
| 35 | K2 | 0,22 | 9,5 | 30,082138 | Lunisolar semidiurnal constituent |
| 36 | M8 | 0,002 | 103,5 | 115,93642 | Shallow water eighth diurnal constituent |
| 37 | MS4 | 0 | 0 | 58,984104 | Shallow water quarter diurnal constituent |



Datums for 9451317, Anchor Point, AK
All figures in meters relative to station datum

### 3.3.- Harmonic Constituents for 8413320, Bar Harbor ME

| Constituent # | Name | Amplitude | Phase | Speed | Description |
|---|---|---|---|---|---|
| 1 | M2 | 1,58 | 92,9 | 28,984104 | Principal lunar semidiurnal constituent |
| 2 | S2 | 0,243 | 128,8 | 30 | Principal solar semidiurnal constituent |
| 3 | N2 | 0,351 | 62,3 | 28,43973 | Larger lunar elliptic semidiurnal constituent |
| 4 | K1 | 0,14 | 194,3 | 15,041069 | Lunar diurnal constituent |
| 5 | M4 | 0,008 | 99,1 | 57,96821 | Shallow water overtides of principal lunar |
| 6 | O1 | 0,11 | 176,1 | 13,943035 | Lunar diurnal constituent |
| 7 | M6 | 0,012 | 47,5 | 86,95232 | Shallow water overtides of principal lunar |
| 8 | MK3 | 0 | 0 | 44,025173 | Shallow water terdiurnal |
| 9 | S4 | 0 | 0 | 60 | Shallow water overtides of principal solar |
| 10 | MN4 | 0 | 0 | 57,423832 | Shallow water quarter diurnal constituent |
| 11 | NU2 | 0,073 | 67,5 | 28,512583 | Larger lunar evectional constituent |
| 12 | S6 | 0 | 0 | 90 | Shallow water overtides of principal solar |
| 13 | MU2 | 0,006 | 38,3 | 27,968208 | Variational constituent |
| 14 | 2N2 | 0,046 | 40,4 | 27,895355 | Lunar elliptical semidiurnal second-order |
| 15 | OO1 | 0,004 | 238,2 | 16,139101 | Lunar diurnal |
| 16 | LAM2 | 0,029 | 132,4 | 29,455626 | Smaller lunar evectional constituent |
| 17 | S1 | 0,006 | 163 | 15 | Solar diurnal constituent |
| 18 | M1 | 0,006 | 213,4 | 14,496694 | Smaller lunar elliptic diurnal constituent |
| 19 | J1 | 0,008 | 202 | 15,5854435 | Smaller lunar elliptic diurnal constituent |
| 20 | MM | 0 | 0 | 0,5443747 | Lunar monthly constituent |
| 21 | SSA | 0 | 0 | 0,0821373 | Solar semiannual constituent |
| 22 | SA | 0 | 0 | 0,0410686 | Solar annual constituent |
| 23 | MSF | 0 | 0 | 1,0158958 | Lunisolar synodic fortnightly constituent |
| 24 | MF | 0 | 0 | 1,0980331 | Lunisolar fortnightly constituent |
| 25 | RHO | 0,004 | 168,2 | 13,471515 | Larger lunar evectional diurnal constituent |
| 26 | Q1 | 0,02 | 160,3 | 13,398661 | Larger lunar elliptic diurnal constituent |
| 27 | T2 | 0,022 | 103,5 | 29,958933 | Larger solar elliptic constituent |
| 28 | R2 | 0,003 | 346,2 | 30,041067 | Smaller solar elliptic constituent |
| 29 | 2Q1 | 0,003 | 171 | 12,854286 | Larger elliptic diurnal |
| 30 | P1 | 0,046 | 193,6 | 14,958931 | Solar diurnal constituent |
| 31 | 2SM2 | 0,005 | 101,6 | 31,015896 | Shallow water semidiurnal constituent |
| 32 | M3 | 0 | 0 | 43,47616 | Lunar terdiurnal constituent |
| 33 | L2 | 0,079 | 135 | 29,528479 | Smaller lunar elliptic semidiurnal constituent |
| 34 | 2MK3 | 0,004 | 259,5 | 42,92714 | Shallow water terdiurnal constituent |
| 35 | K2 | 0,067 | 127 | 30,082138 | Lunisolar semidiurnal constituent |
| 36 | M8 | 0 | 0 | 115,93642 | Shallow water eighth diurnal constituent |
| 37 | MS4 | 0 | 0 | 58,984104 | Shallow water quarter diurnal constituent |



Datums for 8413320, Bar Harbor, ME
All figures in meters relative to station datum

### 3.4.- Harmonic Constituents for 8443970, Boston MA

| Constituent # | Name | Amplitude | Phase | Speed | Description |
|---|---|---|---|---|---|
| 1 | M2 | 1,398 | 109,4 | 28,984104 | Principal lunar semidiurnal constituent |
| 2 | S2 | 0,213 | 146,2 | 30 | Principal solar semidiurnal constituent |
| 3 | N2 | 0,309 | 78,9 | 28,43973 | Larger lunar elliptic semidiurnal |
| 4 | K1 | 0,143 | 205,2 | 15,041069 | Lunar diurnal constituent |
| 5 | M4 | 0,023 | 25,9 | 57,96821 | Shallow water overtides of principal |
| 6 | O1 | 0,119 | 186,7 | 13,943035 | Lunar diurnal constituent |
| 7 | M6 | 0,034 | 282,1 | 86,95232 | Shallow water overtides of principal |
| 8 | MK3 | 0,005 | 232,5 | 44,025173 | Shallow water terdiurnal |
| 9 | S4 | 0 | 0 | 60 | Shallow water overtides of principal solar |
| 10 | MN | 0,011 | 14,6 | 57,423832 | Shallow water quarter diurnal constituent |
| 11 | NU2 | 0,067 | 85,5 | 28,512583 | Larger lunar evectional constituent |
| 12 | S6 | 0 | 0 | 90 | Shallow water overtides of principal solar |
| 13 | MU | 0,01 | 69 | 27,968208 | Variational constituent |
| 14 | 2N2 | 0,039 | 55 | 27,895355 | Lunar elliptical semidiurnal second-order |
| 15 | OO1 | 0,005 | 227 | 16,139101 | Lunar diurnal |
| 16 | LAM | 0,022 | 143,2 | 29,455626 | Smaller lunar evectional constituent |
| 17 | S1 | 0,004 | 122,8 | 15 | Solar diurnal constituent |
| 18 | M1 | 0,007 | 214,4 | 14,496694 | Smaller lunar elliptic diurnal constituent |
| 19 | J1 | 0,01 | 213,5 | 15,5854435 | Smaller lunar elliptic diurnal constituent |
| 20 | MM | 0 | 0 | 0,5443747 | Lunar monthly constituent |
| 21 | SSA | 0,018 | 89,8 | 0,0821373 | Solar semiannual constituent |
| 22 | SA | 0,032 | 126,3 | 0,0410686 | Solar annual constituent |
| 23 | MSF | 0 | 0 | 1,0158958 | Lunisolar synodic fortnightly constituent |
| 24 | MF | 0 | 0 | 1,0980331 | Lunisolar fortnightly constituent |
| 25 | RHO | 0,003 | 152,8 | 13,471515 | Larger lunar evectional diurnal |
| 26 | Q1 | 0,021 | 171,1 | 13,398661 | Larger lunar elliptic diurnal constituent |
| 27 | T2 | 0,019 | 123,9 | 29,958933 | Larger solar elliptic constituent |
| 28 | R2 | 0,005 | 8,2 | 30,041067 | Smaller solar elliptic constituent |
| 29 | 2Q1 | 0,003 | 168,3 | 12,854286 | Larger elliptic diurnal |
| 30 | P1 | 0,047 | 202,1 | 14,958931 | Solar diurnal constituent |
| 31 | 2SM | 0 | 0 | 31,015896 | Shallow water semidiurnal constituent |
| 32 | M3 | 0 | 0 | 43,47616 | Lunar terdiurnal constituent |
| 33 | L2 | 0,055 | 156,2 | 29,528479 | Smaller lunar elliptic semidiurnal |
| 34 | 2MK | 0,007 | 207,9 | 42,92714 | Shallow water terdiurnal constituent |
| 35 | K2 | 0,059 | 144,5 | 30,082138 | Lunisolar semidiurnal constituent |
| 36 | M8 | 0,006 | 237,1 | 115,93642 | Shallow water eighth diurnal constituent |
| 37 | MS4 | 0,009 | 68,7 | 58,984104 | Shallow water quarter diurnal constituent |

**Datums for 8443970, Boston, MA**
All figures in meters relative to station datum



MHHW: 4.205
MHW: 4.071
DHQ: 0.134
DTL: 2.64  MSL: 2.66
NAVD88: 2.752  MTL: 2.624
MN: 2.893    GT: 3.131
MLW: 1.178
MLLW: 1.074
DLQ: 0.104
Datums
NOAA/NOS/CO-OPS

## 3.5.- Harmonic Constituents for 8536110, Cape May NJ

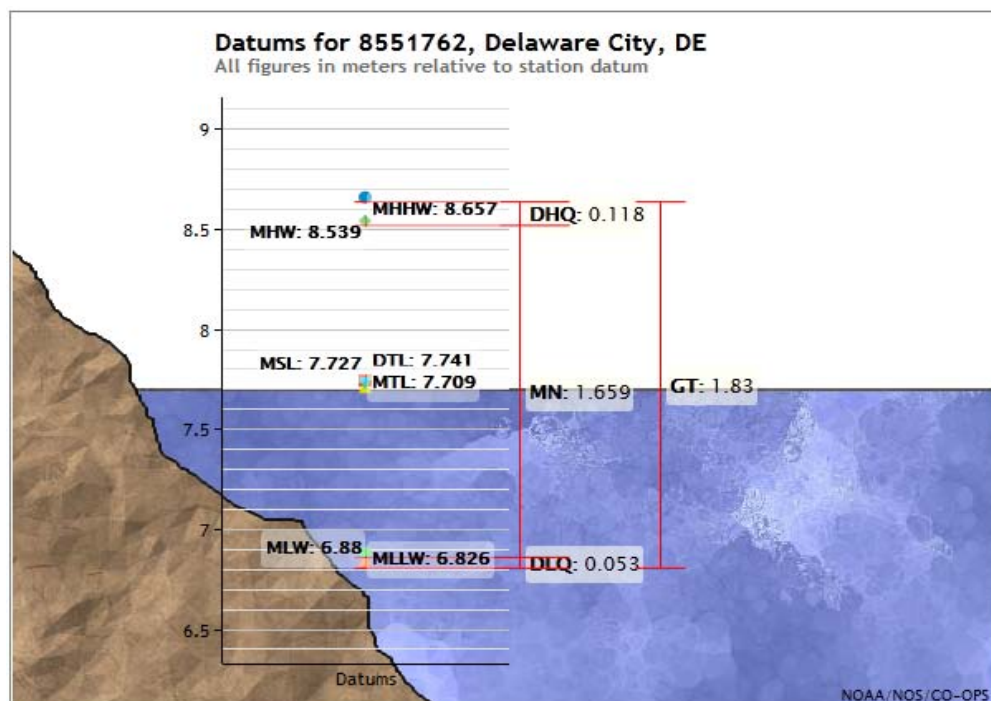| Constituent # | Name | Amplitude | Phase | Speed | Description |
|---|---|---|---|---|---|
| 1 | M2 | 0,714 | 28,6 | 28,984104 | Principal lunar semidiurnal constituent |
| 2 | S2 | 0,125 | 55,3 | 30 | Principal solar semidiurnal constituent |
| 3 | N2 | 0,159 | 9,7 | 28,43973 | Larger lunar elliptic semidiurnal |
| 4 | K1 | 0,105 | 200,4 | 15,041069 | Lunar diurnal constituent |
| 5 | M4 | 0,01 | 101 | 57,96821 | Shallow water overtides of principal lunar |
| 6 | O1 | 0,084 | 185,6 | 13,943035 | Lunar diurnal constituent |
| 7 | M6 | 0,008 | 20,8 | 86,95232 | Shallow water overtides of principal lunar |
| 8 | MK3 | 0 | 0 | 44,025173 | Shallow water terdiurnal |
| 9 | S4 | 0 | 0 | 60 | Shallow water overtides of principal solar |
| 10 | MN4 | 0,003 | 115,3 | 57,423832 | Shallow water quarter diurnal constituent |
| 11 | NU2 | 0,032 | 7,4 | 28,512583 | Larger lunar evectional constituent |
| 12 | S6 | 0 | 0 | 90 | Shallow water overtides of principal solar |
| 13 | MU2 | 0,012 | 40,5 | 27,968208 | Variational constituent |
| 14 | 2N2 | 0,021 | 352,3 | 27,895355 | Lunar elliptical semidiurnal second-order |
| 15 | OO1 | 0,004 | 215 | 16,139101 | Lunar diurnal |
| 16 | LAM2 | 0,01 | 41,6 | 29,455626 | Smaller lunar evectional constituent |
| 17 | S1 | 0,009 | 134,7 | 15 | Solar diurnal constituent |
| 18 | M1 | 0,004 | 243,4 | 14,496694 | Smaller lunar elliptic diurnal constituent |
| 19 | J1 | 0,006 | 197,1 | 15,5854435 | Smaller lunar elliptic diurnal constituent |
| 20 | MM | 0 | 0 | 0,5443747 | Lunar monthly constituent |
| 21 | SSA | 0,032 | 40,3 | 0,0821373 | Solar semiannual constituent |
| 22 | SA | 0,058 | 147,7 | 0,0410686 | Solar annual constituent |
| 23 | MSF | 0 | 0 | 1,0158958 | Lunisolar synodic fortnightly constituent |
| 24 | MF | 0 | 0 | 1,0980331 | Lunisolar fortnightly constituent |
| 25 | RHO | 0,003 | 179,3 | 13,471515 | Larger lunar evectional diurnal constituent |
| 26 | Q1 | 0,013 | 184,1 | 13,398661 | Larger lunar elliptic diurnal constituent |
| 27 | T2 | 0,012 | 33,7 | 29,958933 | Larger solar elliptic constituent |
| 28 | R2 | 0,001 | 56,5 | 30,041067 | Smaller solar elliptic constituent |
| 29 | 2Q1 | 0,002 | 171 | 12,854286 | Larger elliptic diurnal |
| 30 | P1 | 0,036 | 199,2 | 14,958931 | Solar diurnal constituent |
| 31 | 2SM2 | 0 | 0 | 31,015896 | Shallow water semidiurnal constituent |
| 32 | M3 | 0,005 | 94,1 | 43,47616 | Lunar terdiurnal constituent |
| 33 | L2 | 0,037 | 43,9 | 29,528479 | Smaller lunar elliptic semidiurnal |
| 34 | 2MK3 | 0,004 | 110,5 | 42,92714 | Shallow water terdiurnal constituent |
| 35 | K2 | 0,033 | 54,5 | 30,082138 | Lunisolar semidiurnal constituent |
| 36 | M8 | 0 | 0 | 115,93642 | Shallow water eighth diurnal constituent |
| 37 | MS4 | 0,005 | 128,1 | 58,984104 | Shallow water quarter diurnal constituent |

**Datums for 8536110, Cape May, NJ**
All figures in meters relative to station datum

MHHW: 2.398
MHW: 2.265
DHQ: 0.133
DTL: 1.568
NAVD88: 1.658
MSL: 1.521
MN: 1.478
GT: 1.659
MLW: 0.787
MLLW: 0.738
DLQ: 0.049
Datums

NOAA/NOS/CO-OPS

## 3.6.- Harmonic Constituents for 8551762, Delaware City DE

| Constituent # | Name | Amplitude | Phase | Speed | Description |
|---|---|---|---|---|---|
| 1 | M2 | 0,744 | 114,1 | 28,984104 | Principal lunar semidiurnal constituent |
| 2 | S2 | 0,1 | 148 | 30 | Principal solar semidiurnal constituent |
| 3 | N2 | 0,144 | 99,2 | 28,43973 | Larger lunar elliptic semidiurnal |
| 4 | K1 | 0,095 | 247,4 | 15,041069 | Lunar diurnal constituent |
| 5 | M4 | 0,06 | 147,4 | 57,96821 | Shallow water overtides of principal lunar |
| 6 | O1 | 0,068 | 226,2 | 13,943035 | Lunar diurnal constituent |
| 7 | M6 | 0,033 | 60 | 86,95232 | Shallow water overtides of principal lunar |
| 8 | MK3 | 0,016 | 237,8 | 44,025173 | Shallow water terdiurnal |
| 9 | S4 | 0,002 | 133,1 | 60 | Shallow water overtides of principal solar |
| 10 | MN4 | 0,027 | 127,1 | 57,423832 | Shallow water quarter diurnal constituent |
| 11 | NU2 | 0,037 | 91,2 | 28,512583 | Larger lunar evectional constituent |
| 12 | S6 | 0,001 | 132 | 90 | Shallow water overtides of principal solar |
| 13 | MU2 | 0,031 | 228,3 | 27,968208 | Variational constituent |
| 14 | 2N2 | 0,014 | 122,4 | 27,895355 | Lunar elliptical semidiurnal second-order |
| 15 | OO1 | 0,004 | 215,5 | 16,139101 | Lunar diurnal |
| 16 | LAM2 | 0,019 | 118,9 | 29,455626 | Smaller lunar evectional constituent |
| 17 | S1 | 0,026 | 191,4 | 15 | Solar diurnal constituent |
| 18 | M1 | 0,005 | 282,3 | 14,496694 | Smaller lunar elliptic diurnal constituent |
| 19 | J1 | 0,007 | 332 | 15,5854435 | Smaller lunar elliptic diurnal constituent |
| 20 | MM | 0 | 0 | 0,5443747 | Lunar monthly constituent |
| 21 | SSA | 0,041 | 31,3 | 0,0821373 | Solar semiannual constituent |
| 22 | SA | 0,134 | 144,5 | 0,0410686 | Solar annual constituent |
| 23 | MSF | 0 | 0 | 1,0158958 | Lunisolar synodic fortnightly constituent |
| 24 | MF | 0 | 0 | 1,0980331 | Lunisolar fortnightly constituent |
| 25 | RHO | 0,006 | 239,7 | 13,471515 | Larger lunar evectional diurnal constituent |
| 26 | Q1 | 0,009 | 236,5 | 13,398661 | Larger lunar elliptic diurnal constituent |
| 27 | T2 | 0,01 | 155,1 | 29,958933 | Larger solar elliptic constituent |
| 28 | R2 | 0,002 | 258,3 | 30,041067 | Smaller solar elliptic constituent |
| 29 | 2Q1 | 0,005 | 199,2 | 12,854286 | Larger elliptic diurnal |
| 30 | P1 | 0,034 | 246,1 | 14,958931 | Solar diurnal constituent |
| 31 | 2SM2 | 0,002 | 322,8 | 31,015896 | Shallow water semidiurnal constituent |
| 32 | M3 | 0,007 | 174,2 | 43,47616 | Lunar terdiurnal constituent |
| 33 | L2 | 0,104 | 127,7 | 29,528479 | Smaller lunar elliptic semidiurnal |
| 34 | 2MK3 | 0,019 | 197,5 | 42,92714 | Shallow water terdiurnal constituent |
| 35 | K2 | 0,029 | 149 | 30,082138 | Lunisolar semidiurnal constituent |
| 36 | M8 | 0,006 | 68,6 | 115,93642 | Shallow water eighth diurnal constituent |
| 37 | MS4 | 0,018 | 189,7 | 58,984104 | Shallow water quarter diurnal constituent |



Datums for 8551762, Delaware City, DE
All figures in meters relative to station datum

MHHW: 8.657   DHQ: 0.118
MHW: 8.539
MSL: 7.727   DTL: 7.741
MTL: 7.709   MN: 1.659   GT: 1.83
MLW: 6.88   MLLW: 6.826   DLQ: 0.053
Datums
NOAA/NOS/CO-OPS
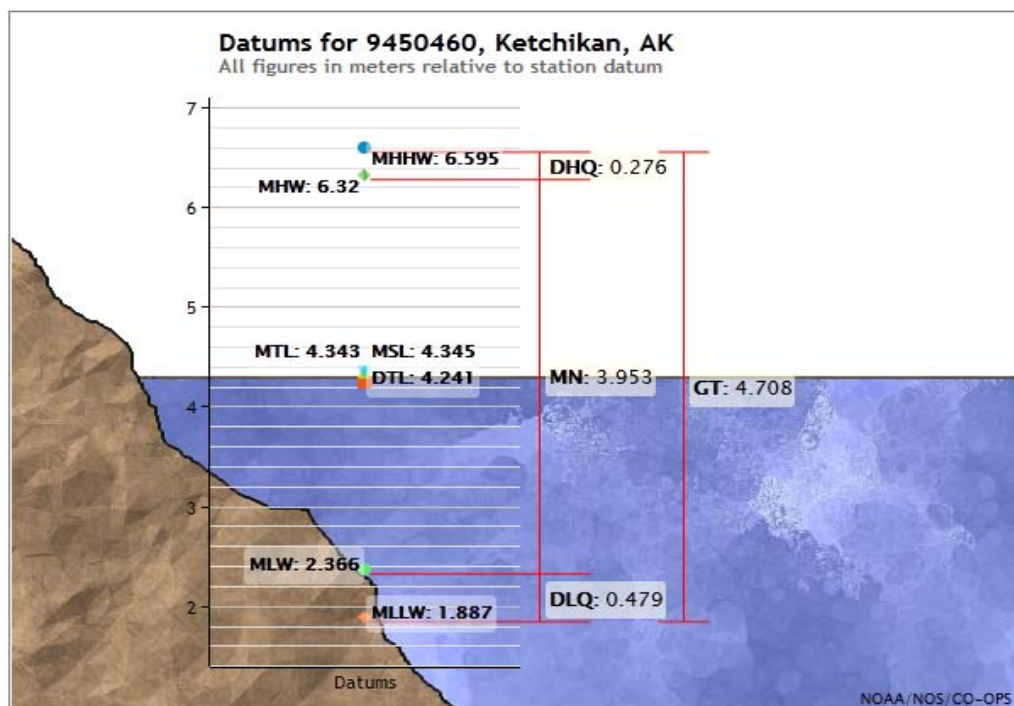
### 3.7.- Harmonic Constituents for 1612340, Honolulu HI

| Constituent # | Name | Amplitude | Phase | Speed | Description |
|---|---|---|---|---|---|
| 1 | M2 | 0,178 | 59,5 | 28,984104 | Principal lunar semidiurnal constituent |
| 2 | S2 | 0,057 | 53,8 | 30 | Principal solar semidiurnal constituent |
| 3 | N2 | 0,034 | 49,5 | 28,43973 | Larger lunar elliptic semidiurnal |
| 4 | K1 | 0,158 | 227 | 15,041069 | Lunar diurnal constituent |
| 5 | M4 | 0 | 0 | 57,96821 | Shallow water overtides of principal lunar |
| 6 | O1 | 0,087 | 215,7 | 13,943035 | Lunar diurnal constituent |
| 7 | M6 | 0 | 0 | 86,95232 | Shallow water overtides of principal lunar |
| 8 | MK3 | 0 | 0 | 44,025173 | Shallow water terdiurnal |
| 9 | S4 | 0 | 0 | 60 | Shallow water overtides of principal solar |
| 10 | MN4 | 0 | 0 | 57,423832 | Shallow water quarter diurnal constituent |
| 11 | NU2 | 0,006 | 60,8 | 28,512583 | Larger lunar evectional constituent |
| 12 | S6 | 0 | 0 | 90 | Shallow water overtides of principal solar |
| 13 | MU2 | 0,005 | 8,8 | 27,968208 | Variational constituent |
| 14 | 2N2 | 0,004 | 37,6 | 27,895355 | Lunar elliptical semidiurnal second-order |
| 15 | OO1 | 0,006 | 252,8 | 16,139101 | Lunar diurnal |
| 16 | LAM2 | 0,001 | 56,9 | 29,455626 | Smaller lunar evectional constituent |
| 17 | S1 | 0 | 0 | 15 | Solar diurnal constituent |
| 18 | M1 | 0,005 | 240,3 | 14,496694 | Smaller lunar elliptic diurnal constituent |
| 19 | J1 | 0,01 | 239,5 | 15,5854435 | Smaller lunar elliptic diurnal constituent |
| 20 | MM | 0 | 0 | 0,5443747 | Lunar monthly constituent |
| 21 | SSA | 0 | 0 | 0,0821373 | Solar semiannual constituent |
| 22 | SA | 0,04 | 191,5 | 0,0410686 | Solar annual constituent |
| 23 | MSF | 0 | 0 | 1,0158958 | Lunisolar synodic fortnightly constituent |
| 24 | MF | 0,007 | 48,2 | 1,0980331 | Lunisolar fortnightly constituent |
| 25 | RHO | 0,003 | 211 | 13,471515 | Larger lunar evectional diurnal constituent |
| 26 | Q1 | 0,014 | 208,3 | 13,398661 | Larger lunar elliptic diurnal constituent |
| 27 | T2 | 0,003 | 53,9 | 29,958933 | Larger solar elliptic constituent |
| 28 | R2 | 0 | 53,6 | 30,041067 | Smaller solar elliptic constituent |
| 29 | 2Q1 | 0,002 | 204,6 | 12,854286 | Larger elliptic diurnal |
| 30 | P1 | 0,048 | 226,2 | 14,958931 | Solar diurnal constituent |
| 31 | 2SM2 | 0 | 0 | 31,015896 | Shallow water semidiurnal constituent |
| 32 | M3 | 0 | 0 | 43,47616 | Lunar terdiurnal constituent |
| 33 | L2 | 0,005 | 69,3 | 29,528479 | Smaller lunar elliptic semidiurnal |
| 34 | 2MK3 | 0 | 0 | 42,92714 | Shallow water terdiurnal constituent |
| 35 | K2 | 0,016 | 47,9 | 30,082138 | Lunisolar semidiurnal constituent |
| 36 | M8 | 0 | 0 | 115,93642 | Shallow water eighth diurnal constituent |
| 37 | MS4 | 0 | 0 | 58,984104 | Shallow water quarter diurnal constituent |



Datums for 1612340, Honolulu, HI
All figures in meters relative to station datum

### 3.8.- Harmonic Constituents for 9450460, Ketchikan AK

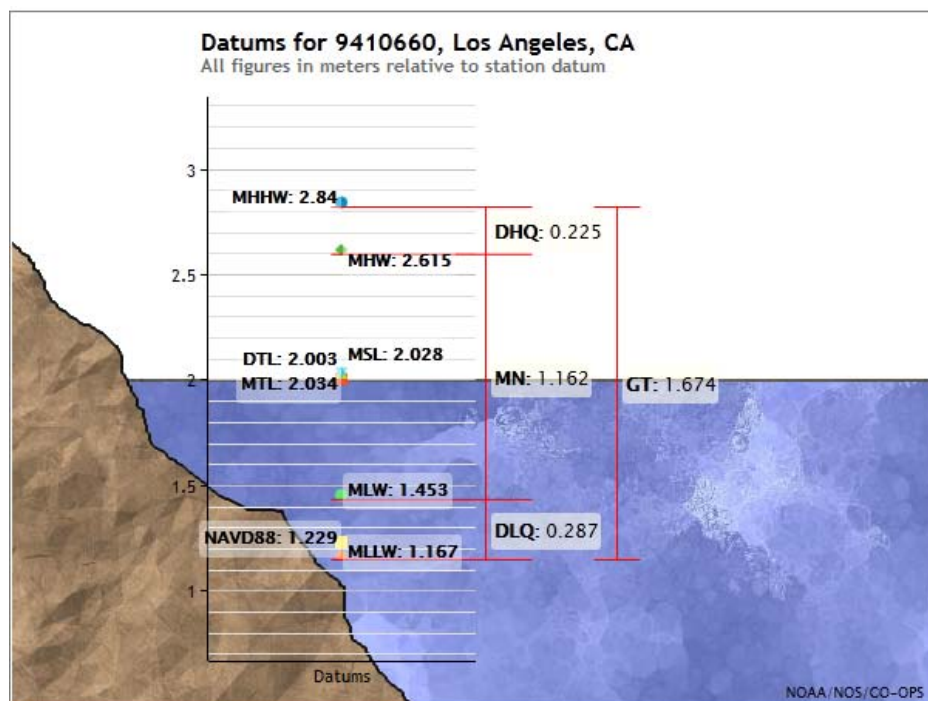| Constituent # | Name | Amplitude | Phase | Speed | Description |
|---|---|---|---|---|---|
| 1 | M2 | 1,882 | 270,1 | 28,984104 | Principal lunar semidiurnal constituent |
| 2 | S2 | 0,624 | 301,8 | 30 | Principal solar semidiurnal constituent |
| 3 | N2 | 0,382 | 245,6 | 28,43973 | Larger lunar elliptic semidiurnal constituent |
| 4 | K1 | 0,513 | 261,1 | 15,041069 | Lunar diurnal constituent |
| 5 | M4 | 0,016 | 291,6 | 57,96821 | Shallow water overtides of principal lunar c |
| 6 | O1 | 0,311 | 244,9 | 13,943035 | Lunar diurnal constituent |
| 7 | M6 | 0 | 0 | 86,95232 | Shallow water overtides of principal lunar c |
| 8 | MK3 | 0,005 | 9,8 | 44,025173 | Shallow water terdiurnal |
| 9 | S4 | 0,003 | 16,3 | 60 | Shallow water overtides of principal solar c |
| 10 | MN4 | 0,006 | 273,2 | 57,423832 | Shallow water quarter diurnal constituent |
| 11 | NU2 | 0,073 | 250 | 28,512583 | Larger lunar evectional constituent |
| 12 | S6 | 0 | 0 | 90 | Shallow water overtides of principal solar c |
| 13 | MU2 | 0,041 | 231,3 | 27,968208 | Variational constituent |
| 14 | 2N2 | 0,045 | 219,6 | 27,895355 | Lunar elliptical semidiurnal second-order c |
| 15 | OO1 | 0,017 | 292,1 | 16,139101 | Lunar diurnal |
| 16 | LAM2 | 0,012 | 277,9 | 29,455626 | Smaller lunar evectional constituent |
| 17 | S1 | 0,015 | 45 | 15 | Solar diurnal constituent |
| 18 | M1 | 0,016 | 276,3 | 14,496694 | Smaller lunar elliptic diurnal constituent |
| 19 | J1 | 0,03 | 275,5 | 15,5854435 | Smaller lunar elliptic diurnal constituent |
| 20 | MM | 0 | 0 | 0,5443747 | Lunar monthly constituent |
| 21 | SSA | 0,031 | 161,1 | 0,0821373 | Solar semiannual constituent |
| 22 | SA | 0,115 | 273,7 | 0,0410686 | Solar annual constituent |
| 23 | MSF | 0 | 0 | 1,0158958 | Lunisolar synodic fortnightly constituent |
| 24 | MF | 0,027 | 173 | 1,0980331 | Lunisolar fortnightly constituent |
| 25 | RHO | 0,011 | 241 | 13,471515 | Larger lunar evectional diurnal constituent |
| 26 | Q1 | 0,054 | 237,4 | 13,398661 | Larger lunar elliptic diurnal constituent |
| 27 | T2 | 0,035 | 296,9 | 29,958933 | Larger solar elliptic constituent |
| 28 | R2 | 0,008 | 340,5 | 30,041067 | Smaller solar elliptic constituent |
| 29 | 2Q1 | 0,007 | 236,6 | 12,854286 | Larger elliptic diurnal |
| 30 | P1 | 0,162 | 258,5 | 14,958931 | Solar diurnal constituent |
| 31 | 2SM2 | 0,004 | 98,5 | 31,015896 | Shallow water semidiurnal constituent |
| 32 | M3 | 0,018 | 336,4 | 43,47616 | Lunar terdiurnal constituent |
| 33 | L2 | 0,042 | 281,3 | 29,528479 | Smaller lunar elliptic semidiurnal constitue |
| 34 | 2MK3 | 0,004 | 53,1 | 42,92714 | Shallow water terdiurnal constituent |
| 35 | K2 | 0,172 | 295,2 | 30,082138 | Lunisolar semidiurnal constituent |
| 36 | M8 | 0 | 0 | 115,93642 | Shallow water eighth diurnal constituent |
| 37 | MS4 | 0,013 | 332,5 | 58,984104 | Shallow water quarter diurnal constituent |



Datums for 9450460, Ketchikan, AK
All figures in meters relative to station datum
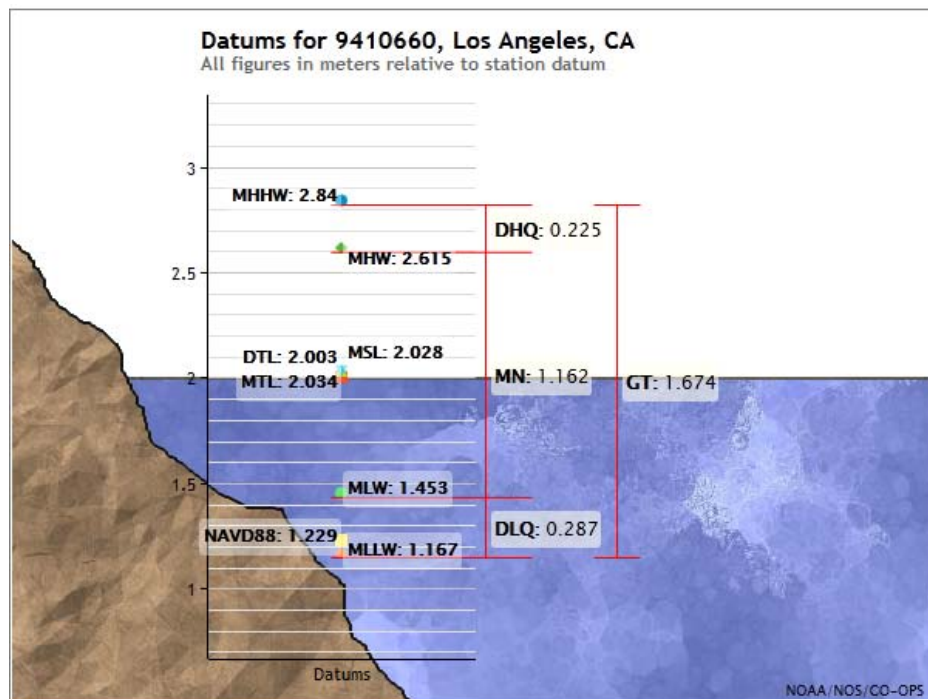
### 3.9.- Harmonic Constituents for 9457292, Kodiak Island AK

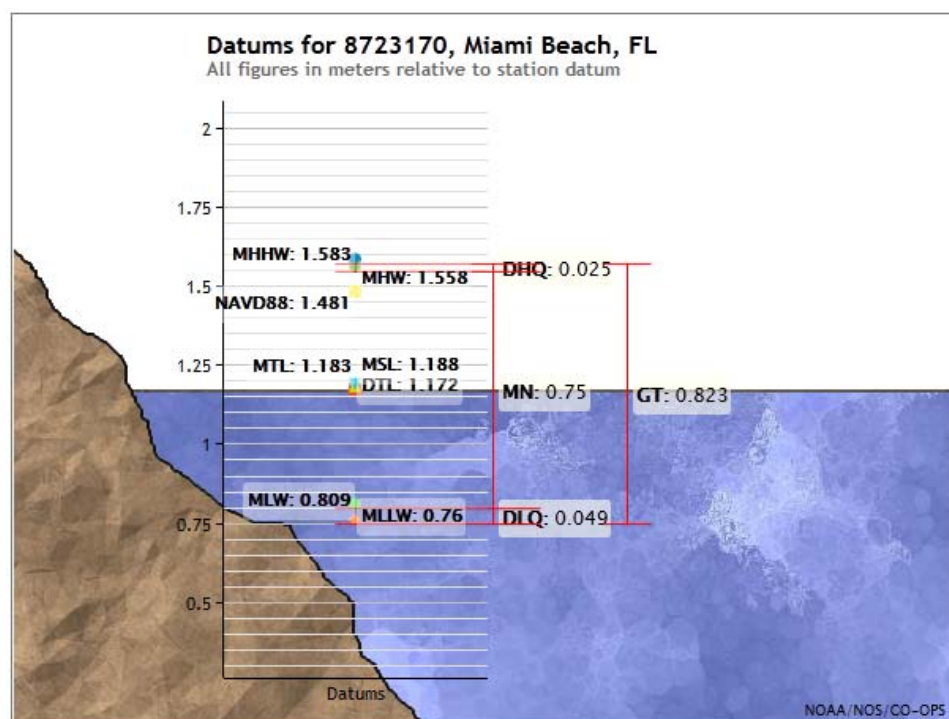| Constituent # | Name | Amplitude | Phase | Speed | Description |
|---|---|---|---|---|---|
| 1 | M2 | 0,973 | 308,1 | 28,984104 | Principal lunar semidiurnal constituent |
| 2 | S2 | 0,325 | 341,4 | 30 | Principal solar semidiurnal constituent |
| 3 | N2 | 0,201 | 284,2 | 28,43973 | Larger lunar elliptic semidiurnal |
| 4 | K1 | 0,398 | 288,6 | 15,041069 | Lunar diurnal constituent |
| 5 | M4 | 0,009 | 28,2 | 57,96821 | Shallow water overtides of principal lunar |
| 6 | O1 | 0,259 | 273 | 13,943035 | Lunar diurnal constituent |
| 7 | M6 | 0,01 | 89,1 | 86,95232 | Shallow water overtides of principal lunar |
| 8 | MK3 | 0,005 | 264,6 | 44,025173 | Shallow water terdiurnal |
| 9 | S4 | 0 | 0 | 60 | Shallow water overtides of principal solar |
| 10 | MN4 | 0,003 | 349 | 57,423832 | Shallow water quarter diurnal constituent |
| 11 | NU2 | 0,039 | 284,2 | 28,512583 | Larger lunar evectional constituent |
| 12 | S6 | 0 | 0 | 90 | Shallow water overtides of principal solar |
| 13 | MU2 | 0,022 | 277,1 | 27,968208 | Variational constituent |
| 14 | 2N2 | 0,024 | 258,9 | 27,895355 | Lunar elliptical semidiurnal second-order |
| 15 | OO1 | 0,012 | 313,1 | 16,139101 | Lunar diurnal |
| 16 | LAM2 | 0,007 | 323,6 | 29,455626 | Smaller lunar evectional constituent |
| 17 | S1 | 0,012 | 77 | 15 | Solar diurnal constituent |
| 18 | M1 | 0,014 | 293,2 | 14,496694 | Smaller lunar elliptic diurnal constituent |
| 19 | J1 | 0,023 | 297,9 | 15,5854435 | Smaller lunar elliptic diurnal constituent |
| 20 | MM | 0,019 | 191,7 | 0,5443747 | Lunar monthly constituent |
| 21 | SSA | 0,015 | 151,7 | 0,0821373 | Solar semiannual constituent |
| 22 | SA | 0,078 | 262,1 | 0,0410686 | Solar annual constituent |
| 23 | MSF | 0,015 | 51,5 | 1,0158958 | Lunisolar synodic fortnightly constituent |
| 24 | MF | 0,02 | 165,2 | 1,0980331 | Lunisolar fortnightly constituent |
| 25 | RHO | 0,009 | 267,1 | 13,471515 | Larger lunar evectional diurnal constituent |
| 26 | Q1 | 0,047 | 264,8 | 13,398661 | Larger lunar elliptic diurnal constituent |
| 27 | T2 | 0,019 | 329,5 | 29,958933 | Larger solar elliptic constituent |
| 28 | R2 | 0,002 | 341,4 | 30,041067 | Smaller solar elliptic constituent |
| 29 | 2Q1 | 0,007 | 257,4 | 12,854286 | Larger elliptic diurnal |
| 30 | P1 | 0,126 | 284,4 | 14,958931 | Solar diurnal constituent |
| 31 | 2SM2 | 0 | 0 | 31,015896 | Shallow water semidiurnal constituent |
| 32 | M3 | 0 | 0 | 43,47616 | Lunar terdiurnal constituent |
| 33 | L2 | 0,024 | 321 | 29,528479 | Smaller lunar elliptic semidiurnal |
| 34 | 2MK3 | 0,005 | 245,5 | 42,92714 | Shallow water terdiurnal constituent |
| 35 | K2 | 0,09 | 332,8 | 30,082138 | Lunisolar semidiurnal constituent |
| 36 | M8 | 0 | 0 | 115,93642 | Shallow water eighth diurnal constituent |
| 37 | MS4 | 0,006 | 71,6 | 58,984104 | Shallow water quarter diurnal constituent |



Datums for 9457292, Kodiak Island, AK
All figures in meters relative to station datum

## 3.10.- Harmonic Constituents for 9410660, Los Angeles CA

| Constituent # | Name | Amplitude | Phase | Speed | Description |
|---|---|---|---|---|---|
| 1 | M2 | 0,515 | 145,5 | 28,984104 | Principal lunar semidiurnal constituent |
| 2 | S2 | 0,203 | 141,1 | 30 | Principal solar semidiurnal constituent |
| 3 | N2 | 0,121 | 123,7 | 28,43973 | Larger lunar elliptic semidiurnal constituent |
| 4 | K1 | 0,343 | 207,7 | 15,041069 | Lunar diurnal constituent |
| 5 | M4 | 0 | 0 | 57,96821 | Shallow water overtides of principal lunar |
| 6 | O1 | 0,218 | 192,3 | 13,943035 | Lunar diurnal constituent |
| 7 | M6 | 0 | 0 | 86,95232 | Shallow water overtides of principal lunar |
| 8 | MK3 | 0 | 0 | 44,025173 | Shallow water terdiurnal |
| 9 | S4 | 0 | 0 | 60 | Shallow water overtides of principal solar |
| 10 | MN4 | 0 | 0 | 57,423832 | Shallow water quarter diurnal constituent |
| 11 | NU2 | 0,023 | 130,2 | 28,512583 | Larger lunar evectional constituent |
| 12 | S6 | 0 | 0 | 90 | Shallow water overtides of principal solar |
| 13 | MU2 | 0,017 | 88,1 | 27,968208 | Variational constituent |
| 14 | 2N2 | 0,015 | 95,1 | 27,895355 | Lunar elliptical semidiurnal second-order |
| 15 | OO1 | 0,011 | 236,9 | 16,139101 | Lunar diurnal |
| 16 | LAM2 | 0,003 | 166,4 | 29,455626 | Smaller lunar evectional constituent |
| 17 | S1 | 0,003 | 314,1 | 15 | Solar diurnal constituent |
| 18 | M1 | 0,012 | 222,6 | 14,496694 | Smaller lunar elliptic diurnal constituent |
| 19 | J1 | 0,02 | 219,1 | 15,5854435 | Smaller lunar elliptic diurnal constituent |
| 20 | MM | 0 | 0 | 0,5443747 | Lunar monthly constituent |
| 21 | SSA | 0 | 0 | 0,0821373 | Solar semiannual constituent |
| 22 | SA | 0,066 | 184,4 | 0,0410686 | Solar annual constituent |
| 23 | MSF | 0 | 0 | 1,0158958 | Lunisolar synodic fortnightly constituent |
| 24 | MF | 0 | 0 | 1,0980331 | Lunisolar fortnightly constituent |
| 25 | RHO | 0,008 | 182,1 | 13,471515 | Larger lunar evectional diurnal constituent |
| 26 | Q1 | 0,039 | 185 | 13,398661 | Larger lunar elliptic diurnal constituent |
| 27 | T2 | 0,012 | 129,7 | 29,958933 | Larger solar elliptic constituent |
| 28 | R2 | 0,003 | 167,5 | 30,041067 | Smaller solar elliptic constituent |
| 29 | 2Q1 | 0,004 | 186,1 | 12,854286 | Larger elliptic diurnal |
| 30 | P1 | 0,107 | 204,6 | 14,958931 | Solar diurnal constituent |
| 31 | 2SM2 | 0 | 0 | 31,015896 | Shallow water semidiurnal constituent |
| 32 | M3 | 0,003 | 350,1 | 43,47616 | Lunar terdiurnal constituent |
| 33 | L2 | 0,008 | 134,2 | 29,528479 | Smaller lunar elliptic semidiurnal constituent |
| 34 | 2MK3 | 0 | 0 | 42,92714 | Shallow water terdiurnal constituent |
| 35 | K2 | 0,06 | 135,5 | 30,082138 | Lunisolar semidiurnal constituent |
| 36 | M8 | 0 | 0 | 115,93642 | Shallow water eighth diurnal constituent |
| 37 | MS4 | 0 | 0 | 58,984104 | Shallow water quarter diurnal constituent |



Datums for 9410660, Los Angeles, CA
All figures in meters relative to station datum

### 3.11.- Harmonic Constituents for 8723170, Miami Beach FL

| Constituent # | Name | Amplitude | Phase | Speed | Description |
|---|---|---|---|---|---|
| 1 | M2 | 0,373 | 20,4 | 28,984104 | Principal lunar semidiurnal constituent |
| 2 | S2 | 0,075 | 44,5 | 30 | Principal solar semidiurnal constituent |
| 3 | N2 | 0,085 | 0,8 | 28,43973 | Larger lunar elliptic semidiurnal constituent |
| 4 | K1 | 0,042 | 244,8 | 15,041069 | Lunar diurnal constituent |
| 5 | M4 | 0 | 0 | 57,96821 | Shallow water overtides of principal lunar |
| 6 | O1 | 0,034 | 268,7 | 13,943035 | Lunar diurnal constituent |
| 7 | M6 | 0 | 0 | 86,95232 | Shallow water overtides of principal lunar |
| 8 | MK3 | 0 | 0 | 44,025173 | Shallow water terdiurnal |
| 9 | S4 | 0 | 0 | 60 | Shallow water overtides of principal solar |
| 10 | MN4 | 0 | 0 | 57,423832 | Shallow water quarter diurnal constituent |
| 11 | NU2 | 0,016 | 3,4 | 28,512583 | Larger lunar evectional constituent |
| 12 | S6 | 0 | 0 | 90 | Shallow water overtides of principal solar |
| 13 | MU2 | 0,011 | 356,7 | 27,968208 | Variational constituent |
| 14 | 2N2 | 0,011 | 341,2 | 27,895355 | Lunar elliptical semidiurnal second-order |
| 15 | OO1 | 0 | 0 | 16,139101 | Lunar diurnal |
| 16 | LAM2 | 0 | 0 | 29,455626 | Smaller lunar evectional constituent |
| 17 | S1 | 0 | 0 | 15 | Solar diurnal constituent |
| 18 | M1 | 0 | 0 | 14,496694 | Smaller lunar elliptic diurnal constituent |
| 19 | J1 | 0 | 0 | 15,5854435 | Smaller lunar elliptic diurnal constituent |
| 20 | MM | 0 | 0 | 0,5443747 | Lunar monthly constituent |
| 21 | SSA | 0,062 | 68,7 | 0,0821373 | Solar semiannual constituent |
| 22 | SA | 0,088 | 198,8 | 0,0410686 | Solar annual constituent |
| 23 | MSF | 0 | 0 | 1,0158958 | Lunisolar synodic fortnightly constituent |
| 24 | MF | 0 | 0 | 1,0980331 | Lunisolar fortnightly constituent |
| 25 | RHO | 0 | 0 | 13,471515 | Larger lunar evectional diurnal constituent |
| 26 | Q1 | 0,006 | 280,5 | 13,398661 | Larger lunar elliptic diurnal constituent |
| 27 | T2 | 0,004 | 44,4 | 29,958933 | Larger solar elliptic constituent |
| 28 | R2 | 0 | 0 | 30,041067 | Smaller solar elliptic constituent |
| 29 | 2Q1 | 0 | 0 | 12,854286 | Larger elliptic diurnal |
| 30 | P1 | 0,013 | 248,4 | 14,958931 | Solar diurnal constituent |
| 31 | 2SM2 | 0 | 0 | 31,015896 | Shallow water semidiurnal constituent |
| 32 | M3 | 0 | 0 | 43,47616 | Lunar terdiurnal constituent |
| 33 | L2 | 0,01 | 23,2 | 29,528479 | Smaller lunar elliptic semidiurnal constituent |
| 34 | 2MK3 | 0 | 0 | 42,92714 | Shallow water terdiurnal constituent |
| 35 | K2 | 0,02 | 56,4 | 30,082138 | Lunisolar semidiurnal constituent |
| 36 | M8 | 0 | 0 | 115,93642 | Shallow water eighth diurnal constituent |
| 37 | MS4 | 0 | 0 | 58,984104 | Shallow water quarter diurnal constituent |



Datums for 8723170, Miami Beach, FL
All figures in meters relative to station datum

MHHW: 1.583
MHW: 1.558
NAVD88: 1.481
DHQ: 0.025
MTL: 1.183  MSL: 1.188
DTL: 1.172
MN: 0.75  GT: 0.823
MLW: 0.809
MLLW: 0.76  DLQ: 0.049
Datums
NOAA/NOS/CO-OPS

### 3.12.- Harmonic Constituents for 8412581, Milbridge ME

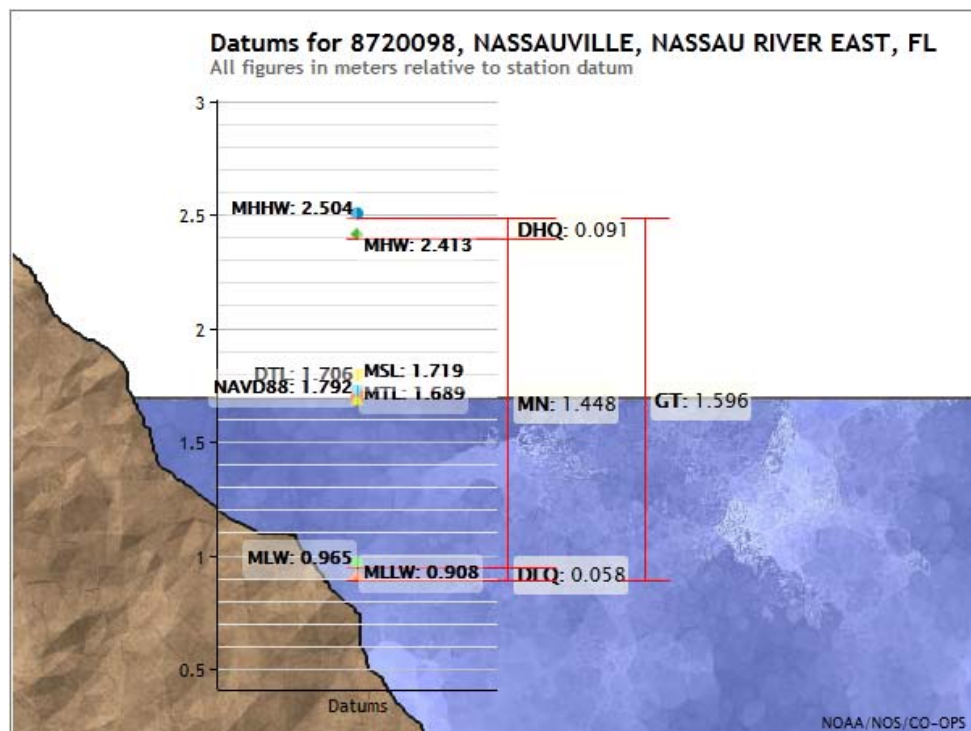| Constituent # | Name | Amplitude | Phase | Speed | Description |
|---|---|---|---|---|---|
| 1 | M2 | 1,631 | 98,2 | 28,984104 | Principal lunar semidiurnal constituent |
| 2 | S2 | 0,221 | 138,4 | 30 | Principal solar semidiurnal constituent |
| 3 | N2 | 0,33 | 64,8 | 28,43973 | Larger lunar elliptic semidiurnal constituent |
| 4 | K1 | 0,147 | 192,8 | 15,041069 | Lunar diurnal constituent |
| 5 | M4 | 0,084 | 106,5 | 57,96821 | Shallow water overtides of principal lunar |
| 6 | O1 | 0,122 | 180,1 | 13,943035 | Lunar diurnal constituent |
| 7 | M6 | 0,016 | 356,5 | 86,95232 | Shallow water overtides of principal lunar |
| 8 | MK3 | 0 | 0 | 44,025173 | Shallow water terdiurnal |
| 9 | S4 | 0 | 34,7 | 60 | Shallow water overtides of principal solar |
| 10 | MN4 | 0 | 0 | 57,423832 | Shallow water quarter diurnal constituent |
| 11 | NU2 | 0,064 | 69,3 | 28,512583 | Larger lunar evectional constituent |
| 12 | S6 | 0,003 | 59,7 | 90 | Shallow water overtides of principal solar |
| 13 | MU2 | 0,039 | 282,2 | 27,968208 | Variational constituent |
| 14 | 2N2 | 0,044 | 31,5 | 27,895355 | Lunar elliptical semidiurnal second-order |
| 15 | OO1 | 0,005 | 205,5 | 16,139101 | Lunar diurnal |
| 16 | LAM2 | 0,011 | 116,8 | 29,455626 | Smaller lunar evectional constituent |
| 17 | S1 | 0 | 0 | 15 | Solar diurnal constituent |
| 18 | M1 | 0,009 | 186,5 | 14,496694 | Smaller lunar elliptic diurnal constituent |
| 19 | J1 | 0,01 | 199,1 | 15,5854435 | Smaller lunar elliptic diurnal constituent |
| 20 | MM | 0 | 0 | 0,5443747 | Lunar monthly constituent |
| 21 | SSA | 0 | 0 | 0,0821373 | Solar semiannual constituent |
| 22 | SA | 0 | 0 | 0,0410686 | Solar annual constituent |
| 23 | MSF | 0 | 0 | 1,0158958 | Lunisolar synodic fortnightly constituent |
| 24 | MF | 0 | 0 | 1,0980331 | Lunisolar fortnightly constituent |
| 25 | RHO | 0,005 | 174,7 | 13,471515 | Larger lunar evectional diurnal constituent |
| 26 | Q1 | 0,024 | 173,8 | 13,398661 | Larger lunar elliptic diurnal constituent |
| 27 | T2 | 0,013 | 136,8 | 29,958933 | Larger solar elliptic constituent |
| 28 | R2 | 0,002 | 140 | 30,041067 | Smaller solar elliptic constituent |
| 29 | 2Q1 | 0,003 | 167,5 | 12,854286 | Larger elliptic diurnal |
| 30 | P1 | 0,048 | 191,9 | 14,958931 | Solar diurnal constituent |
| 31 | 2SM2 | 0 | 0 | 31,015896 | Shallow water semidiurnal constituent |
| 32 | M3 | 0 | 0 | 43,47616 | Lunar terdiurnal constituent |
| 33 | L2 | 0,046 | 131,6 | 29,528479 | Smaller lunar elliptic semidiurnal constituent |
| 34 | 2MK3 | 0 | 0 | 42,92714 | Shallow water terdiurnal constituent |
| 35 | K2 | 0,06 | 141,7 | 30,082138 | Lunisolar semidiurnal constituent |
| 36 | M8 | 0,008 | 162,2 | 115,93642 | Shallow water eighth diurnal constituent |
| 37 | MS4 | 0 | 0 | 58,984104 | Shallow water quarter diurnal constituent |



Datums for 8412581, Milbridge, ME
All figures in meters relative to station datum
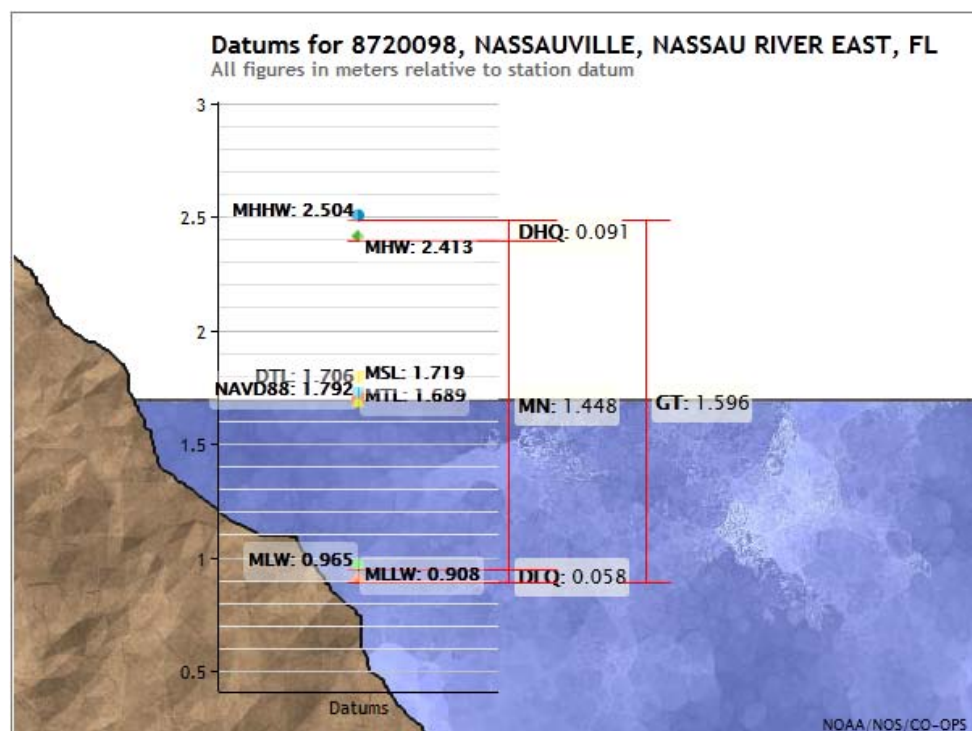
### 3.13.- Harmonic Constituents for 9413450, Monterey CA

| Constituent # | Name | Amplitude | Phase | Speed | Description |
|---|---|---|---|---|---|
| 1 | M2 | 0,493 | 181,1 | 28,984104 | Principal lunar semidiurnal constituent |
| 2 | S2 | 0,13 | 180,2 | 30 | Principal solar semidiurnal constituent |
| 3 | N2 | 0,112 | 154,6 | 28,43973 | Larger lunar elliptic semidiurnal |
| 4 | K1 | 0,365 | 219,8 | 15,041069 | Lunar diurnal constituent |
| 5 | M4 | 0 | 0 | 57,96821 | Shallow water overtides of principal lunar |
| 6 | O1 | 0,23 | 203,4 | 13,943035 | Lunar diurnal constituent |
| 7 | M6 | 0 | 0 | 86,95232 | Shallow water overtides of principal lunar |
| 8 | MK3 | 0 | 0 | 44,025173 | Shallow water terdiurnal |
| 9 | S4 | 0 | 0 | 60 | Shallow water overtides of principal solar |
| 10 | MN4 | 0 | 0 | 57,423832 | Shallow water quarter diurnal constituent |
| 11 | NU2 | 0,022 | 161,1 | 28,512583 | Larger lunar evectional constituent |
| 12 | S6 | 0 | 0 | 90 | Shallow water overtides of principal solar |
| 13 | MU2 | 0,012 | 114,6 | 27,968208 | Variational constituent |
| 14 | 2N2 | 0,013 | 123,9 | 27,895355 | Lunar elliptical semidiurnal second-order |
| 15 | OO1 | 0,011 | 250,2 | 16,139101 | Lunar diurnal |
| 16 | LAM2 | 0,003 | 180,7 | 29,455626 | Smaller lunar evectional constituent |
| 17 | S1 | 0,01 | 319,1 | 15 | Solar diurnal constituent |
| 18 | M1 | 0,012 | 225,9 | 14,496694 | Smaller lunar elliptic diurnal constituent |
| 19 | J1 | 0,022 | 233,4 | 15,5854435 | Smaller lunar elliptic diurnal constituent |
| 20 | MM | 0 | 0 | 0,5443747 | Lunar monthly constituent |
| 21 | SSA | 0,027 | 283,9 | 0,0821373 | Solar semiannual constituent |
| 22 | SA | 0,048 | 206 | 0,0410686 | Solar annual constituent |
| 23 | MSF | 0 | 0 | 1,0158958 | Lunisolar synodic fortnightly constituent |
| 24 | MF | 0 | 0 | 1,0980331 | Lunisolar fortnightly constituent |
| 25 | RHO | 0,008 | 196,6 | 13,471515 | Larger lunar evectional diurnal constituent |
| 26 | Q1 | 0,041 | 195,1 | 13,398661 | Larger lunar elliptic diurnal constituent |
| 27 | T2 | 0,007 | 167,8 | 29,958933 | Larger solar elliptic constituent |
| 28 | R2 | 0,001 | 180,2 | 30,041067 | Smaller solar elliptic constituent |
| 29 | 2Q1 | 0,005 | 199,4 | 12,854286 | Larger elliptic diurnal |
| 30 | P1 | 0,114 | 215,6 | 14,958931 | Solar diurnal constituent |
| 31 | 2SM2 | 0 | 0 | 31,015896 | Shallow water semidiurnal constituent |
| 32 | M3 | 0 | 0 | 43,47616 | Lunar terdiurnal constituent |
| 33 | L2 | 0,007 | 220,2 | 29,528479 | Smaller lunar elliptic semidiurnal |
| 34 | 2MK3 | 0 | 0 | 42,92714 | Shallow water terdiurnal constituent |
| 35 | K2 | 0,037 | 172 | 30,082138 | Lunisolar semidiurnal constituent |
| 36 | M8 | 0 | 0 | 115,93642 | Shallow water eighth diurnal constituent |
| 37 | MS4 | 0 | 0 | 58,984104 | Shallow water quarter diurnal constituent |



Datums for 9413450, Monterey, CA
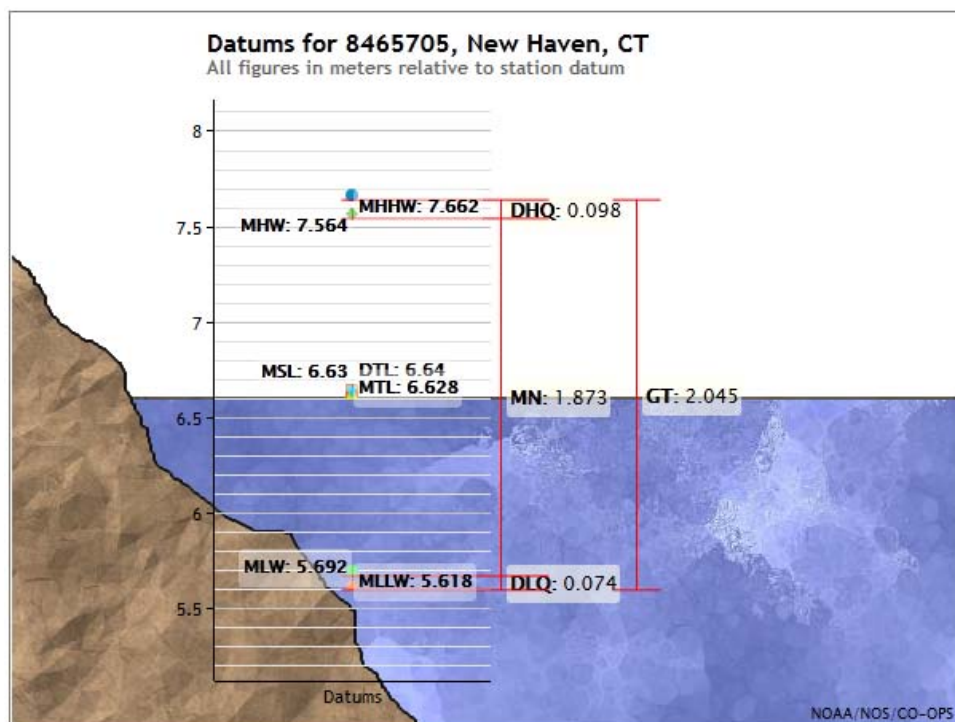All figures in meters relative to station datum

### 3.14.- Harmonic Constituents for 8720098, NASSAUVILLE, NASSAU RIVER EAST FL

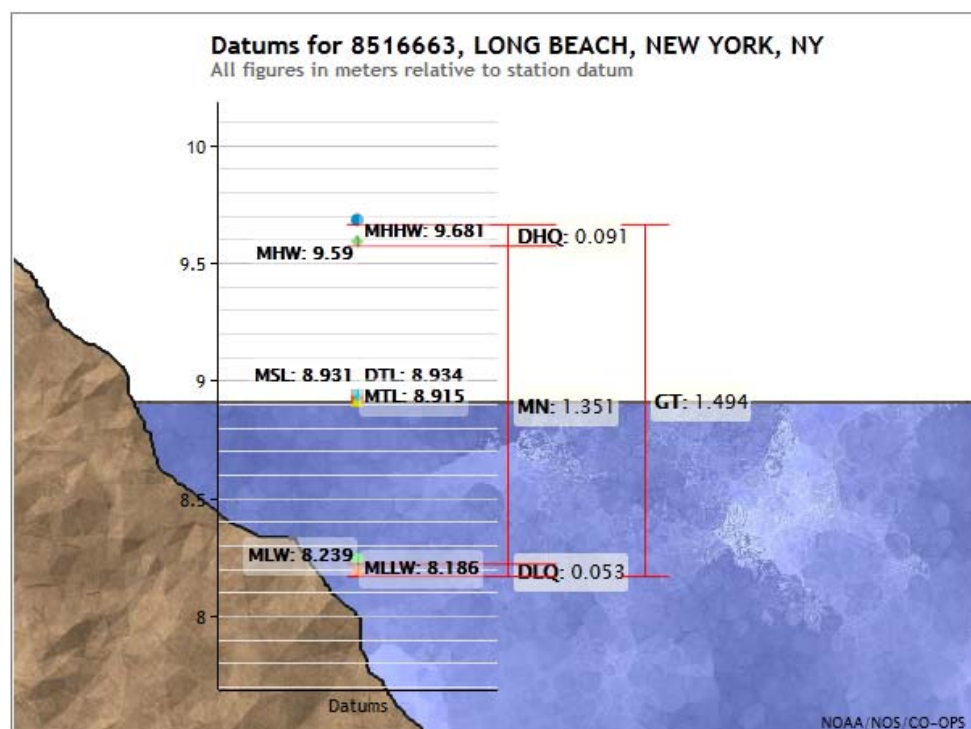| Constituent # | Name | Amplitude | Phase | Speed | Description |
|---|---|---|---|---|---|
| 1 | M2 | 0,661 | 51,9 | 28,984104 | Principal lunar semidiurnal constituent |
| 2 | S2 | 0,069 | 86,6 | 30 | Principal solar semidiurnal constituent |
| 3 | N2 | 0,117 | 40,3 | 28,43973 | Larger lunar elliptic semidiurnal constituent |
| 4 | K1 | 0,103 | 231,2 | 15,041069 | Lunar diurnal constituent |
| 5 | M4 | 0,047 | 355 | 57,96821 | Shallow water overtides of principal lunar |
| 6 | O1 | 0,11 | 229,2 | 13,943035 | Lunar diurnal constituent |
| 7 | M6 | 0,017 | 184,1 | 86,95232 | Shallow water overtides of principal lunar |
| 8 | MK3 | 0 | 0 | 44,025173 | Shallow water terdiurnal |
| 9 | S4 | 0,003 | 231,1 | 60 | Shallow water overtides of principal solar |
| 10 | MN4 | 0 | 0 | 57,423832 | Shallow water quarter diurnal constituent |
| 11 | NU2 | 0,023 | 41,8 | 28,512583 | Larger lunar evectional constituent |
| 12 | S6 | 0,001 | 32,9 | 90 | Shallow water overtides of principal solar |
| 13 | MU2 | 0,016 | 17,2 | 27,968208 | Variational constituent |
| 14 | 2N2 | 0,016 | 28,6 | 27,895355 | Lunar elliptical semidiurnal second-order |
| 15 | OO1 | 0,005 | 233,1 | 16,139101 | Lunar diurnal |
| 16 | LAM2 | 0,005 | 68 | 29,455626 | Smaller lunar evectional constituent |
| 17 | S1 | 0 | 0 | 15 | Solar diurnal constituent |
| 18 | M1 | 0,008 | 230,2 | 14,496694 | Smaller lunar elliptic diurnal constituent |
| 19 | J1 | 0,009 | 232,1 | 15,5854435 | Smaller lunar elliptic diurnal constituent |
| 20 | MM | 0 | 0 | 0,5443747 | Lunar monthly constituent |
| 21 | SSA | 0 | 0 | 0,0821373 | Solar semiannual constituent |
| 22 | SA | 0 | 0 | 0,0410686 | Solar annual constituent |
| 23 | MSF | 0 | 0 | 1,0158958 | Lunisolar synodic fortnightly constituent |
| 24 | MF | 0 | 0 | 1,0980331 | Lunisolar fortnightly constituent |
| 25 | RHO | 0,004 | 228,4 | 13,471515 | Larger lunar evectional diurnal constituent |
| 26 | Q1 | 0,021 | 228,2 | 13,398661 | Larger lunar elliptic diurnal constituent |
| 27 | T2 | 0,004 | 85,2 | 29,958933 | Larger solar elliptic constituent |
| 28 | R2 | 0,001 | 88 | 30,041067 | Smaller solar elliptic constituent |
| 29 | 2Q1 | 0,003 | 227,3 | 12,854286 | Larger elliptic diurnal |
| 30 | P1 | 0,034 | 231 | 14,958931 | Solar diurnal constituent |
| 31 | 2SM2 | 0 | 0 | 31,015896 | Shallow water semidiurnal constituent |
| 32 | M3 | 0 | 0 | 43,47616 | Lunar terdiurnal constituent |
| 33 | L2 | 0,019 | 63,5 | 29,528479 | Smaller lunar elliptic semidiurnal constituent |
| 34 | 2MK3 | 0 | 0 | 42,92714 | Shallow water terdiurnal constituent |
| 35 | K2 | 0,019 | 89,4 | 30,082138 | Lunisolar semidiurnal constituent |
| 36 | M8 | 0,004 | 133,9 | 115,93642 | Shallow water eighth diurnal constituent |
| 37 | MS4 | 0 | 0 | 58,984104 | Shallow water quarter diurnal constituent |



Datums for 8720098, NASSAUVILLE, NASSAU RIVER EAST, FL
All figures in meters relative to station datum

### 3.15.- Harmonic Constituents for 8465705, New Haven CT

| Constituent # | Name | Amplitude | Phase | Speed | Description |
|---|---|---|---|---|---|
| 1 | M2 | 0,893 | 106,4 | 28,984104 | Principal lunar semidiurnal constituent |
| 2 | S2 | 0,143 | 130,7 | 30 | Principal solar semidiurnal constituent |
| 3 | N2 | 0,189 | 81,7 | 28,43973 | Larger lunar elliptic semidiurnal |
| 4 | K1 | 0,093 | 190 | 15,041069 | Lunar diurnal constituent |
| 5 | M4 | 0,004 | 101,8 | 57,96821 | Shallow water overtides of principal lunar |
| 6 | O1 | 0,064 | 218,4 | 13,943035 | Lunar diurnal constituent |
| 7 | M6 | 0,027 | 350 | 86,95232 | Shallow water overtides of principal lunar |
| 8 | MK3 | 0,004 | 186,5 | 44,025173 | Shallow water terdiurnal |
| 9 | S4 | 0 | 0 | 60 | Shallow water overtides of principal solar |
| 10 | MN4 | 0,004 | 67,4 | 57,423832 | Shallow water quarter diurnal constituent |
| 11 | NU2 | 0,043 | 86,3 | 28,512583 | Larger lunar evectional constituent |
| 12 | S6 | 0 | 0 | 90 | Shallow water overtides of principal solar |
| 13 | MU2 | 0,004 | 321,5 | 27,968208 | Variational constituent |
| 14 | 2N2 | 0,026 | 72 | 27,895355 | Lunar elliptical semidiurnal second-order |
| 15 | OO1 | 0,005 | 229,6 | 16,139101 | Lunar diurnal |
| 16 | LAM2 | 0,019 | 133,6 | 29,455626 | Smaller lunar evectional constituent |
| 17 | S1 | 0,016 | 113,2 | 15 | Solar diurnal constituent |
| 18 | M1 | 0,003 | 228,7 | 14,496694 | Smaller lunar elliptic diurnal constituent |
| 19 | J1 | 0,008 | 248,9 | 15,5854435 | Smaller lunar elliptic diurnal constituent |
| 20 | MM | 0 | 0 | 0,5443747 | Lunar monthly constituent |
| 21 | SSA | 0,022 | 61,2 | 0,0821373 | Solar semiannual constituent |
| 22 | SA | 0,063 | 132 | 0,0410686 | Solar annual constituent |
| 23 | MSF | 0 | 0 | 1,0158958 | Lunisolar synodic fortnightly constituent |
| 24 | MF | 0 | 0 | 1,0980331 | Lunisolar fortnightly constituent |
| 25 | RHO | 0,004 | 173,1 | 13,471515 | Larger lunar evectional diurnal constituent |
| 26 | Q1 | 0,014 | 210,7 | 13,398661 | Larger lunar elliptic diurnal constituent |
| 27 | T2 | 0,013 | 99,6 | 29,958933 | Larger solar elliptic constituent |
| 28 | R2 | 0,001 | 131,8 | 30,041067 | Smaller solar elliptic constituent |
| 29 | 2Q1 | 0,002 | 246,5 | 12,854286 | Larger elliptic diurnal |
| 30 | P1 | 0,03 | 203,7 | 14,958931 | Solar diurnal constituent |
| 31 | 2SM2 | 0 | 0 | 31,015896 | Shallow water semidiurnal constituent |
| 32 | M3 | 0,004 | 162,4 | 43,47616 | Lunar terdiurnal constituent |
| 33 | L2 | 0,052 | 143,8 | 29,528479 | Smaller lunar elliptic semidiurnal |
| 34 | 2MK3 | 0,004 | 186,1 | 42,92714 | Shallow water terdiurnal constituent |
| 35 | K2 | 0,04 | 131,1 | 30,082138 | Lunisolar semidiurnal constituent |
| 36 | M8 | 0 | 0 | 115,93642 | Shallow water eighth diurnal constituent |
| 37 | MS4 | 0 | 0 | 58,984104 | Shallow water quarter diurnal constituent |



Datums for 8465705, New Haven, CT
All figures in meters relative to station datum

### 3.16.- Harmonic Constituents for 8516663, LONG BEACH, NEW YORK NY

| Constituent # | Name | Amplitude | Phase | Speed | Description |
|---|---|---|---|---|---|
| 1 | M2 | 0,611 | 10,2 | 28,984104 | Principal lunar semidiurnal constituent |
| 2 | S2 | 0,122 | 45,1 | 30 | Principal solar semidiurnal constituent |
| 3 | N2 | 0,121 | 357,3 | 28,43973 | Larger lunar elliptic semidiurnal constituent |
| 4 | K1 | 0,082 | 187,6 | 15,041069 | Lunar diurnal constituent |
| 5 | M4 | 0,016 | 264,6 | 57,96821 | Shallow water overtides of principal lunar |
| 6 | O1 | 0,063 | 171,2 | 13,943035 | Lunar diurnal constituent |
| 7 | M6 | 0,019 | 55,2 | 86,95232 | Shallow water overtides of principal lunar |
| 8 | MK3 | 0 | 0 | 44,025173 | Shallow water terdiurnal |
| 9 | S4 | 0,01 | 9 | 60 | Shallow water overtides of principal solar |
| 10 | MN4 | 0 | 0 | 57,423832 | Shallow water quarter diurnal constituent |
| 11 | NU2 | 0,023 | 359 | 28,512583 | Larger lunar evectional constituent |
| 12 | S6 | 0,005 | 233,8 | 90 | Shallow water overtides of principal solar |
| 13 | MU2 | 0,015 | 335,2 | 27,968208 | Variational constituent |
| 14 | 2N2 | 0,016 | 344,5 | 27,895355 | Lunar elliptical semidiurnal second-order |
| 15 | OO1 | 0,002 | 204,7 | 16,139101 | Lunar diurnal |
| 16 | LAM2 | 0,004 | 26,4 | 29,455626 | Smaller lunar evectional constituent |
| 17 | S1 | 0 | 0 | 15 | Solar diurnal constituent |
| 18 | M1 | 0,004 | 179,6 | 14,496694 | Smaller lunar elliptic diurnal constituent |
| 19 | J1 | 0,005 | 195,9 | 15,5854435 | Smaller lunar elliptic diurnal constituent |
| 20 | MM | 0 | 0 | 0,5443747 | Lunar monthly constituent |
| 21 | SSA | 0,028 | 42,9 | 0,0821373 | Solar semiannual constituent |
| 22 | SA | 0,067 | 129,1 | 0,0410686 | Solar annual constituent |
| 23 | MSF | 0 | 0 | 1,0158958 | Lunisolar synodic fortnightly constituent |
| 24 | MF | 0 | 0 | 1,0980331 | Lunisolar fortnightly constituent |
| 25 | RHO | 0,002 | 164,1 | 13,471515 | Larger lunar evectional diurnal constituent |
| 26 | Q1 | 0,012 | 162,9 | 13,398661 | Larger lunar elliptic diurnal constituent |
| 27 | T2 | 0,007 | 43,7 | 29,958933 | Larger solar elliptic constituent |
| 28 | R2 | 0,001 | 46,6 | 30,041067 | Smaller solar elliptic constituent |
| 29 | 2Q1 | 0,001 | 154,7 | 12,854286 | Larger elliptic diurnal |
| 30 | P1 | 0,027 | 186,3 | 14,958931 | Solar diurnal constituent |
| 31 | 2SM2 | 0 | 0 | 31,015896 | Shallow water semidiurnal constituent |
| 32 | M3 | 0 | 0 | 43,47616 | Lunar terdiurnal constituent |
| 33 | L2 | 0,017 | 23 | 29,528479 | Smaller lunar elliptic semidiurnal constituent |
| 34 | 2MK3 | 0 | 0 | 42,92714 | Shallow water terdiurnal constituent |
| 35 | K2 | 0,033 | 47,9 | 30,082138 | Lunisolar semidiurnal constituent |
| 36 | M8 | 0,003 | 276 | 115,93642 | Shallow water eighth diurnal constituent |
| 37 | MS4 | 0 | 0 | 58,984104 | Shallow water quarter diurnal constituent |



Datums for 8516663, LONG BEACH, NEW YORK, NY
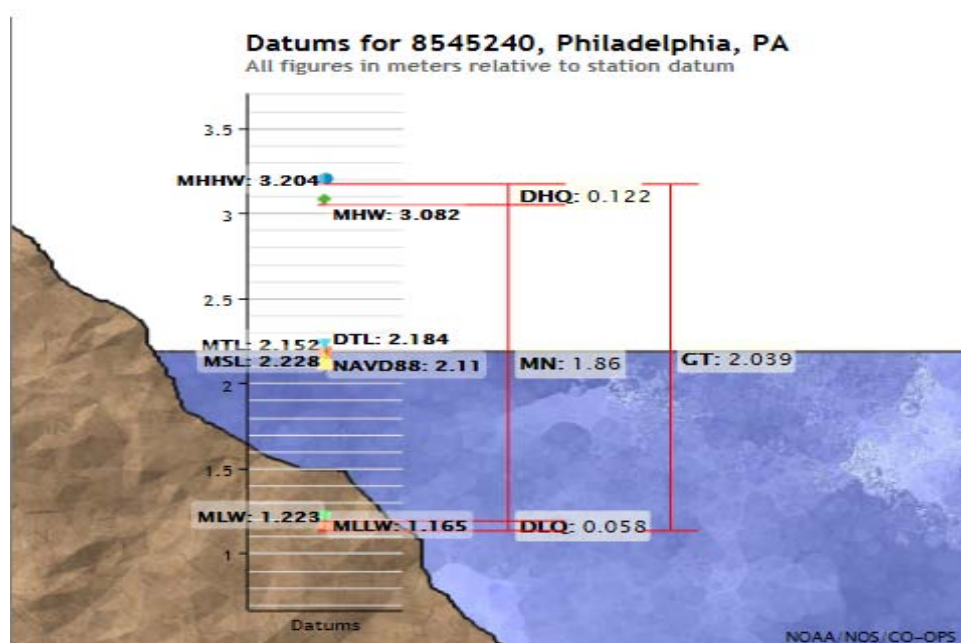All figures in meters relative to station datum

### 3.17.- Harmonic Constituents for 8516891, NORTON POINT, HOOK CREEK, NEW YORK NY

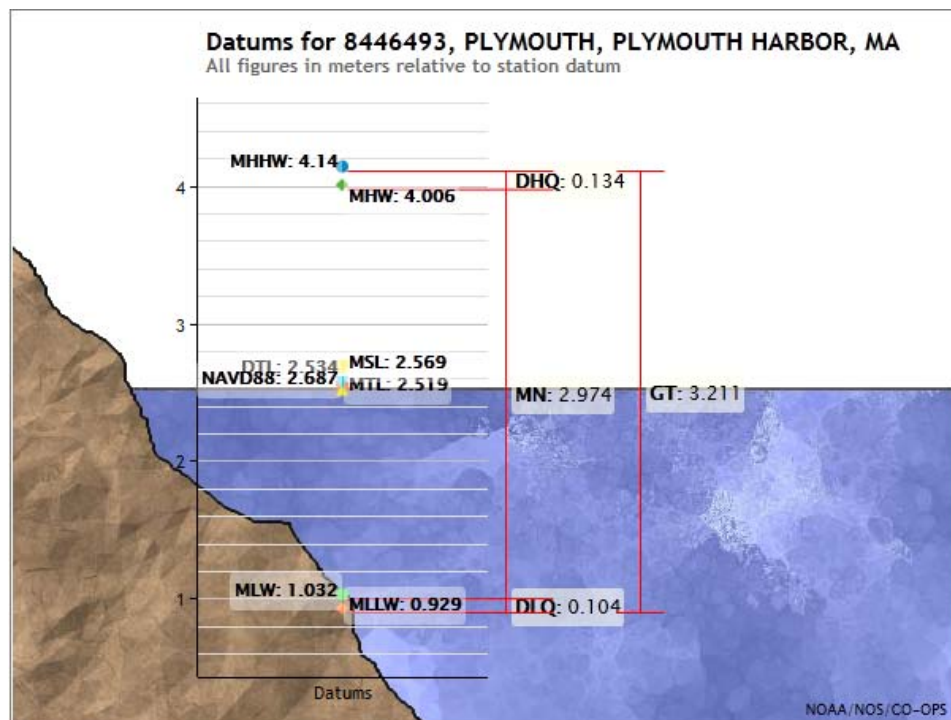| Constituent # | Name | Amplitude | Phase | Speed | Description |
|---|---|---|---|---|---|
| 1 | M2 | 0,784 | 18,2 | 28,984104 | Principal lunar semidiurnal constituent |
| 2 | S2 | 0,149 | 48,9 | 30 | Principal solar semidiurnal constituent |
| 3 | N2 | 0,176 | 7,8 | 28,43973 | Larger lunar elliptic semidiurnal constituent |
| 4 | K1 | 0,102 | 187,8 | 15,041069 | Lunar diurnal constituent |
| 5 | M4 | 0,032 | 309,7 | 57,96821 | Shallow water overtides of principal lunar |
| 6 | O1 | 0,063 | 175,5 | 13,943035 | Lunar diurnal constituent |
| 7 | M6 | 0,03 | 100,7 | 86,95232 | Shallow water overtides of principal lunar |
| 8 | MK3 | 0 | 0 | 44,025173 | Shallow water terdiurnal |
| 9 | S4 | 0,02 | 33,5 | 60 | Shallow water overtides of principal solar |
| 10 | MN4 | 0 | 0 | 57,423832 | Shallow water quarter diurnal constituent |
| 11 | NU2 | 0,034 | 9,2 | 28,512583 | Larger lunar evectional constituent |
| 12 | S6 | 0,002 | 342,4 | 90 | Shallow water overtides of principal solar |
| 13 | MU2 | 0,019 | 347,5 | 27,968208 | Variational constituent |
| 14 | 2N2 | 0,023 | 357,4 | 27,895355 | Lunar elliptical semidiurnal second-order |
| 15 | OO1 | 0,002 | 198,3 | 16,139101 | Lunar diurnal |
| 16 | LAM2 | 0,005 | 32,3 | 29,455626 | Smaller lunar evectional constituent |
| 17 | S1 | 0 | 0 | 15 | Solar diurnal constituent |
| 18 | M1 | 0,005 | 181,6 | 14,496694 | Smaller lunar elliptic diurnal constituent |
| 19 | J1 | 0,005 | 193,5 | 15,5854435 | Smaller lunar elliptic diurnal constituent |
| 20 | MM | 0 | 0 | 0,5443747 | Lunar monthly constituent |
| 21 | SSA | 0,028 | 42,9 | 0,0821373 | Solar semiannual constituent |
| 22 | SA | 0,028 | 129,1 | 0,0410686 | Solar annual constituent |
| 23 | MSF | 0 | 0 | 1,0158958 | Lunisolar synodic fortnightly constituent |
| 24 | MF | 0 | 0 | 1,0980331 | Lunisolar fortnightly constituent |
| 25 | RHO | 0,002 | 171,6 | 13,471515 | Larger lunar evectional diurnal constituent |
| 26 | Q1 | 0,012 | 169,5 | 13,398661 | Larger lunar elliptic diurnal constituent |
| 27 | T2 | 0,009 | 47,7 | 29,958933 | Larger solar elliptic constituent |
| 28 | R2 | 0,001 | 50 | 30,041067 | Smaller solar elliptic constituent |
| 29 | 2Q1 | 0,001 | 166,7 | 12,854286 | Larger elliptic diurnal |
| 30 | P1 | 0,034 | 186,8 | 14,958931 | Solar diurnal constituent |
| 31 | 2SM2 | 0 | 0 | 31,015896 | Shallow water semidiurnal constituent |
| 32 | M3 | 0 | 0 | 43,47616 | Lunar terdiurnal constituent |
| 33 | L2 | 0,022 | 28,5 | 29,528479 | Smaller lunar elliptic semidiurnal constituent |
| 34 | 2MK3 | 0 | 0 | 42,92714 | Shallow water terdiurnal constituent |
| 35 | K2 | 0,04 | 51,4 | 30,082138 | Lunisolar semidiurnal constituent |
| 36 | M8 | 0,002 | 324,6 | 115,93642 | Shallow water eighth diurnal constituent |
| 37 | MS4 | 0 | 0 | 58,984104 | Shallow water quarter diurnal constituent |



Datums for 8516891, NORTON POINT, HOOK CREEK, NEW YORK,
All figures in meters relative to station datum

### 3.18.- Harmonic Constituents for 8545240, Philadelphia PA

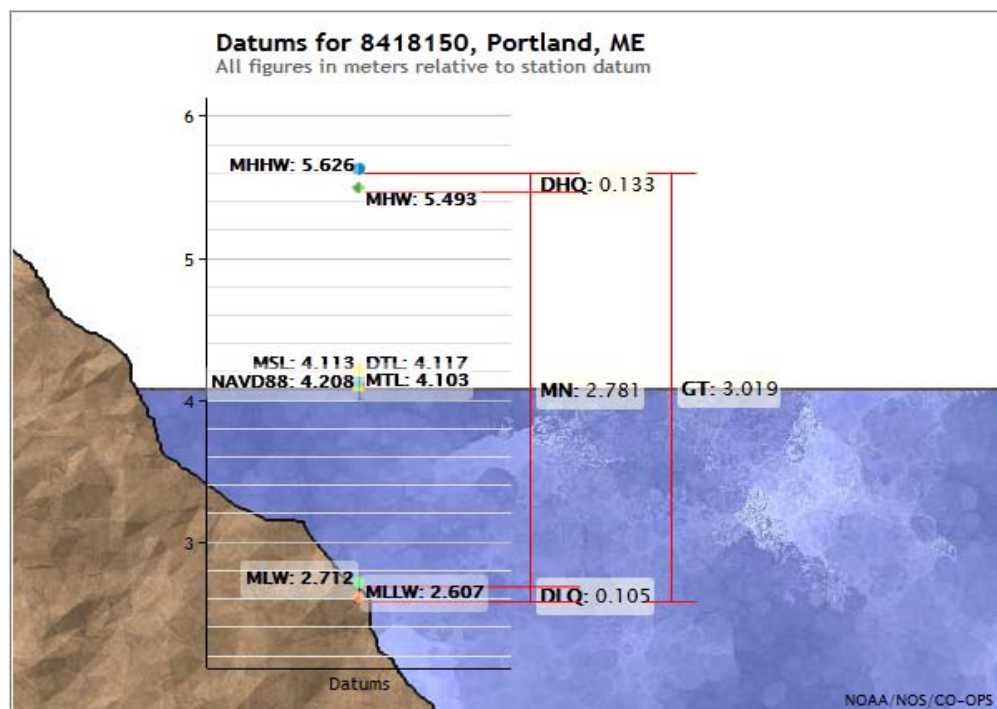| Constituent # | Name | Amplitude | Phase | Speed | Description |
|---|---|---|---|---|---|
| 1 | M2 | 0,839 | 185,8 | 28,984104 | Principal lunar semidiurnal constituent |
| 2 | S2 | 0,093 | 225,5 | 30 | Principal solar semidiurnal constituent |
| 3 | N2 | 0,146 | 168,7 | 28,43973 | Larger lunar elliptic semidiurnal |
| 4 | K1 | 0,102 | 283,7 | 15,041069 | Lunar diurnal constituent |
| 5 | M4 | 0,084 | 256,4 | 57,96821 | Shallow water overtides of principal lunar |
| 6 | O1 | 0,081 | 263,8 | 13,943035 | Lunar diurnal constituent |
| 7 | M6 | 0,052 | 248,4 | 86,95232 | Shallow water overtides of principal lunar |
| 8 | MK3 | 0,022 | 332,4 | 44,025173 | Shallow water terdiurnal |
| 9 | S4 | 0 | 0 | 60 | Shallow water overtides of principal solar |
| 10 | MN4 | 0,033 | 240 | 57,423832 | Shallow water quarter diurnal constituent |
| 11 | NU2 | 0,047 | 163,2 | 28,512583 | Larger lunar evectional constituent |
| 12 | S6 | 0 | 0 | 90 | Shallow water overtides of principal solar |
| 13 | MU2 | 0,045 | 309,1 | 27,968208 | Variational constituent |
| 14 | 2N2 | 0,015 | 148,6 | 27,895355 | Lunar elliptical semidiurnal second-order |
| 15 | OO1 | 0,003 | 303,5 | 16,139101 | Lunar diurnal |
| 16 | LAM | 0,026 | 196,2 | 29,455626 | Smaller lunar evectional constituent |
| 17 | S1 | 0,024 | 240,3 | 15 | Solar diurnal constituent |
| 18 | M1 | 0,005 | 352,1 | 14,496694 | Smaller lunar elliptic diurnal constituent |
| 19 | J1 | 0,005 | 311,7 | 15,5854435 | Smaller lunar elliptic diurnal constituent |
| 20 | MM | 0,029 | 27 | 0,5443747 | Lunar monthly constituent |
| 21 | SSA | 0,091 | 63 | 0,0821373 | Solar semiannual constituent |
| 22 | SA | 0,15 | 119,2 | 0,0410686 | Solar annual constituent |
| 23 | MSF | 0,027 | 17,7 | 1,0158958 | Lunisolar synodic fortnightly constituent |
| 24 | MF | 0 | 0 | 1,0980331 | Lunisolar fortnightly constituent |
| 25 | RHO | 0,003 | 264,2 | 13,471515 | Larger lunar evectional diurnal constituent |
| 26 | Q1 | 0,012 | 271,9 | 13,398661 | Larger lunar elliptic diurnal constituent |
| 27 | T2 | 0,009 | 221,5 | 29,958933 | Larger solar elliptic constituent |
| 28 | R2 | 0,001 | 227,2 | 30,041067 | Smaller solar elliptic constituent |
| 29 | 2Q1 | 0,002 | 244,1 | 12,854286 | Larger elliptic diurnal |
| 30 | P1 | 0,031 | 279,1 | 14,958931 | Solar diurnal constituent |
| 31 | 2SM | 0,003 | 119,8 | 31,015896 | Shallow water semidiurnal constituent |
| 32 | M3 | 0,004 | 262,8 | 43,47616 | Lunar terdiurnal constituent |
| 33 | L2 | 0,093 | 197,3 | 29,528479 | Smaller lunar elliptic semidiurnal |
| 34 | 2MK | 0,023 | 295,6 | 42,92714 | Shallow water terdiurnal constituent |
| 35 | K2 | 0,03 | 221,7 | 30,082138 | Lunisolar semidiurnal constituent |
| 36 | M8 | 0,016 | 335,6 | 115,93642 | Shallow water eighth diurnal constituent |
| 37 | MS4 | 0,022 | 305,2 | 58,984104 | Shallow water quarter diurnal constituent |



Datums for 8545240, Philadelphia, PA
All figures in meters relative to station datum
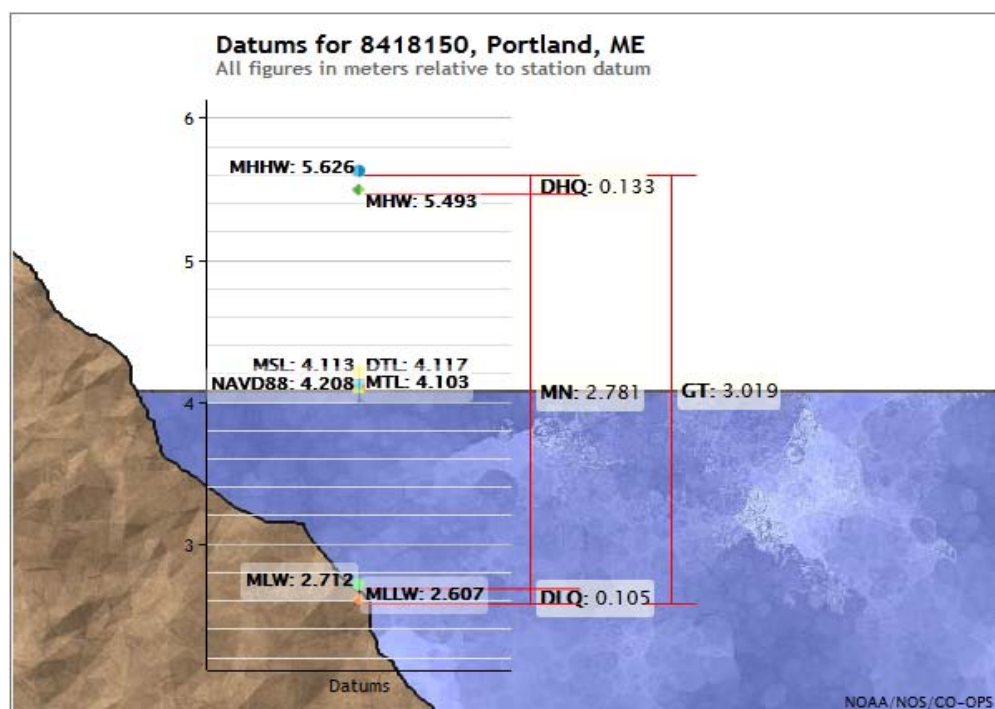
### 3.19.- Harmonic Constituents for 8446493, PLYMOUTH, PLYMOUTH HARBOR MA

| Constituent # | Name | Amplitude | Phase | Speed | Description |
|---|---|---|---|---|---|
| 1 | M2 | 1,355 | 117,4 | 28,984104 | Principal lunar semidiurnal constituent |
| 2 | S2 | 0,208 | 156,3 | 30 | Principal solar semidiurnal constituent |
| 3 | N2 | 0,306 | 83,5 | 28,43973 | Larger lunar elliptic semidiurnal constituent |
| 4 | K1 | 0,14 | 210,9 | 15,041069 | Lunar diurnal constituent |
| 5 | M4 | 0,046 | 112,7 | 57,96821 | Shallow water overtides of principal lunar |
| 6 | O1 | 0,117 | 193,4 | 13,943035 | Lunar diurnal constituent |
| 7 | M6 | 0,059 | 325,2 | 86,95232 | Shallow water overtides of principal lunar |
| 8 | MK3 | 0 | 0 | 44,025173 | Shallow water terdiurnal |
| 9 | S4 | 0,001 | 284,5 | 60 | Shallow water overtides of principal solar |
| 10 | MN4 | 0 | 0 | 57,423832 | Shallow water quarter diurnal constituent |
| 11 | NU2 | 0,059 | 88,1 | 28,512583 | Larger lunar evectional constituent |
| 12 | S6 | 0,003 | 90,8 | 90 | Shallow water overtides of principal solar |
| 13 | MU2 | 0,033 | 297,2 | 27,968208 | Variational constituent |
| 14 | 2N2 | 0,041 | 49,7 | 27,895355 | Lunar elliptical semidiurnal second-order |
| 15 | OO1 | 0,005 | 228,4 | 16,139101 | Lunar diurnal |
| 16 | LAM2 | 0,01 | 135,4 | 29,455626 | Smaller lunar evectional constituent |
| 17 | S1 | 0 | 0 | 15 | Solar diurnal constituent |
| 18 | M1 | 0,008 | 202,2 | 14,496694 | Smaller lunar elliptic diurnal constituent |
| 19 | J1 | 0,009 | 219,5 | 15,5854435 | Smaller lunar elliptic diurnal constituent |
| 20 | MM | 0 | 0 | 0,5443747 | Lunar monthly constituent |
| 21 | SSA | 0,018 | 89,8 | 0,0821373 | Solar semiannual constituent |
| 22 | SA | 0,032 | 126,3 | 0,0410686 | Solar annual constituent |
| 23 | MSF | 0 | 0 | 1,0158958 | Lunisolar synodic fortnightly constituent |
| 24 | MF | 0 | 0 | 1,0980331 | Lunisolar fortnightly constituent |
| 25 | RHO | 0,004 | 185,9 | 13,471515 | Larger lunar evectional diurnal constituent |
| 26 | Q1 | 0,023 | 184,8 | 13,398661 | Larger lunar elliptic diurnal constituent |
| 27 | T2 | 0,012 | 154,7 | 29,958933 | Larger solar elliptic constituent |
| 28 | R2 | 0,002 | 157,8 | 30,041067 | Smaller solar elliptic constituent |
| 29 | 2Q1 | 0,003 | 176,1 | 12,854286 | Larger elliptic diurnal |
| 30 | P1 | 0,046 | 209,6 | 14,958931 | Solar diurnal constituent |
| 31 | 2SM2 | 0 | 0 | 31,015896 | Shallow water semidiurnal constituent |
| 32 | M3 | 0 | 0 | 43,47616 | Lunar terdiurnal constituent |
| 33 | L2 | 0,038 | 151,3 | 29,528479 | Smaller lunar elliptic semidiurnal constituent |
| 34 | 2MK3 | 0 | 0 | 42,92714 | Shallow water terdiurnal constituent |
| 35 | K2 | 0,056 | 159,4 | 30,082138 | Lunisolar semidiurnal constituent |
| 36 | M8 | 0,013 | 300,5 | 115,93642 | Shallow water eighth diurnal constituent |
| 37 | MS4 | 0 | 0 | 58,984104 | Shallow water quarter diurnal constituent |



Datums for 8446493, PLYMOUTH, PLYMOUTH HARBOR, MA
All figures in meters relative to station datum

### 3.20.- Harmonic Constituents for 8418150, Portland ME

| Constituent # | Name | Amplitude | Phase | Speed | Description |
|---|---|---|---|---|---|
| 1 | M2 | 1,365 | 102,5 | 28,984104 | Principal lunar semidiurnal constituent |
| 2 | S2 | 0,206 | 138,5 | 30 | Principal solar semidiurnal constituent |
| 3 | N2 | 0,306 | 72 | 28,43973 | Larger lunar elliptic semidiurnal |
| 4 | K1 | 0,141 | 202,2 | 15,041069 | Lunar diurnal constituent |
| 5 | M4 | 0,011 | 359,1 | 57,96821 | Shallow water overtides of principal lunar |
| 6 | O1 | 0,112 | 182,4 | 13,943035 | Lunar diurnal constituent |
| 7 | M6 | 0,014 | 130,4 | 86,95232 | Shallow water overtides of principal lunar |
| 8 | MK3 | 0,004 | 236,5 | 44,025173 | Shallow water terdiurnal |
| 9 | S4 | 0 | 0 | 60 | Shallow water overtides of principal solar |
| 10 | MN4 | 0,006 | 343,1 | 57,423832 | Shallow water quarter diurnal constituent |
| 11 | NU2 | 0,065 | 79,5 | 28,512583 | Larger lunar evectional constituent |
| 12 | S6 | 0 | 0 | 90 | Shallow water overtides of principal solar |
| 13 | MU2 | 0,01 | 43,6 | 27,968208 | Variational constituent |
| 14 | 2N2 | 0,04 | 49,6 | 27,895355 | Lunar elliptical semidiurnal second-order |
| 15 | OO1 | 0,005 | 244,7 | 16,139101 | Lunar diurnal |
| 16 | LAM2 | 0,022 | 139,4 | 29,455626 | Smaller lunar evectional constituent |
| 17 | S1 | 0,008 | 216,8 | 15 | Solar diurnal constituent |
| 18 | M1 | 0,006 | 219,2 | 14,496694 | Smaller lunar elliptic diurnal constituent |
| 19 | J1 | 0,009 | 210,7 | 15,5854435 | Smaller lunar elliptic diurnal constituent |
| 20 | MM | 0 | 0 | 0,5443747 | Lunar monthly constituent |
| 21 | SSA | 0,02 | 105,8 | 0,0821373 | Solar semiannual constituent |
| 22 | SA | 0,032 | 128,3 | 0,0410686 | Solar annual constituent |
| 23 | MSF | 0 | 0 | 1,0158958 | Lunisolar synodic fortnightly constituent |
| 24 | MF | 0 | 0 | 1,0980331 | Lunisolar fortnightly constituent |
| 25 | RHO | 0,003 | 158,3 | 13,471515 | Larger lunar evectional diurnal constituent |
| 26 | Q1 | 0,019 | 164,2 | 13,398661 | Larger lunar elliptic diurnal constituent |
| 27 | T2 | 0,019 | 110,7 | 29,958933 | Larger solar elliptic constituent |
| 28 | R2 | 0,005 | 333,5 | 30,041067 | Smaller solar elliptic constituent |
| 29 | 2Q1 | 0,003 | 162,8 | 12,854286 | Larger elliptic diurnal |
| 30 | P1 | 0,048 | 201,3 | 14,958931 | Solar diurnal constituent |
| 31 | 2SM2 | 0,004 | 96,9 | 31,015896 | Shallow water semidiurnal constituent |
| 32 | M3 | 0 | 0 | 43,47616 | Lunar terdiurnal constituent |
| 33 | L2 | 0,059 | 147,1 | 29,528479 | Smaller lunar elliptic semidiurnal |
| 34 | 2MK3 | 0,005 | 221,2 | 42,92714 | Shallow water terdiurnal constituent |
| 35 | K2 | 0,056 | 137,3 | 30,082138 | Lunisolar semidiurnal constituent |
| 36 | M8 | 0 | 0 | 115,93642 | Shallow water eighth diurnal constituent |
| 37 | MS4 | 0,004 | 37 | 58,984104 | Shallow water quarter diurnal constituent |



Datums for 8418150, Portland, ME
All figures in meters relative to station datum
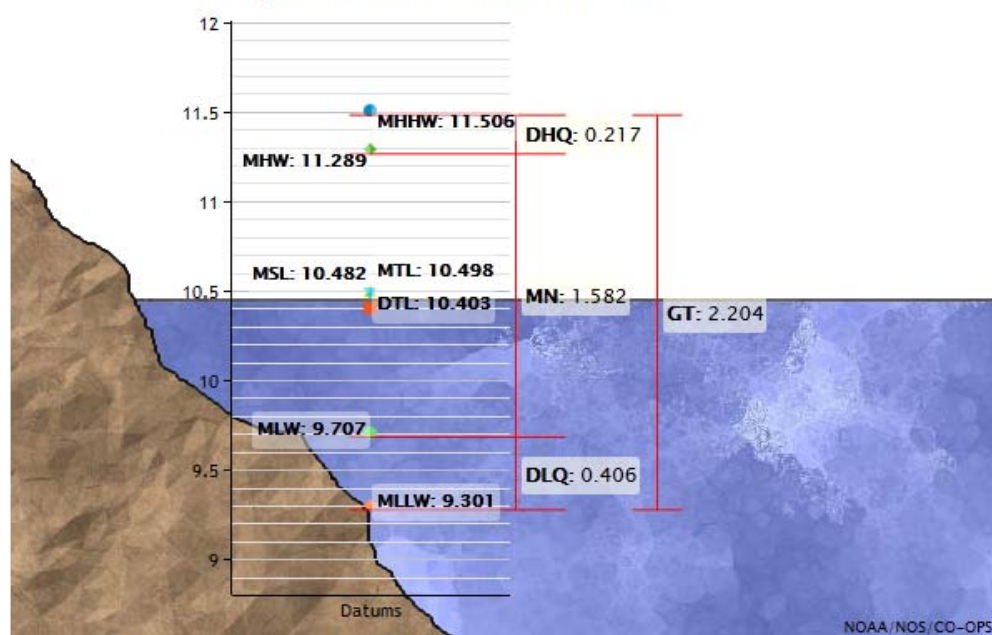
### 3.21.- Harmonic Constituents for 9459450, Sand Point AK

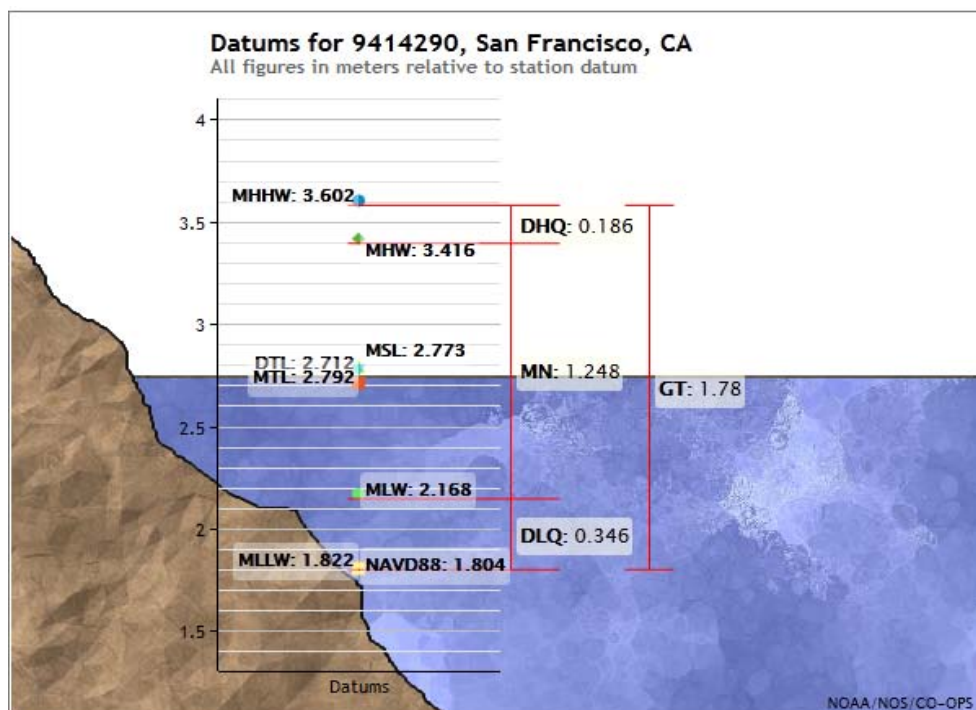| Constituent # | Name | Amplitude | Phase | Speed | Description |
|---|---|---|---|---|---|
| 1 | M2 | 0,738 | 322,2 | 28,984104 | Principal lunar semidiurnal constituent |
| 2 | S2 | 0,245 | 349,8 | 30 | Principal solar semidiurnal constituent |
| 3 | N2 | 0,162 | 298,5 | 28,43973 | Larger lunar elliptic semidiurnal constituent |
| 4 | K1 | 0,416 | 285 | 15,041069 | Lunar diurnal constituent |
| 5 | M4 | 0 | 0 | 57,96821 | Shallow water overtides of principal lunar |
| 6 | O1 | 0,268 | 270,1 | 13,943035 | Lunar diurnal constituent |
| 7 | M6 | 0,009 | 24,3 | 86,95232 | Shallow water overtides of principal lunar |
| 8 | MK3 | 0 | 0 | 44,025173 | Shallow water terdiurnal |
| 9 | S4 | 0 | 0 | 60 | Shallow water overtides of principal solar |
| 10 | MN4 | 0 | 0 | 57,423832 | Shallow water quarter diurnal constituent |
| 11 | NU2 | 0,031 | 301,8 | 28,512583 | Larger lunar evectional constituent |
| 12 | S6 | 0 | 0 | 90 | Shallow water overtides of principal solar |
| 13 | MU2 | 0,018 | 276,4 | 27,968208 | Variational constituent |
| 14 | 2N2 | 0,02 | 272,8 | 27,895355 | Lunar elliptical semidiurnal second-order |
| 15 | OO1 | 0,012 | 312,1 | 16,139101 | Lunar diurnal |
| 16 | LAM2 | 0,005 | 336,1 | 29,455626 | Smaller lunar evectional constituent |
| 17 | S1 | 0,01 | 58,3 | 15 | Solar diurnal constituent |
| 18 | M1 | 0,014 | 290,8 | 14,496694 | Smaller lunar elliptic diurnal constituent |
| 19 | J1 | 0,023 | 299,1 | 15,5854435 | Smaller lunar elliptic diurnal constituent |
| 20 | MM | 0 | 0 | 0,5443747 | Lunar monthly constituent |
| 21 | SSA | 0 | 0 | 0,0821373 | Solar semiannual constituent |
| 22 | SA | 0,123 | 272,3 | 0,0410686 | Solar annual constituent |
| 23 | MSF | 0 | 0 | 1,0158958 | Lunisolar synodic fortnightly constituent |
| 24 | MF | 0 | 0 | 1,0980331 | Lunisolar fortnightly constituent |
| 25 | RHO | 0,009 | 270,3 | 13,471515 | Larger lunar evectional diurnal constituent |
| 26 | Q1 | 0,048 | 263,2 | 13,398661 | Larger lunar elliptic diurnal constituent |
| 27 | T2 | 0,016 | 340,7 | 29,958933 | Larger solar elliptic constituent |
| 28 | R2 | 0,002 | 350,8 | 30,041067 | Smaller solar elliptic constituent |
| 29 | 2Q1 | 0,006 | 268,3 | 12,854286 | Larger elliptic diurnal |
| 30 | P1 | 0,13 | 281,9 | 14,958931 | Solar diurnal constituent |
| 31 | 2SM2 | 0 | 0 | 31,015896 | Shallow water semidiurnal constituent |
| 32 | M3 | 0 | 0 | 43,47616 | Lunar terdiurnal constituent |
| 33 | L2 | 0,014 | 332,9 | 29,528479 | Smaller lunar elliptic semidiurnal constituent |
| 34 | 2MK3 | 0 | 0 | 42,92714 | Shallow water terdiurnal constituent |
| 35 | K2 | 0,066 | 342,8 | 30,082138 | Lunisolar semidiurnal constituent |
| 36 | M8 | 0 | 0 | 115,93642 | Shallow water eighth diurnal constituent |
| 37 | MS4 | 0 | 0 | 58,984104 | Shallow water quarter diurnal constituent |

Datums for 9459450, Sand Point, AK
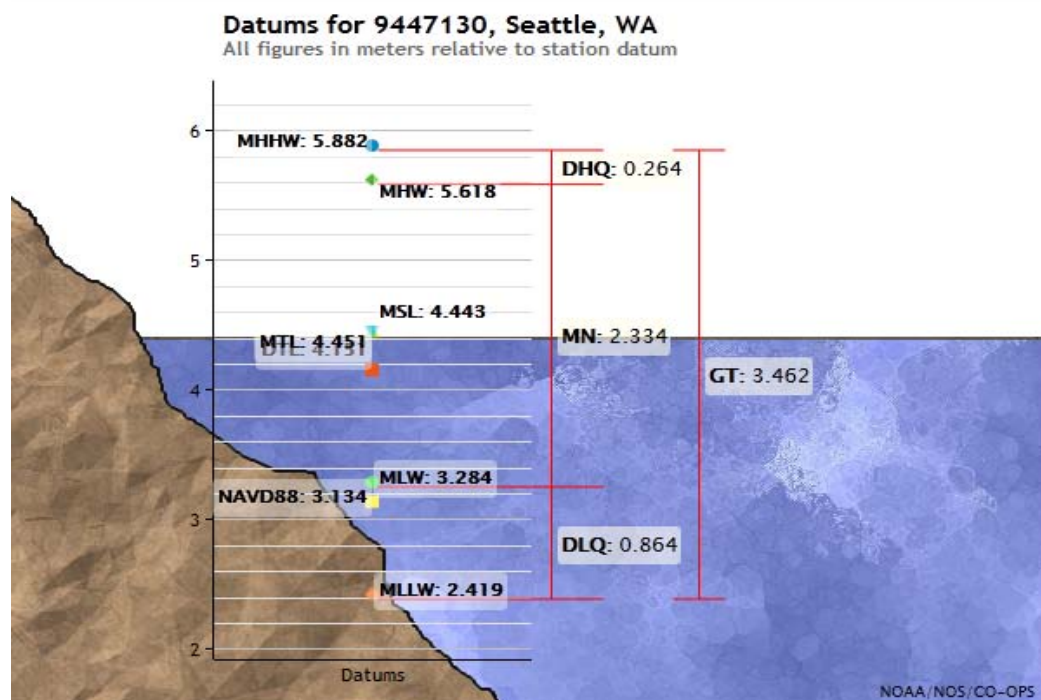All figures in meters relative to station datum

### 3.22.- Harmonic Constituents for 9414290, San Francisco CA

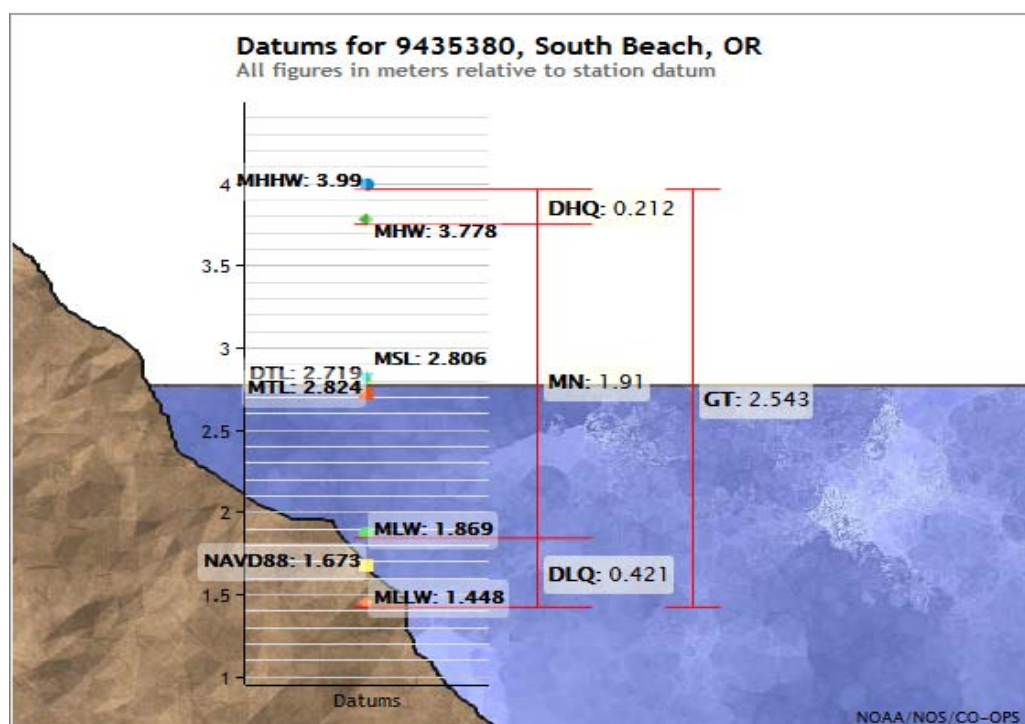| Constituent # | Name | Amplitude | Phase | Speed | Description |
|---|---|---|---|---|---|
| 1 | M2 | 0,58 | 210,6 | 28,984104 | Principal lunar semidiurnal constituent |
| 2 | S2 | 0,137 | 218,4 | 30 | Principal solar semidiurnal constituent |
| 3 | N2 | 0,123 | 184,9 | 28,43973 | Larger lunar elliptic semidiurnal |
| 4 | K1 | 0,368 | 226,5 | 15,041069 | Lunar diurnal constituent |
| 5 | M4 | 0,023 | 142 | 57,96821 | Shallow water overtides of principal lunar |
| 6 | O1 | 0,23 | 210,1 | 13,943035 | Lunar diurnal constituent |
| 7 | M6 | 0 | 0 | 86,95232 | Shallow water overtides of principal lunar |
| 8 | MK3 | 0,019 | 129 | 44,025173 | Shallow water terdiurnal |
| 9 | S4 | 0 | 0 | 60 | Shallow water overtides of principal solar |
| 10 | MN4 | 0,009 | 119,3 | 57,423832 | Shallow water quarter diurnal constituent |
| 11 | NU2 | 0,026 | 188,3 | 28,512583 | Larger lunar evectional constituent |
| 12 | S6 | 0 | 0 | 90 | Shallow water overtides of principal solar |
| 13 | MU2 | 0,007 | 100,9 | 27,968208 | Variational constituent |
| 14 | 2N2 | 0,014 | 158,4 | 27,895355 | Lunar elliptical semidiurnal second-order |
| 15 | OO1 | 0,011 | 261,1 | 16,139101 | Lunar diurnal |
| 16 | LAM2 | 0,006 | 217,5 | 29,455626 | Smaller lunar evectional constituent |
| 17 | S1 | 0,007 | 284,8 | 15 | Solar diurnal constituent |
| 18 | M1 | 0,011 | 244,5 | 14,496694 | Smaller lunar elliptic diurnal constituent |
| 19 | J1 | 0,019 | 243,8 | 15,5854435 | Smaller lunar elliptic diurnal constituent |
| 20 | MM | 0 | 0 | 0,5443747 | Lunar monthly constituent |
| 21 | SSA | 0,039 | 286,9 | 0,0821373 | Solar semiannual constituent |
| 22 | SA | 0,038 | 221,4 | 0,0410686 | Solar annual constituent |
| 23 | MSF | 0 | 0 | 1,0158958 | Lunisolar synodic fortnightly constituent |
| 24 | MF | 0 | 0 | 1,0980331 | Lunisolar fortnightly constituent |
| 25 | RHO | 0,009 | 202,3 | 13,471515 | Larger lunar evectional diurnal constituent |
| 26 | Q1 | 0,04 | 203,2 | 13,398661 | Larger lunar elliptic diurnal constituent |
| 27 | T2 | 0,009 | 196,6 | 29,958933 | Larger solar elliptic constituent |
| 28 | R2 | 0,001 | 218,7 | 30,041067 | Smaller solar elliptic constituent |
| 29 | 2Q1 | 0,004 | 208 | 12,854286 | Larger elliptic diurnal |
| 30 | P1 | 0,116 | 223,3 | 14,958931 | Solar diurnal constituent |
| 31 | 2SM2 | 0 | 0 | 31,015896 | Shallow water semidiurnal constituent |
| 32 | M3 | 0,005 | 26,8 | 43,47616 | Lunar terdiurnal constituent |
| 33 | L2 | 0,016 | 225,8 | 29,528479 | Smaller lunar elliptic semidiurnal |
| 34 | 2MK3 | 0,014 | 96,7 | 42,92714 | Shallow water terdiurnal constituent |
| 35 | K2 | 0,04 | 209,9 | 30,082138 | Lunisolar semidiurnal constituent |
| 36 | M8 | 0 | 0 | 115,93642 | Shallow water eighth diurnal constituent |
| 37 | MS4 | 0,01 | 154,3 | 58,984104 | Shallow water quarter diurnal constituent |



Datums for 9414290, San Francisco, CA
All figures in meters relative to station datum

### 3.23.- Harmonic Constituents for 9447130, Seattle WA

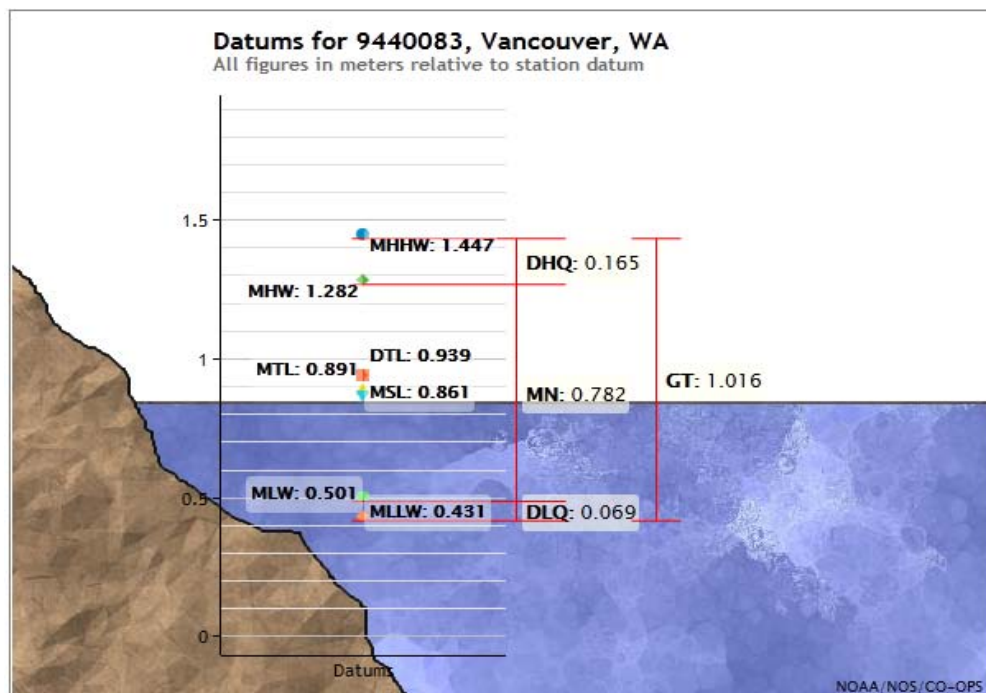| Constituent # | Name | Amplitude | Phase | Speed | Description |
|---|---|---|---|---|---|
| 1 | M2 | 1,072 | 10,6 | 28,984104 | Principal lunar semidiurnal constituent |
| 2 | S2 | 0,268 | 37 | 30 | Principal solar semidiurnal constituent |
| 3 | N2 | 0,216 | 340,8 | 28,43973 | Larger lunar elliptic semidiurnal constituent |
| 4 | K1 | 0,834 | 277 | 15,041069 | Lunar diurnal constituent |
| 5 | M4 | 0,021 | 200,2 | 57,96821 | Shallow water overtides of principal lunar |
| 6 | O1 | 0,461 | 254,6 | 13,943035 | Lunar diurnal constituent |
| 7 | M6 | 0,009 | 313,6 | 86,95232 | Shallow water overtides of principal lunar |
| 8 | MK3 | 0,034 | 78,1 | 44,025173 | Shallow water terdiurnal |
| 9 | S4 | 0 | 0 | 60 | Shallow water overtides of principal solar |
| 10 | MN4 | 0,009 | 174 | 57,423832 | Shallow water quarter diurnal constituent |
| 11 | NU2 | 0,045 | 354,9 | 28,512583 | Larger lunar evectional constituent |
| 12 | S6 | 0 | 0 | 90 | Shallow water overtides of principal solar |
| 13 | MU2 | 0,034 | 236,6 | 27,968208 | Variational constituent |
| 14 | 2N2 | 0,024 | 308,7 | 27,895355 | Lunar elliptical semidiurnal second-order |
| 15 | OO1 | 0,032 | 328,9 | 16,139101 | Lunar diurnal |
| 16 | LAM2 | 0,02 | 48,4 | 29,455626 | Smaller lunar evectional constituent |
| 17 | S1 | 0,016 | 44,2 | 15 | Solar diurnal constituent |
| 18 | M1 | 0,027 | 319,8 | 14,496694 | Smaller lunar elliptic diurnal constituent |
| 19 | J1 | 0,04 | 315,2 | 15,5854435 | Smaller lunar elliptic diurnal constituent |
| 20 | MM | 0 | 0 | 0,5443747 | Lunar monthly constituent |
| 21 | SSA | 0,033 | 231,1 | 0,0821373 | Solar semiannual constituent |
| 22 | SA | 0,077 | 292,9 | 0,0410686 | Solar annual constituent |
| 23 | MSF | 0 | 0 | 1,0158958 | Lunisolar synodic fortnightly constituent |
| 24 | MF | 0,022 | 140,5 | 1,0980331 | Lunisolar fortnightly constituent |
| 25 | RHO | 0,015 | 246,6 | 13,471515 | Larger lunar evectional diurnal constituent |
| 26 | Q1 | 0,075 | 249,9 | 13,398661 | Larger lunar elliptic diurnal constituent |
| 27 | T2 | 0,016 | 37,1 | 29,958933 | Larger solar elliptic constituent |
| 28 | R2 | 0,002 | 38 | 30,041067 | Smaller solar elliptic constituent |
| 29 | 2Q1 | 0,008 | 251,5 | 12,854286 | Larger elliptic diurnal |
| 30 | P1 | 0,258 | 276,6 | 14,958931 | Solar diurnal constituent |
| 31 | 2SM2 | 0,008 | 282,6 | 31,015896 | Shallow water semidiurnal constituent |
| 32 | M3 | 0,005 | 342,4 | 43,47616 | Lunar terdiurnal constituent |
| 33 | L2 | 0,045 | 56,1 | 29,528479 | Smaller lunar elliptic semidiurnal constituent |
| 34 | 2MK3 | 0,034 | 46,7 | 42,92714 | Shallow water terdiurnal constituent |
| 35 | K2 | 0,079 | 37,9 | 30,082138 | Lunisolar semidiurnal constituent |
| 36 | M8 | 0 | 0 | 115,93642 | Shallow water eighth diurnal constituent |
| 37 | MS4 | 0,012 | 229,9 | 58,984104 | Shallow water quarter diurnal constituent |



Datums for 9447130, Seattle, WA
All figures in meters relative to station datum

MHHW: 5.882
MHW: 5.618
DHQ: 0.264
MSL: 4.443
MTL: 4.451
MN: 2.334
GT: 3.462
MLW: 3.284
NAVD88: 3.134
DLQ: 0.864
MLLW: 2.419

Datums

NOAA/NOS/CO-OPS

### 3.24.- Harmonic Constituents for 9435380, South Beach OR

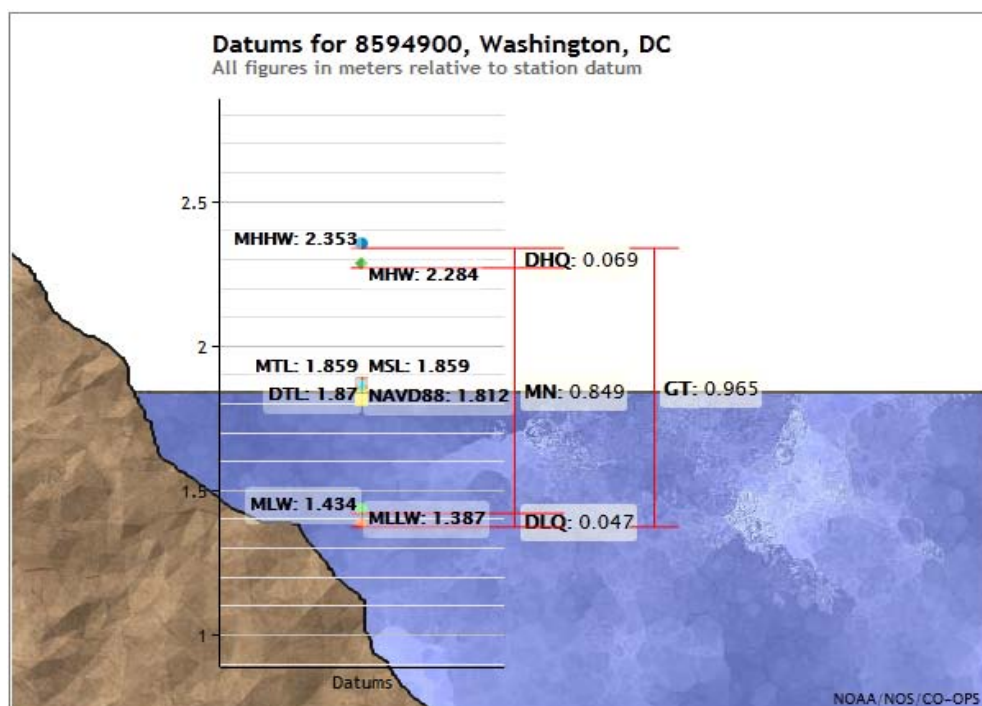| Constituent # | Name | Amplitude | Phase | Speed | Description |
|---|---|---|---|---|---|
| 1 | M2 | 0.887 | 231.2 | 28.984104 | Principal lunar semidiurnal constituent |
| 2 | S2 | 0.242 | 259.3 | 30.0 | Principal solar semidiurnal constituent |
| 3 | N2 | 0.184 | 207.5 | 28.43973 | Larger lunar elliptic semidiurnal constituent |
| 4 | K1 | 0.434 | 238.1 | 15.041069 | Lunar diurnal constituent |
| 5 | M4 | 0.012 | 198.8 | 57.96821 | Shallow water overtides of principal lunar |
| 6 | O1 | 0.263 | 221.4 | 13.943035 | Lunar diurnal constituent |
| 7 | M6 | 0.008 | 298.3 | 86.95232 | Shallow water overtides of principal lunar |
| 8 | MK3 | 0.003 | 196.9 | 44.025173 | Shallow water terdiurnal |
| 9 | S4 | 0.001 | 349.7 | 60.0 | Shallow water overtides of principal solar |
| 10 | MN4 | 0.005 | 180.3 | 57.423832 | Shallow water quarter diurnal constituent |
| 11 | NU2 | 0.037 | 210.4 | 28.512583 | Larger lunar evectional constituent |
| 12 | S6 | 0.001 | 123.6 | 90.0 | Shallow water overtides of principal solar |
| 13 | MU2 | 0.015 | 203.9 | 27.968208 | Variational constituent |
| 14 | 2N2 | 0.021 | 182.5 | 27.895355 | Lunar elliptical semidiurnal second-order |
| 15 | OO1 | 0.014 | 274.4 | 16.139101 | Lunar diurnal |
| 16 | LAM2 | 0.007 | 223.2 | 29.455626 | Smaller lunar evectional constituent |
| 17 | S1 | 0.012 | 5.4 | 15.0 | Solar diurnal constituent |
| 18 | M1 | 0.015 | 257.9 | 14.496694 | Smaller lunar elliptic diurnal constituent |
| 19 | J1 | 0.024 | 256.0 | 15.5854435 | Smaller lunar elliptic diurnal constituent |
| 20 | MM | 0.0 | 0.0 | 0.5443747 | Lunar monthly constituent |
| 21 | SSA | 0.027 | 234.0 | 0.0821373 | Solar semiannual constituent |
| 22 | SA | 0.122 | 285.9 | 0.0410686 | Solar annual constituent |
| 23 | MSF | 0.0 | 0.0 | 1.0158958 | Lunisolar synodic fortnightly constituent |
| 24 | MF | 0.025 | 183.0 | 1.0980331 | Lunisolar fortnightly constituent |
| 25 | RHO | 0.009 | 211.9 | 13.471515 | Larger lunar evectional diurnal constituent |
| 26 | Q1 | 0.046 | 214.2 | 13.398661 | Larger lunar elliptic diurnal constituent |
| 27 | T2 | 0.015 | 251.7 | 29.958933 | Larger solar elliptic constituent |
| 28 | R2 | 0.002 | 213.6 | 30.041067 | Smaller solar elliptic constituent |
| 29 | 2Q1 | 0.005 | 214.4 | 12.854286 | Larger elliptic diurnal |
| 30 | P1 | 0.134 | 233.9 | 14.958931 | Solar diurnal constituent |
| 31 | 2SM2 | 0.002 | 54.2 | 31.015896 | Shallow water semidiurnal constituent |
| 32 | M3 | 0.0 | 0.0 | 43.47616 | Lunar terdiurnal constituent |
| 33 | L2 | 0.022 | 235.9 | 29.528479 | Smaller lunar elliptic semidiurnal constituent |
| 34 | 2MK3 | 0.002 | 349.0 | 42.92714 | Shallow water terdiurnal constituent |
| 35 | K2 | 0.064 | 250.6 | 30.082138 | Lunisolar semidiurnal constituent |
| 36 | M8 | 0.002 | 260.4 | 115.93642 | Shallow water eighth diurnal constituent |
| 37 | MS4 | 0.007 | 239.9 | 58.984104 | Shallow water quarter diurnal constituent |



Datums for 9435380, South Beach, OR
All figures in meters relative to station datum

MHHW: 3.99
DHQ: 0.212
MHW: 3.778
MSL: 2.806
DTL: 2.719
MTL: 2.824
MN: 1.91
GT: 2.543
MLW: 1.869
NAVD88: 1.673
DLQ: 0.421
MLLW: 1.448
Datums
NOAA/NOS/CO-OPS
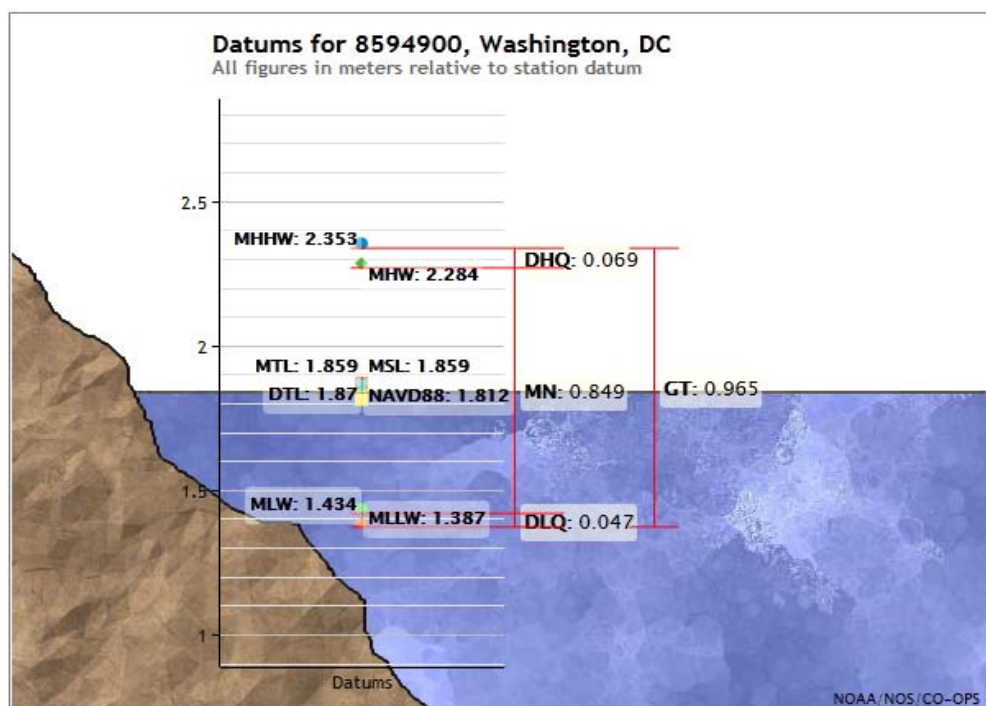
### 3.25.- Harmonic Constituents for 9440083, Vancouver WA

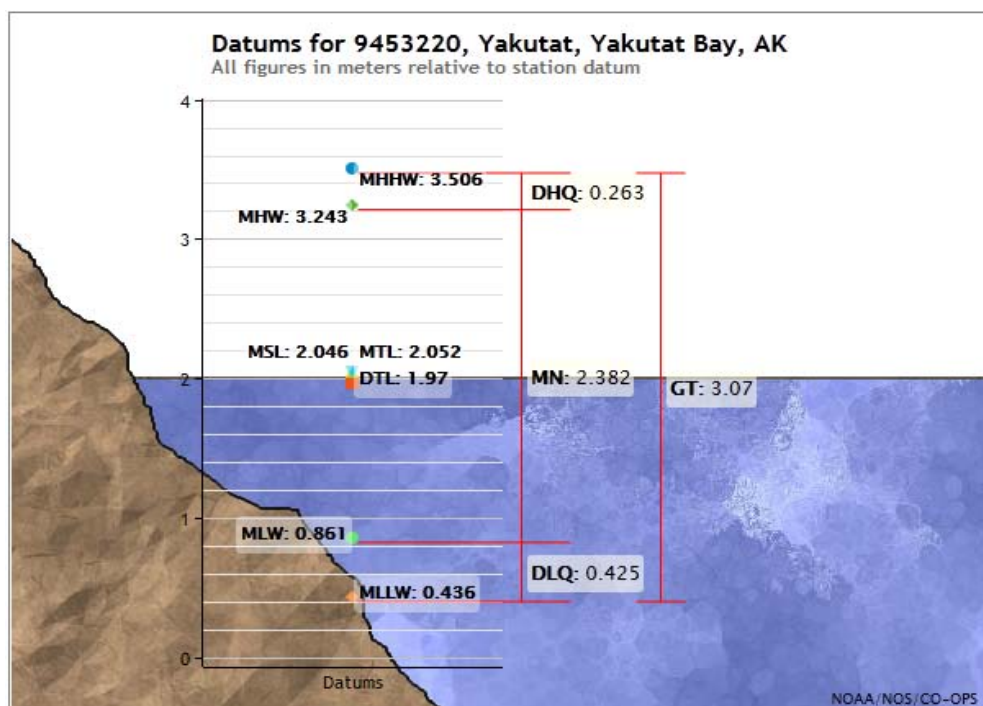| Constituent # | Name | Amplitude | Phase | Speed | Description |
|---|---|---|---|---|---|
| 1 | M2 | 0,265 | 58,6 | 28,984104 | Principal lunar semidiurnal constituent |
| 2 | S2 | 0,06 | 104,1 | 30 | Principal solar semidiurnal constituent |
| 3 | N2 | 0,048 | 32,8 | 28,43973 | Larger lunar elliptic semidiurnal |
| 4 | K1 | 0,139 | 355,5 | 15,041069 | Lunar diurnal constituent |
| 5 | M4 | 0,054 | 39,5 | 57,96821 | Shallow water overtides of principal lunar |
| 6 | O1 | 0,068 | 24,2 | 13,943035 | Lunar diurnal constituent |
| 7 | M6 | 0,004 | 28,3 | 86,95232 | Shallow water overtides of principal lunar |
| 8 | MK3 | 0,049 | 341,6 | 44,025173 | Shallow water terdiurnal |
| 9 | S4 | 0,002 | 152,5 | 60 | Shallow water overtides of principal solar |
| 10 | MN4 | 0,019 | 16,1 | 57,423832 | Shallow water quarter diurnal constituent |
| 11 | NU2 | 0,013 | 29,6 | 28,512583 | Larger lunar evectional constituent |
| 12 | S6 | 0 | 0 | 90 | Shallow water overtides of principal solar |
| 13 | MU2 | 0,013 | 186,8 | 27,968208 | Variational constituent |
| 14 | 2N2 | 0,013 | 279,8 | 27,895355 | Lunar elliptical semidiurnal second-order |
| 15 | OO1 | 0,002 | 162,5 | 16,139101 | Lunar diurnal |
| 16 | LAM2 | 0,011 | 103,9 | 29,455626 | Smaller lunar evectional constituent |
| 17 | S1 | 0,067 | 356,2 | 15 | Solar diurnal constituent |
| 18 | M1 | 0,007 | 32,6 | 14,496694 | Smaller lunar elliptic diurnal constituent |
| 19 | J1 | 0,013 | 69,5 | 15,5854435 | Smaller lunar elliptic diurnal constituent |
| 20 | MM | 0 | 0 | 0,5443747 | Lunar monthly constituent |
| 21 | SSA | 0 | 0 | 0,0821373 | Solar semiannual constituent |
| 22 | SA | 0 | 0 | 0,0410686 | Solar annual constituent |
| 23 | MSF | 0 | 0 | 1,0158958 | Lunisolar synodic fortnightly constituent |
| 24 | MF | 0 | 0 | 1,0980331 | Lunisolar fortnightly constituent |
| 25 | RHO | 0,004 | 48,2 | 13,471515 | Larger lunar evectional diurnal constituent |
| 26 | Q1 | 0,017 | 7,4 | 13,398661 | Larger lunar elliptic diurnal constituent |
| 27 | T2 | 0,01 | 106,2 | 29,958933 | Larger solar elliptic constituent |
| 28 | R2 | 0,014 | 111,8 | 30,041067 | Smaller solar elliptic constituent |
| 29 | 2Q1 | 0,003 | 38,1 | 12,854286 | Larger elliptic diurnal |
| 30 | P1 | 0,031 | 55 | 14,958931 | Solar diurnal constituent |
| 31 | 2SM2 | 0,006 | 270,2 | 31,015896 | Shallow water semidiurnal constituent |
| 32 | M3 | 0,011 | 204,3 | 43,47616 | Lunar terdiurnal constituent |
| 33 | L2 | 0,01 | 38,2 | 29,528479 | Smaller lunar elliptic semidiurnal |
| 34 | 2MK3 | 0,036 | 325,1 | 42,92714 | Shallow water terdiurnal constituent |
| 35 | K2 | 0,027 | 98 | 30,082138 | Lunisolar semidiurnal constituent |
| 36 | M8 | 0,001 | 115 | 115,93642 | Shallow water eighth diurnal constituent |
| 37 | MS4 | 0,023 | 76,9 | 58,984104 | Shallow water quarter diurnal constituent |



Datums for 9440083, Vancouver, WA
All figures in meters relative to station datum

MHHW: 1.447
DHQ: 0.165
MHW: 1.282
DTL: 0.939
MTL: 0.891
MSL: 0.861
MN: 0.782
GT: 1.016
MLW: 0.501
MLLW: 0.431
DLQ: 0.069
Datum
NOAA/NOS/CO-OPS

### 3.26.- Harmonic Constituents for 8594900, Washington DC

| Constituent # | Name | Amplitude | Phase | Speed | Description |
|---|---|---|---|---|---|
| 1 | M2 | 0,407 | 20,4 | 28,984104 | Principal lunar semidiurnal constituent |
| 2 | S2 | 0,052 | 64,3 | 30 | Principal solar semidiurnal constituent |
| 3 | N2 | 0,075 | 356,5 | 28,43973 | Larger lunar elliptic semidiurnal |
| 4 | K1 | 0,046 | 357 | 15,041069 | Lunar diurnal constituent |
| 5 | M4 | 0,042 | 320,9 | 57,96821 | Shallow water overtides of principal lunar |
| 6 | O1 | 0,035 | 22,6 | 13,943035 | Lunar diurnal constituent |
| 7 | M6 | 0,012 | 191,3 | 86,95232 | Shallow water overtides of principal lunar |
| 8 | MK3 | 0,012 | 255,4 | 44,025173 | Shallow water terdiurnal |
| 9 | S4 | 0 | 0 | 60 | Shallow water overtides of principal solar |
| 10 | MN4 | 0,016 | 297,6 | 57,423832 | Shallow water quarter diurnal constituent |
| 11 | NU2 | 0,017 | 1,3 | 28,512583 | Larger lunar evectional constituent |
| 12 | S6 | 0 | 0 | 90 | Shallow water overtides of principal solar |
| 13 | MU2 | 0,008 | 117,7 | 27,968208 | Variational constituent |
| 14 | 2N2 | 0,007 | 323,6 | 27,895355 | Lunar elliptical semidiurnal second-order |
| 15 | OO1 | 0,003 | 57 | 16,139101 | Lunar diurnal |
| 16 | LAM2 | 0,013 | 45,4 | 29,455626 | Smaller lunar evectional constituent |
| 17 | S1 | 0,012 | 326,3 | 15 | Solar diurnal constituent |
| 18 | M1 | 0,002 | 9,7 | 14,496694 | Smaller lunar elliptic diurnal constituent |
| 19 | J1 | 0,003 | 344,3 | 15,5854435 | Smaller lunar elliptic diurnal constituent |
| 20 | MM | 0 | 0 | 0,5443747 | Lunar monthly constituent |
| 21 | SSA | 0,038 | 40 | 0,0821373 | Solar semiannual constituent |
| 22 | SA | 0,077 | 110,6 | 0,0410686 | Solar annual constituent |
| 23 | MSF | 0 | 0 | 1,0158958 | Lunisolar synodic fortnightly constituent |
| 24 | MF | 0 | 0 | 1,0980331 | Lunisolar fortnightly constituent |
| 25 | RHO | 0,001 | 33,6 | 13,471515 | Larger lunar evectional diurnal constituent |
| 26 | Q1 | 0,007 | 345,8 | 13,398661 | Larger lunar elliptic diurnal constituent |
| 27 | T2 | 0,005 | 104,1 | 29,958933 | Larger solar elliptic constituent |
| 28 | R2 | 0,004 | 85,4 | 30,041067 | Smaller solar elliptic constituent |
| 29 | 2Q1 | 0,001 | 48 | 12,854286 | Larger elliptic diurnal |
| 30 | P1 | 0,013 | 4,4 | 14,958931 | Solar diurnal constituent |
| 31 | 2SM2 | 0 | 0 | 31,015896 | Shallow water semidiurnal constituent |
| 32 | M3 | 0 | 0 | 43,47616 | Lunar terdiurnal constituent |
| 33 | L2 | 0,027 | 33,5 | 29,528479 | Smaller lunar elliptic semidiurnal |
| 34 | 2MK3 | 0,011 | 266,7 | 42,92714 | Shallow water terdiurnal constituent |
| 35 | K2 | 0,018 | 62,2 | 30,082138 | Lunisolar semidiurnal constituent |
| 36 | M8 | 0,004 | 106,3 | 115,93642 | Shallow water eighth diurnal constituent |
| 37 | MS4 | 0,011 | 9,2 | 58,984104 | Shallow water quarter diurnal constituent |



Datums for 8594900, Washington, DC
All figures in meters relative to station datum

## 3.27.- Harmonic Constituents for 9453220, Yakutat, Yakutat Bay AK

| Constituent # | Name | Amplitude | Phase | Speed | Description |
|---|---|---|---|---|---|
| 1 | M2 | 1,126 | 281,5 | 28,984104 | Principal lunar semidiurnal constituent |
| 2 | S2 | 0,366 | 312,8 | 30 | Principal solar semidiurnal constituent |
| 3 | N2 | 0,231 | 257,3 | 28,43973 | Larger lunar elliptic semidiurnal constituent |
| 4 | K1 | 0,454 | 268 | 15,041069 | Lunar diurnal constituent |
| 5 | M4 | 0 | 0 | 57,96821 | Shallow water overtides of principal lunar |
| 6 | O1 | 0,281 | 253,1 | 13,943035 | Lunar diurnal constituent |
| 7 | M6 | 0 | 0 | 86,95232 | Shallow water overtides of principal lunar |
| 8 | MK3 | 0 | 0 | 44,025173 | Shallow water terdiurnal |
| 9 | S4 | 0 | 0 | 60 | Shallow water overtides of principal solar |
| 10 | MN4 | 0 | 0 | 57,423832 | Shallow water quarter diurnal constituent |
| 11 | NU2 | 0,045 | 260,6 | 28,512583 | Larger lunar evectional constituent |
| 12 | S6 | 0 | 0 | 90 | Shallow water overtides of principal solar |
| 13 | MU2 | 0,026 | 234,5 | 27,968208 | Variational constituent |
| 14 | 2N2 | 0,027 | 231,8 | 27,895355 | Lunar elliptical semidiurnal second-order |
| 15 | OO1 | 0,017 | 293,6 | 16,139101 | Lunar diurnal |
| 16 | LAM2 | 0,007 | 299,6 | 29,455626 | Smaller lunar evectional constituent |
| 17 | S1 | 0,009 | 30,1 | 15 | Solar diurnal constituent |
| 18 | M1 | 0,016 | 273 | 14,496694 | Smaller lunar elliptic diurnal constituent |
| 19 | J1 | 0,028 | 279,5 | 15,5854435 | Smaller lunar elliptic diurnal constituent |
| 20 | MM | 0 | 0 | 0,5443747 | Lunar monthly constituent |
| 21 | SSA | 0 | 0 | 0,0821373 | Solar semiannual constituent |
| 22 | SA | 0,118 | 266,4 | 0,0410686 | Solar annual constituent |
| 23 | MSF | 0 | 0 | 1,0158958 | Lunisolar synodic fortnightly constituent |
| 24 | MF | 0,023 | 164,9 | 1,0980331 | Lunisolar fortnightly constituent |
| 25 | RHO | 0,009 | 251,1 | 13,471515 | Larger lunar evectional diurnal constituent |
| 26 | Q1 | 0,05 | 246 | 13,398661 | Larger lunar elliptic diurnal constituent |
| 27 | T2 | 0,023 | 303,7 | 29,958933 | Larger solar elliptic constituent |
| 28 | R2 | 0,003 | 313,9 | 30,041067 | Smaller solar elliptic constituent |
| 29 | 2Q1 | 0,005 | 249,8 | 12,854286 | Larger elliptic diurnal |
| 30 | P1 | 0,142 | 265,2 | 14,958931 | Solar diurnal constituent |
| 31 | 2SM2 | 0 | 0 | 31,015896 | Shallow water semidiurnal constituent |
| 32 | M3 | 0,003 | 266,2 | 43,47616 | Lunar terdiurnal constituent |
| 33 | L2 | 0,024 | 303,6 | 29,528479 | Smaller lunar elliptic semidiurnal constituent |
| 34 | 2MK3 | 0 | 0 | 42,92714 | Shallow water terdiurnal constituent |
| 35 | K2 | 0,1 | 306,6 | 30,082138 | Lunisolar semidiurnal constituent |
| 36 | M8 | 0 | 0 | 115,93642 | Shallow water eighth diurnal constituent |
| 37 | MS4 | 0 | 0 | 58,984104 | Shallow water quarter diurnal constituent |

### Datums for 9453220, Yakutat, Yakutat Bay, AK
All figures in meters relative to station datum

MHHW: 3.506
MHW: 3.243
DHQ: 0.263
MSL: 2.046  MTL: 2.052
DTL: 1.97
MN: 2.382
GT: 3.07
MLW: 0.861
DLQ: 0.425
MLLW: 0.436
Datums
NOAA/NOS/CO-OPS

## Appendix .- VREG Program Listing.

- **VREG** is a short FOCAL routine that sequentially shows the contents of the data registers specified by the control word "bbb,eeeii" in the X-register. A short pause is made in-between each display, you can stop it and resume it using R/S – This function is an example where MCODE would not be of any real advantage.

Input: bbb.eee in X
Output: sequential listing of Rnn with their contents

| 01 | LBL "VREG" |
|----|------------|
| 02 | CF 21 |
| 03 | CF 29 |
| 04 | LBL 00 |
| 05 | FIX 0 |
| 06 | "R" |
| 07 | ARCL X |
| 08 | "⌐: " |
| 09 | FIX 4 |
| 10 | ARCL IND X |
| 11 | AVIEW |
| 12 | PSE |
| 13 | ISG X |
| 14 | GTO 00 |
| 15 | SF 29 |
| 16 | END |

All in all, not much to write home about, but very handy nonetheless. The irony here is that such a simple FOCAL program is more code-efficient than an equivalent MCODE implementation of the same functionality; so you see sometimes FOCAL has its very valid point.