

UE18CS203

PROJECT FINAL PRESENTATION

TSUNAMI WAVES ANALYSIS

PRESENTED BY:

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DESCRIPTION OF DATASET

NAME OF DATASET-->waves.csv

SOURCE:https://www.kaggle.com/noaa/seismic-waves#sources.csv

Dataset conatins 30 rows and 26,204 columns

The column headings are as follows:

| SOURCE_ID | WAVE_ID | YEAR | MONTH | DAY | REGION_ CODE | COUNTRY | STATE/ PROVINCE | LOCATION | LATITUDE |
|-----------|------------------------------|---------------------------|-----------------------------|---------------------------------|--------------------------|--------------------|-------------------------------|--------------------------|------------------------------------|
| LONGITUDE | DISTANCE_ FROM_ SOURCE | TRAVEL_ TIME_ HOURS | TRAVEL_ TIME_ MINUTES | VALIDITY | MEASUREM ENT_ TYPE | PERIOD | FIRST_ MOTION | MAXIMUM_ HEIGHT | HORIZONTAL_ INUNDATION |
| INJURIES | INJURY_ ESTIMATE | FATALITIES | FATALITY_ ESTIMATE | DAMAGE_ MILLIONS_ DOLLARS | DAMAGE_ ESTIMATE | HOUSES_ DAMAGED | HOUSE_ DAMAGE_ ESTIMATE | HOUSES_ DESTROYE D | HOUSE_ DESTRUCTION_ ESTIMATE |

DATASET BEFORE CLEANING

| A1 | | → # ∑ | | | | | | | | | |
|----------|--------------|----------------|------------|----|--|---|-------------------|--|-------------------|--------|--|
| | A | В | c | D | E | F G | Н | | J | K | L M |
| 1 | SOURCE ID W. | VAVE_ID Y | YEAR M | | | REGION_CODE COUNTRY | STATE/PROVINCE | | | | DISTANCE_FROM_SOURCE TRAVEL_TIME_HOUR |
| 2 | 1 | 11014 | -2000 | | | 50 SYRIA | | UGARIT | 35.583 | 35.75 | 12 |
| 3 | 3 | 17601 | -1610 | | | 50 SYRIA | | UGARIT | 35.583 | | |
| 4 | 3 | 1 | -1610 | | | 50 GREECE | | N. AND E. COAST CRETE | 35.5 | 25 | |
| 5 | 9 | | -479 | | | 50 GREECE | | POTIDAEA, MACEDONIA | 40.3 | 23.33 | 67 |
| 6 | 10 | | | 6 | | 50 GREECE | | TARFI | | | |
| 7 | 10 | 19365 | | 6 | | 50 GREECE | | THERMOPLYLES | 38.8 | | |
| 8 | 10 | | -426 | 6 | | 50 GREECE | | DAPHNUS | 38 | | |
| 9 | 10 | | | 6 | | 50 GREECE | | SKOPELOS | 39.12 | | |
| 10 | 10 | | | 6 | | 50 GREECE | | ATALANTI | 38.651 | | |
| 11 | 10 | | | 6 | | 50 GREECE | | THRONIUM | 38.817 | | |
| 12 | 10 | 17613 | | 6 | | 50 GREECE | | LICHADES ISLAND | 38.815 | | |
| 13 | 10 | | | 6 | | 50 GREECE | | OPOUS | 38.633 | | |
| 14 | 10 | | | 6 | | 50 GREECE | | CENEUM | 40.173 | | |
| 15 | 10 | | | 6 | | 50 GREECE | | OROBIES | 38.817 | | |
| 16 | 11 | | | | `ـــــــــــــــــــــــــــــــــــــ | 50 GREECE | | HELICE, PELOPONNESUS | 38.21 | | |
| 17 | 3092 | | | | <u> </u> | 50 GREECE | _ | ISLAND OF RHODES | 36.167 | | |
| 18 | 5382 | 17622 | | | \Box | 73 SPAIN | | CADIZ | 36.533 | | |
| 19 | 4281 | | | | | 73 SPAIN | | CADIZ | 36.533 | | |
| 20 | 15 | | | | <u> </u> | 50 LEBANON | | SIDON | 33.5631 | | |
| 21 | 15 | | | | | 50 ISRAEL | | AKKO (ACRE) | 32.924 | | |
| 22 | 15 | 19368 | -138 | | <u> </u> | 50 LEBANON | | SUR [TYRE] | 33.2733 | | |
| 23 | 3714 | 17631 | -58 | | \longrightarrow | 50 ALBANIA | _ | DURAZZO | 41.323 | | |
| 24 | 19 | 16093 | -23 | | \rightarrow | 50 EGYPT | | PELUSIUM | 31.133 | | |
| 25 | 19 | 16092 | -23 | | `— | 50 EGYPT | + | ALEXANDRIA | 31.2 | | |
| 26 | 23 | 17632 | 62 | | | 50 GREECE | | LEBENA | 34.931 | | |
| 27 | 4396 | 16533 | | 12 | 13 | | _ | CAESAREA | 32.483 | | |
| 28 | 3583 | 25334 | 123 | | \rightarrow | 84 SOUTH KOREA | _ | KYONGJU | 35.8428 | | |
| 29 | 27 | | 142 | | | 50 GREECE | _ | ISLAND OF SERVICES | 36.58 | | |
| 30 | 27 | | 142 | | · | 50 GREECE | _ | ISLAND OF SERIFOS | 37.15 | | |
| 31 | 27 | | | | | 50 GREECE | | ISLAND OF BUODES | 36.8933 | | |
| 32 | 27 | | | - | - | 50 GREECE | _ | ISLAND OF RHODES | 36.167 | | |
| 33 | 29 | | | 6 | | | _ | YEHSIAN, SHANDONG | 37.1717 | | |
| 34 | 29 | 25330 | 173 | 6 | | - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 | _ | HUANGXIAN, SHANDONG | 37.6481 | | |
| 35 | 29 | 25332 | 173 | 6 | 28 | | _ | CHANYI, SHANDONG | 36.8536 | | |
| 36 | 3427 | 10864 | 258 | | · | 50 ITALY | _ | ROME | 41.9 | | |
| 37 | 34 | 10865 | | 7 | ·—— | 50 GREECE | _ | THRACE | 41.3 | | |
| 38 | 3474 | 25838 | 346 | | · | 50 ALBANIA | | DURRES (DYRRACHIUM) | 41.3231 | | |
| 39 | 36 | 10866 | | | ·—— | 50 SYRIA | _ | ARWAD ISLAND | 34.85 | 35.85 | 110 |
| 40 | 36 36 | 10868 | 348 348 | | · | 50 SYRIA | _ | SYRIAN COAST BEIRUT | 22.52 | 35.3 | 45 |
| 41 | 36 2314 | 10867 25832 | 348 358 | | 24 | 50 LEBANON 50 TURKEY | _ | | 33.53 40.77 | | |
| 42 | | | | | | | _ | IZMIT (NICOMEDEA) | | | |
| 43 44 | 38 | 19371 | | | 21 21 | | REGIONE SICILIANA | EPIDAURUS | 42.5811 | | |
| | 38 38 | 10857 19370 | 365 365 | | 21 21 | | NEGIONE SIGILIANA | ISLAND OF SICILY ADRA | 38.18 36.7333 | | |
| 45 | | | | | 21 21 | | + | | 36.7333 37.025 | | |
| 46 | 38 | 19369 | | 7 | | | _ | CAPE SOUTH VICENTE | | | |
| 47 | 38 38 | 17 | 365 365 | | 21 21 | | + | ACHAEA, PELOPONNESUS KNOSSOS, CRETE | 38.25 35.3 | | |
| 46 | 38 | 10 | 300 | | 21 | JUGRECE | | MNOSSOS, UNETE | 35.3 | ∠5.16/ | 200 |
| | | | | | | | | | | | The state of the s |

CLEANING:

- The original data had nearly 50% of its data missing.
- The first step involved pairing up columns with high correlation, linear regression was then applied on those columns which helped to reduce the number of missing values appreciably.
- The INJURY_ESTIAMTE is a catogorical data which is used to estimate INJURY as follows:
 - 0 = None
 - $1 = \text{Few } (\sim 1 \text{ to } 50 \text{ injuries})$
 - $2 = Some(\sim 51 \text{ to } 100 \text{ injuries})$
 - $3 = Many (\sim 101 \text{ to } 1000 \text{ injuries})$
 - $4 = \text{Very Many } (\sim 1001 \text{ or more})$
 - injuries)

CLEANING

 The FATALITY_ESTIAMTE is a catogorical data which is used to estimate FATALITY as follows:

```
• 0 = None
```

- $1 = \text{Few } (\sim 1 \text{ to } 50 \text{ deaths})$
- 2 = Some (~51 to 100 deaths)
- $3 = Many (\sim 101 \text{ to } 1000 \text{ deaths})$
- $4 = \text{Very Many } (\sim 1001 \text{ or more})$
- deaths)
- THE DAMAGE_ESTIMATE was similarly
- used to estimate
- DAMAGE_MILLIONS_DOLLARS
 - 0 = NONE
 - 1 = LIMITED (roughly corresponding to
 - less than \$1 million)
 - 2 = MODERATE (~\$1 to \$5 million)
 - 3 = SEVERE (~>\$5 to \$24 million)
 - ◆ 4 = EXTREME (~\$25 million or more)

```
(np.isnan(data.loc[i, HOUSES_
                                  (data.loc[i,'HOUSE_DAM
             data.loc[i,
         (data.loc[i, HOU
             data.loc[i, 
         (data.loc[i, HOUSE
             data.loc[i, 'H
         (data.loc[i,'HOUSE_
             data.loc[i, 'HOUSES DAMAGED
             data.loc[i, 'HOUSES_DAMAGED']=1001
(np.isnan(data.loc[i, 'HOUSES_DESTROYED']) and no (np.isnan(data.loc[i, 'HOUSE_DESTRUCTION_ESTIMATE']))):
                        c_UESTRUCTION_ESTIMATE']==0):
|HOUSES DESTROYER:
             data.loc[i,'
         (data.loc[i,'HOU
             data.loc[i, |
          (data.loc[i,'HOL
             data.loc[i, HOL
         (data.loc[i,'HOUSE_
             data.loc[i, HOUS
             data.loc[i,'HOUSES_DESTROYED']=1001
```

CLEANING

- HOUSES_DESTROYED was also estimated via same procedure(using HOUSE DESTRUCTION ESTIMATE.
 - 0 = None
 - $1 = \text{Few } (\sim 1 \text{ to } 50 \text{ houses})$
 - 2 = Some (~51 to 100 houses)
 - $3 = Many (\sim 101 \text{ to } 1000 \text{ houses})$
 - 4 = Very Many (~1001 or more houses)
- The following columns were found to be either irrelevant or having to many missiing values and were dropped.
- An python module called reverse_geocoder provides with the functionality to estimate STATE/PROVINCE based on latitude and longitude

CLEANING:

- A dictionary was created which had the the country with the STATE/PROVINCE with highest frequency. This was used to replace the missing values corresponding to a particular COUNTRY.
- Finally the rest of numeriacal values were dealt by replacing with mean and categorical values were replace by 'ffill' method.

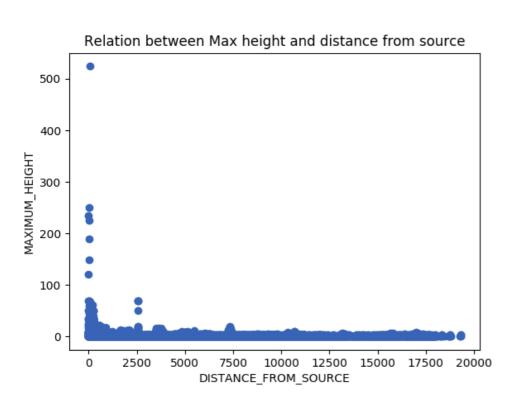
| | | 美 | | | | | | | |
|--------------|------|------|--------------------------|----------------------------------|---------------------------------|------------------|----------------|----------------------|-------------------|
| В | C | D | E F | G | — н | | | К | |
| EAR MC | ONTH | DAY | REGION CODE COUNTRY | STATE/PROVINCE | LOCATION | LATITUDE | LONGITUDE | DISTANCE FROM SOURCE | TRAVEL TIME HOURS |
| 1802 | 3 | 3 19 | 74 ANTIGUA AND BARBUDA | ANTIGUA | ANTIGUA ISLAND | 17.05 | -61.8 | 66 | 0.220827945323144 |
| 1802 | | 3 19 | 74 SAINT KITTS AND NEVIS | SAINT KITTS | SAINT CHRISTOPHER (SAINT KITTS) | 17.333 | -62.75 | 40 | 0.183287870315442 |
| 1802 | 8 | 3 15 | 74 VENEZUELA | Municipio Pedernales | ORINOCO RIVER | 9.8 | -62.3 | 247 | 0.482164621338293 |
| 1802 | 8 | 15 | 83 INDONESIA | MALUKU | AMBON ISLAND | -3.683 | 128.187 | 2 | 0.128421606842649 |
| 1802 | 1 | 1 7 | 50 ALGERIA | MALUKU | ALGIERS | 36.763 | 3.051 | 32 | 0.171737078005381 |
| 1802 | 12 | 2 9 | 85 JAPAN | NIIGATA | OGI | 37.28 | 137.25 | 104 | 0.275694208795937 |
| 1804 | - : | 1 13 | 50 SPAIN | Provincia de Almeria | ALMERIA | 36.833 | -2.433 | 36 | 0.177512474160412 |
| 1804 | | 7 10 | 85 JAPAN | YAMAGATA | SAKATA | 38.917 | 139.85 | 17 | 0.150079342424015 |
| 1804 | - | 7 10 | 85 JAPAN | AKITA | KISAGATA | 39.2167 | 139.9 | 19 | 0.15296704050153 |
| 1805 | | 5 8 | 81 AUSTRALIA | North Sydney | NORFOLK ISLAND | -29.058 | 167.955 | 1 | 0.126977757803891 |
| 1805 | - | 7 26 | 50 ITALY | CAMPANIA | BAY OF NAPLES | 40.83 | 14.25 | 77 | 0.236710284749479 |
| 1806 | | 3 25 | 88 USA | CA | SANTA BARBARA, CA | 34.42 | -119.68 | 3 | 0.129865455881406 |
| 1806 | 12 | 2 1 | 89 PERU | Callao | CALLAO | -12.05 | -77.15 | 8 | 0.137084701075195 |
| 1808 | | | 50 FRANCE | Departement des Bouches-du-Rhone | MARSEILLES | 43.3 | 5.366 | | 0.453287640563138 |
| 1808 | 8 | 3 8 | 85 JAPAN | TOKUSHIMA | NAKA RIVER | 33.94 | 134.67 | | |
| 1809 | 12 | 2 4 | 70 SOUTH AFRICA | City of Cape Town | TABLE BAY | -33.88 | 18.45 | | |
| 1810 | | 2 16 | 50 EGYPT | City of Cape Town | RASHID (ROSETTA) | 31.4 | 30.417 | 679 | 1.10590740608163 |
| 1810 | | 2 16 | 50 EGYPT | City of Cape Town | ALEXANDRIA | 31.2 | 29.919 | | 1.07991812338399 |
| 1810 | 9 | 25 | 85 JAPAN | AKITA | OGA | 39.9 | 139.9 | | 0.125533908765133 |
| 1811 | 1 | | 89 CHILE | VALPARAISO | VALPARAISO | -33,033 | -71.633 | | |
| 1811 | 12 | | 75 USA | MI | ORCHARD LAKE, MI | 46.257 | -89.571 | 1187 | 1.83938271777056 |
| 1811 | 12 | | 75 USA | AR | NEW MADRID, AR | 36.5837 | -89.5266 | | |
| 1811 | 12 | | 75 USA | LA | LAKE BISTINEAU, TX-LA BORDER | 32.3167 | -93.4167 | | |
| 1812 | | | 74 VENEZUELA | Municipio Vargas | LA GUAIRA | 10.6 | -66.933 | | 0.131309304920164 |
| 1812 | | | 50 FRANCE | Departement des Bouches-du-Rhone | MARSEILLES | 43.3 | 5.366 | | 0.125533908765133 |
| 1812 | 1 | | 74 JAMAICA | Departement des Bouches-du-Rhone | ANNOTTO BAY | 18.267 | -76.767 | 30 | |
| 1812 | 12 | | 80 USA | HI | HOOKENA, HAWAII, HI | 19.38 | -155.9 | | 5.76953980126911 |
| 1812 | 12 | | 88 USA | CA | SANTA BARBARA, CA | 34.42 | -119.68 | | |
| 1812 | 12 | | 88 USA | CA | VENTURA, CA | 34.27 | -119.28 | | 0.209277153013082 |
| 1812 | 12 | | 88 USA | CA | EL REFUGIO (GAVIOTA), CA | 34.47 | -120.2 | | |
| 1813 | | 5 17 | 50 ITALY | NAPLES | TORRE DEL GRECO | 40.7853 | 14.363 | | 0.135640852036437 |
| 1815 | | | 60 INDONESIA | WEST NUSA TENGGARA | SUMBAWA ISLAND | -8.84 | 118.08 | | |
| 1815 | - 4 | | 83 INDONESIA | WEST NUSA TENGGARA WEST SULAWESI | SULAWESI I | -8.84 -2.823 | 118.08 | 605 | 0.22949103955569 |
| 1815 | | 1 10 | 60 INDONESIA | EAST JAVA | SUMENEP, JAVA | -2.823 -7.017 | 113.867 | 474 | 0.809918353136298 |
| 1815 | - 4 | | 60 INDONESIA | WEST NUSA TENGGARA | BIMA, SUMBAWA ISLAND | -7.017 | 113.867 | | |
| 1815 | | | 83 INDONESIA | MALUKU | AMBON ISLAND | -8.467 | 118.717 | 24 | |
| 1815 | 1 | | 60 INDONESIA | BALI | BALI ISLAND | -3.083 | 128.187 | | |
| | 1 | | | | PENANG ISLAND | | 100.335 | | |
| 1816 | | _ | 60 MALAYSIA | Langkawi PA | | 5.411 39.95 | | | 0.742057448314685 |
| 1817 1818 | | | 75 USA | LIGURIA | PHILADELPHIA, PENNSYLVANIA | 39.95 44.398 | -75.15 8.95 | | 0.131309304920164 |
| | | | 50 ITALY | | GENOA | | | 91 | |
| 1818 | | | 50 FRANCE | Departement des Alpes-Maritimes | ANTIBES | 43.5 | 7.1 | | 0.252592624175814 |
| 1818 | | 18 | 60 INDONESIA | BENGKULU | FORT MALBORO, BENGKULU, SUMATRA | -3.767 | 102.267 | 89 | |
| 1818 | 11 | | 60 INDONESIA | WEST NUSA TENGGARA | BIMA, SUMBAWA ISLAND | -8.467 | 118.717 | 250 | |
| 1818 | 12 | | 50 ITALY | LIGURIA | HARBOUR OF GENOA | 44.398 | 8.95 | | 0.300239642454819 |
| 1819 | | L 8 | 50 ITALY | LIGURIA | GENOA | 44.398 | 8.95 | | |
| 1819 | | 1 12 | 80 USA | HI | HAKAAANO, MOLOKAI, HI | 21.176 | -156.788 | 10621 | 15.460654549411 |
| 1819 | 4 | 1 12 | 89 CHILE | COPIAPO | COPIAPO | -27.366389 | -70.333056 | 122 | 0.301683491493577 |

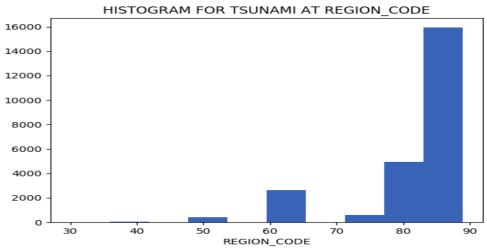
NORMALIZATION:

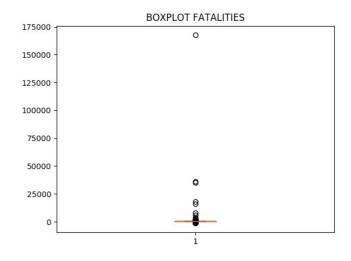
All numerical data were normalized using the preprocessing.normalize() function.

| DITAMICE LOCATION | 11 ▼ 第 ∑ = YEAR | | | | | | | | | | |
|--|-----------------------------------|--------------------|--------------------|----------------------|-------------------|------------------|-------------------|-------------------|-----------------------|-------------------|-------------|
| AMTICAL ISLAND | G | Н | | J | K | | *** | N | 0 | Р | Q |
| SANTO-FRHSTOPHER (SANT KITTS) | 1 LOCATION | LATITUDE | LONGITUDE | DISTANCE_FROM_SOURCE | TRAVEL_TIME_HOURS | MEASUREMENT_TYPE | PERIOD | MAXIMUM_HEIGHT | HORIZONTAL_INUNDATION | FATALITIES | FATALITY_ES |
| ORGENISSESSESSESSESSESSESSESSESSESSESSESSESSE | 2 ANTIGUA ISLAND | 0.027289765084692 | -0.098915394852433 | 0.105637800327841 | 0.000353451187801 | 1 | 0.038026356390124 | 0.006822262606343 | 0.25773782018258 | 0.577806756338646 | ۇ |
| AMERINA | 3 SAINT CHRISTOPHER (SAINT KITTS) | 0.027836588948709 | -0.100775743179572 | 0.064239517564667 | 0.000294358109113 | 1 | 0.038155010703965 | 0.006845344321179 | 0.258609822802714 | 0.579761646021121 | L |
| ALGIERS | 4 ORINOCO RIVER | 0.014660115333231 | -0.093196447475539 | 0.369494743602859 | 0.000721284587594 | 1 | 0.035540260896688 | 0.006376235220846 | 0.240887380275316 | 0.540030779111872 | 2 |
| ALMERIA 0.05987215977327 0.188948930951237 0.000623048970000 0.500052248970000 0.0006230489700000 0.000623048970000 0.0006230489700000 0.000623048970000000 0.0006230489700000 0.00062304897000000 0.0006230489700000000000000000000000000000000000 | 5 AMBON ISLAND | -0.008566407277731 | 0.298154235598835 | 0.00465186384889 | 0.000298699915144 | 1 | 0.055259417155216 | 0.00991402519449 | 0.374541320131423 | 0.839661424724655 | ۇ |
| AMERIA 0.079897398381237 0.00827698970907 0.000287599016518 1.008381247141982 0.0098759134871082 0.0 | 6 ALGIERS | 0.059305625500877 | 0.004921836177765 | 0.051622011697306 | 0.000277044170302 | 1 | 0.038326066328412 | 0.006876033203866 | 0.259769216127774 | 0.582360819460234 | 4 |
| SANATA | 7 OGI | 0.058015147075237 | 0.213588490774578 | 0.161844830896584 | 0.000429035409632 | 1 | 0.036972157477942 | 0.006633130054582 | 0.250592593675018 | 0.561788307246796 | ۇ |
| NARSHILES | 8 ALMERIA | 0.059397393931237 | -0.003923488704007 | 0.058054086865705 | 0.000286259016518 | 1 | 0.038312421141362 | 0.006873585137362 | 0.259676730780759 | 0.582153482181098 | 3 |
| NORFOCK ISLAND | 9 SAKATA | 0.074333788236681 | 0.267121830688385 | 0.032471012668592 | 0.000286660484067 | 1 | 0.045379134871085 | 0.001910059568741 | 0.307574020067887 | 0.689531504315389 | j |
| Part of NAPLES 0.0654077550296 0.22827666750968 0.12840497531005 0.000739169034651 1 0.0380586715175065 0.2554140585878 0.575500691021085 0.12840517500205 0.1498387390251 0.0008704051777 1 0.03806906712817 0.000873069175187 0.000873069175 | 10 KISAGATA | 0.090005147050121 | 0.321080561911427 | 0.043606366521209 | 0.000351070359672 | 1 | 0.054526246196399 | 0.002295071922169 | 0.369571980371179 | 0.828520963902967 | 1 |
| SANTA BARBARA, CA | 11 NORFOLK ISLAND | -0.066964382044391 | 0.387053575134754 | 0.002304507607006 | 0.00029262120878 | 1 | 0.054750418898574 | 0.011522538035032 | 0.371091394511477 | 0.831927246129297 | 1 |
| Collaborary | 12 BAY OF NAPLES | 0.06540727252196 | 0.022827666750868 | 0.123349497531005 | 0.000379196034861 | 1 | 0.038058876157966 | 0.006828096938558 | 0.25795823504406 | 0.578300891021986 | ۇ |
| MAKRELLES 0.065620974811.026 0.00813157900305 0.3446015682394 0.0008704061777 1 0.0360064175817 0.00272756231889 0.24468271303340 0.5686183268757 7.7816 0.00874645216 1 0.038707583756 0.00273603340340 0.56861832686277 7.7816 0.00874645216 1 0.03870566185376 0.0027360333505 0.24780728033505 0.568618327171002 0.00072736045518 1 0.038705661855 0.0088469001012 0.26007280033505 0.2478078033505 0.2478078033505 0.2478078033505 0.2478078033505 0.2478078033505 0.2478078033505 0.2478078033505 0.2478078033505 0.2478078033505 0.2478078033505 0.2478078033505 0.2478078033505 0.2478078033505 0.2478078033505 0.2478078033505 0.2478078033505 0.2478078033505 0.247807803505 0.247807803505 0.247807803505 0.247807803505 0.247807803505 0.247807803505 0.247807803505 0.247807803505 0.247807803505 0.247807803505 0.247807803505 0.247807803505 0.247808078035 0.247807803505 0.24780780505 0.24780780505 0.24780780505 0.24780780505 0.24780780505 0.24780780 | 13 SANTA BARBARA, CA | 0.054600775900287 | -0.189849531079209 | 0.004758928753657 | 0.000206006817367 | 1 | 0.037687492978112 | 0.006761467531456 | 0.255441046958878 | 0.57265776002335 | ز |
| Formation Control Co | 14 CALLAO | -0.029279050826232 | -0.187458819190355 | 0.019438373992519 | 0.000333087961019 | 1 | 0.057727034376124 | 0.002429796749065 | 0.391266516651358 | 0.877156626412417 | 1 |
| TABLE BAY | 15 MARSEILLES | 0.065629097481026 | 0.008133157900305 | 0.344060164623394 | 0.00068704061777 | 1 | 0.036009561752817 | 0.000227352531689 | 0.244068241949979 | 0.547161759599318 | 3 |
| Fig. 2016 Pack Control Contr | | 0.053575489056789 | 0.212581352718848 | 0.020520959273372 | 0.000227788877259 | 1 | 0.03750279245376 | 0.002367802993081 | 0.254189170233044 | 0.569851253668257 | 1 |
| December Contember Conte | 17 TABLE BAY | -0.054718678255903 | | _ | 0.000202746445216 | 1 | 0.038370856810664 | 0.006884069010112 | 0.260072800335055 | 0.583041406445723 | 3 |
| OCA | 18 RASHID (ROSETTA) | 0.039680499885244 | 0.038438272771002 | 0.858059217263708 | 0.001397546455418 | 1 | 0.030023186696253 | 0.005386423611553 | 0.203493351154633 | 0.456199377661559 | j |
| 1 | 19 ALEXANDRIA | 0.040211201181711 | 0.03856022205627 | 0.851910384009966 | 0.001391820670486 | 1 | 0.030619757913212 | 0.005493453732023 | 0.207536835191474 | 0.465264218801207 | 1 |
| CRICHARD LAKE, MI | 20 OGA | 0.062850127496647 | 0.220369244029597 | 0 | 0.000197739904036 | 1 | 0.037423341925591 | 0.00157519116533 | 0.253650664630967 | 0.56864401068395 | ز |
| New Madrid, Ar 0.083749661087924 -0.204949811209775 0.30905021505746 0.00073801971587 7 0.054388205714881 0.00975772203723 0.368636359496974 0.826423453222772 0.1841818600786 0.00115068068375 7 0.030611969297561 0.00549205638591 0.207484044942532 0.465145871550166 0.0041738089 0.0040011738089 0.0549205638591 0.207484044942532 0.465145871550166 0.004871148181 0.00487140570729 -0.163375942427412 0.009763551158765 0.000320511579052 1.0.057990534068821 0.01040011738089 0.39305249042509 0.88116049207881 0.00440011738089 0.00440011738091380 0.0044001173809 0.0044001173909 0.0044001173909 0.0044001173909 0.0044001173909 0.0044001173909 0.0044001173909 0.0044001173909 0.0044001173 | 21 VALPARAISO | -0.05299143213232 | -0.114913427721807 | 0.035292329092454 | 0.000252337887272 | 1 | 0.038112456329333 | 0.006416787107719 | 0.258321394649241 | 0.579115036471631 | L |
| 4 LAKE BISTINEAU, TX-LA BORDER | ORCHARD LAKE, MI | 0.034468219585776 | -0.066743474425871 | 0.884488329297527 | 0.001370608716916 | 7 | 0.017703155665732 | 0.003176101745682 | 0.119989743556486 | 0.268997714301944 | 1 |
| LA GUAIRA 0.025873410570729 | 23 NEW MADRID, AR | 0.083749661087924 | -0.20494981120975 | 0.309050321505746 | 0.000733601971587 | 7 | 0.054388205714861 | 0.009757722203723 | 0.368636359496974 | 0.826423452322772 | 2 |
| MARSEILLES 0.069894807670141 0.00861790714965 0 0.000202636683816 1 0.03835008387441 0.06880342162744 0.259932004008055 0.582725763716415 | 24 LAKE BISTINEAU, TX-LA BORDER | 0.041639832651317 | -0.120366737780721 | 0.591418158009768 | 0.001015668066375 | 7 | 0.030611969297561 | 0.00549205638591 | 0.207484044942532 | 0.465145871550166 | ۇ |
| ANNOTTO BAY 0.029287942413813 -0.123082469769592 0.048099757618349 0.000270720474951 1 0.038091750713803 0.006833994922859 0.258181054613571 0.578800416674127 | | 0.025873410570729 | -0.163375942427412 | 0.009763551158765 | 0.000320511279052 | 1 | 0.057990534968821 | 0.010404011738089 | 0.39305249024509 | 0.881160492078581 | L |
| HOOKENA, HAWAII, HI 0.004893118042971 -0.03936207961296 0.986955543342261 0.001456709974264 1 0.005998480073742 0.000757448613463 0.040656937066323 0.091146316486712 0.001456709974264 1 0.00569131399138 0.00316863157318 0.255119988671254 0.57193799990399 0.0004905763827 1 0.037640124389138 0.00316863157318 0.255119988671254 0.57193799990399 0.00049057663127 1 0.055691516301297 0.00468238941142 0.377470033334214 0.377470033334214 0.377470033334214 0.377470033334214 0.377470033334214 0.377470033334214 0.37873797318255 0.846227182876076 0.0014378633502 0.000434758336611 1 0.055913379999518 0.00800175708681 0.378973797318255 0.84622718276076 0.001437893849142 0.001437496340903 0.001449149918972 0.000218947005016 1 0.038349331692937 0.006880207214776 0.259926905817439 0.582714334392691 0.00144084518 0.0014459493525 0.00144663138977667 0.001444894493525 1 0.00343790625232 0.004884563880641 0.184533624661204 0.413694719018619 0.00144894493525 0.00144663138977667 0.602196666948407 0.001028966524808 1 0.03043790625232 0.004884563880641 0.184533624661204 0.413694719018619 0.001448949180180 0.0014494949525 0.0019056856549 0.204579796866317 0.458635014279272 0.0019056856549 0.204579796866317 0.458635014279272 0.0019056856549 0.204579796866317 0.458635014279272 0.0019056856549 0.204579796866317 0.458635014279272 0.0019056856549 0.204579796866317 0.458635014279272 0.0019056856549 0.204579796866317 0.458635014279272 0.0019056856549 0.204579796866312 0.0059383606800 0.0053624514337 1 0.005532180229984 0.0069886885478 0.374953164543937 0.5895894138193861 0.00057871326727 1 0.05532180229984 0.0069886885378 0.374953164543937 0.5895894138149 0.00053624599940 0.006748705165379 0.20596045162112 0.03799589663904 0.00057865413437 1 0.037616355299400 0.006748705165379 0.25495889881510 0.00053624514337 1 0.037616355299400 0.006748705165379 0.2549588988152 0.94484948641244 0.000157922719383 1 0.018178850162149 0.0036144551992 0.122218940514028 0.918202256599008 0.9440043412730288 0.00643412730288 0.006431236718927 0.000410266236801 1 0.0 | 26 MARSEILLES | 0.069894807670141 | 0.008661790714965 | 0 | 0.000202636683816 | 1 | 0.03835008387441 | 0.006880342162744 | 0.259932004008055 | 0.582725763716415 | ز |
| SANTA BARBARA, CA 0.054532149374433 -0.189610913339108 0.050698105170884 0.000272085763827 1 0.037640124389138 0.00316863157318 0.25511998671254 0.571937998959039 0.00490770649124 1 0.055691516301297 0.004688238941142 0.3774700333734214 0.84627128876076 0.006121801142 0.00611142 0.00611142 0.00611142 0.006114696911142 0.006147663502 0.00043475833661 1 0.055691516301297 0.006488238941142 0.3774700333734214 0.84627128876076 0.00612146074 0.0061834290699463 0.023184282506599 0.011299169918972 0.00043475833661 1 0.03843931692937 0.006880207214776 0.259926905817439 0.582714334392691 0.0061299169918972 0.000218947005016 1 0.03843931692937 0.006880207214776 0.259926905817439 0.582714334392691 0.0061299169918972 0.000218947005016 1 0.0061299169918972 0.000218947005016 1 0.0061299169918972 0.000218947005016 1 0.0061299169918972 0.000218947005016 1 0.0061299169918972 0.000218947005016 1 0.0061299169918972 0.000218947005016 1 0.0061299169918972 0.000218947005016 1 0.0061299169918972 0.000218947005016 1 0.0061299169918972 0.000218947005016 1 0.0061299169918972 0.000218947005016 1 0.0061299169918972 0.000218947005016 1 0.0061299169918972 0.000218947005016 1 0.0061299169918972 0.000218947005016 1 0.0061299169918972 0.000218947005016 1 0.0061299169918972 0.000218947005016 1 0.0061299169918972 0.0002189470916918972 0.00021899169918972 0.00021899169918972 0.00021899169918972 0.00021899169918972 0.00061299169918972 0.00061299169918972 0.00061299169918972 0.00061299169918972 0.000612991897291991891 0.0006129918918973801 0.00061299169918972 0.00061299189199 0.25495889835176 0.571576860361225 0.00061299189199 0.000612918111 0.00061291899 0.00061291811 0.000612918111 0.000612918111 0.000612918111 0.000612918111 0.000 | 27 ANNOTTO BAY | 0.029287942413813 | -0.123082469769592 | 0.048099757618349 | 0.000270720474951 | 1 | 0.038091750713803 | 0.006833994922859 | 0.258181054613571 | 0.578800416674127 | 1 |
| VENTURA, CA 0.080332974256463 -0.279606570449691 0.135958929293109 0.000490570649124 1 0.055691516301297 0.004688238941142 0.377470033334214 0.846227128876076 | 28 HOOKENA, HAWAII, HI | 0.004893118042971 | -0.03936207961296 | 0.986955543342261 | 0.001456709974264 | 1 | 0.005998480073742 | 0.000757448613463 | 0.040656937066323 | 0.091146316486712 | 2 |
| EL REFUGIO (GAVIOTA), CA 0.081123696111142 -0.282885647593828 0.096491776633502 0.000434758336611 1 0.055913379996518 0.00801757086681 0.378973797318255 0.849598325968152 TORRE DEL GRECO 0.065834290699463 0.023184282506599 0.011299169918972 0.000218947005016 1 0.038349331692937 0.006880207214776 0.259926905817439 0.582714334392691 33 SUMBAWA ISLAND -0.021028092416053 0.280882030824375 0.171269530990473 0.000545900315434 1 0.007136230457936 0.00832602200926 0.38304386468869 0.85876398438342 44 SULAWESI I -0.03323069783351 0.136147963400903 0.693311094200178 0.001144894493525 1 0.003437906252232 0.00488563880641 0.18453624661204 0.458634719018619 55 SUMENEP, JAVA -0.008914797493622 0.144663138977667 0.602196666948407 0.001028966524808 1 0.030183479709524 0.0019058856549 0.20457996866317 0.458635014279272 56 BIMA, SUMBAWA ISLAND -0.019715320694663 0.276431289347855 0.195593118973861 0.000574711326727 1 0.055320180229864 0.000698546853478 0.374953164543937 0.840584713685282 57 AMBON ISLAND -0.005831350628007 0.20296045152112 0.03799956963904 0.000253625413437 1 0.037616357299404 0.006748705165379 0.25495889835176 0.571576860361225 58 BALI ISLAND -0.006503932650903 0.087994382923983 0.042849438641244 0.00015792719383 1 0.018178850162149 0.003261445519922 0.123213940514028 0.918202565998066 59 PENANG ISLAND -0.006603932650903 0.087994382923983 0.042849438641244 0.00015792719383 1 0.031350020771706 0.005624469308199 0.2124164664126604 0.476304593663 50 PHILADELPHIA, PENNSYLVANIA 0.0640341273028 -0.12047215185685 0.006412356718927 0.000210500525916 1 0.033935773345179 0.00680601121181 0.25712385979389 0.576430355853618 50 PHILADELPHIA, PENNSYLVANIA 0.07089294970053 0.01429101897202 0.14530515895479 0.000410246236801 1 0.037935773345179 0.006806011211811 0.25712385979389 0.576430355853618 50 PHILADELPHIA, PENNSYLVANIA 0.07089294970053 0.01429101897202 0.14530515895479 0.000410246236801 1 0.037935773345179 0.006806011211811 0.25712385979389 0.576430355853618 50 PART OR AND OR AND OR AND OR AND OR | SANTA BARBARA, CA | 0.054532149374433 | -0.189610913339108 | 0.050698105170884 | | 1 | 0.037640124389138 | | | 0.571937998959039 | j |
| TORRE DEL GRECO 0.065834290699463 0.023184282506599 0.011299169918972 0.000218947005016 1 0.038349331692937 0.006880207214776 0.259926905817439 0.58271433492691 33 SUMBAWA ISLAND -0.021028092416053 0.280882030824375 0.171269530990473 0.000545900315434 1 0.007136230457936 0.008325602200926 0.38304548648889 0.858726398438342 34 SULAWESI I -0.003235069783351 0.136147963400903 0.693311094200178 0.00114489449355 1 0.00343790625223 0.00848456388064 1 0.18456386461404 0.41694719018619 35 SUMENEP, JAVA -0.00891479749362 0.144663138977667 0.602196666948407 0.001028966524808 1 0.030183479709524 0.0019056856549 0.24545796866317 0.458635014279272 36 BIMA, SUMBAWA ISLAND -0.019715320694663 0.276431289347855 0.195593118973861 0.000574711326727 1 0.055320180229864 0.000698548853478 0.374953164543937 0.840584713685282 37 AMBON ISLAND -0.005831350628007 0.20296045152112 0.037999569663904 0.000253625413437 1 0.037616357299404 0.006748705165379 0.25495889835176 0.571576860361225 38 BALI ISLAND -0.006503932650903 0.087994382923983 0.042849438641244 0.00015792719383 1 0.018178850162149 0.003261445519922 0.123213940614028 0.918202256599086 39 PENANG ISLAND -0.00740129137264 0.132397866750581 0.563451329072587 0.00079187951993 1 0.031350020771706 0.005624469308199 0.2124184644216604 0.476304913290569 0.918179388205 40 PHILADELPHIA, PENNSYLVANIA 0.0640341273028 -0.12047215185685 0.006412356718927 0.000210500525916 1 0.037935773345179 0.006806011211811 0.25712385979389 0.576430355853618 | | 0.080332974256463 | -0.279606570449691 | 0.135958929293109 | 0.000490570649124 | 1 | 0.055691516301297 | 0.004688238941142 | 0.377470033334214 | 0.846227128876076 | 5 |
| SUMBAWA ISLAND -0.021028092416053 0.280882030824375 0.171269530990473 0.000545900315434 1 0.007136230457936 0.008325602200926 0.383045486468869 0.858726398438342 4 SULAWESI I -0.003235069783351 0.136147963400903 0.693311094200178 0.001144894493525 1 0.003437906252232 0.004884563880641 0.18453624661204 0.413694719018619 5 SUMENEP, JAVA -0.008914797493622 0.144663138977667 0.602196666948407 0.00102896652408 1 0.030183479709524 0.0019056865149 0.20459796866317 0.4586501427972 5 BIMA, SUMBAWA ISLAND -0.019715320694663 0.276431289347855 0.195593118973861 0.0005747113267277 1 0.055320180229864 0.000698548853478 0.374953164543937 0.840584713685282 7 AMBON ISLAND -0.005831350628007 0.20296045152112 0.037999569663904 0.000253625413437 1 0.037616357299404 0.006748705165379 0.25495889835176 0.571576860361225 8 BALI ISLAND -0.005603932650903 0.087994382923983 0.042849438641244 0.000157922719383 1 0.018178850162149 0.003261445519922 0.123213490514028 0.918202256598086 9 PENANG ISLAND -0.00714012137264 0.13239786675081 0.563451329072587 0.00097187951993 1 0.0336000771706 0.0056449303199 0.212413406404 0.47660491323663 0 PHILADELPHIA, PENNSYLVANIA 0.06404341273028 -0.12047215185685 0.006412356718927 0.000210500525916 1 0.037935773345179 0.006806011211811 0.25712385979389 0.576430355853618 9 PENANG ISLAND -0.0070892949970053 0.014291001897202 0.14530515895479 0.000410246236801 1 0.037935773345179 0.006806011211811 0.25712385979389 0.576430355853618 | 31 EL REFUGIO (GAVIOTA), CA | 0.081123696111142 | -0.282885647593828 | 0.096491776633502 | 0.000434758336611 | 1 | 0.055913379996518 | 0.008001757086681 | 0.378973797318255 | 0.849598325968152 | 2 |
| \$\frac{4}{5}\text{ULAWESI I} \text{0.003235069783351} \text{0.136147963400903} \text{0.693311094200178} \text{0.001144894493525} \text{1} \text{0.003437906252322} \text{0.004884563880641} \text{0.184533624661204} \text{0.413694719018619} \text{0.5520180229864} \text{0.0019056856549} \text{0.0019056856549} \text{0.004579796866317} \text{0.458635014279272} \text{0.00574711326727} \text{1} \text{0.00583150628007} \text{0.00583150628007} \text{0.0025665498347855} \text{0.195593118973861} \text{0.000574711326727} \text{0.0057471326727} \text{0.00574785568378} \text{0.006748705165379} \text{0.006748705165379} \qquad | | 0.065834290699463 | 0.023184282506599 | | | 1 | | | | | |
| SUMENEP, JAVA -0.008914797493622 0.144663138977667 0.602196666948407 0.001028966524808 1 0.030183479709524 0.0019056856549 0.204579796866317 0.458635014279272 0.0019056856549 0.204579796866317 0.458635014279272 0.0019056856549 0.000698546853478 0.374953164543937 0.840584713685282 0.7481289347855 0.195593118973861 0.00574711326727 1 0.055320180229864 0.000698546853478 0.374953164543937 0.840584713685282 0.7481289347855 0.0006985413437 0.0006748705165379 0.25495889835176 0.571576860361225 0.879943829383 0.042849438641244 0.00057922719383 1 0.0181580501249 0.0006748705165379 0.254958898935176 0.571576860361225 0.99999999999999999999999999999999999 | | | | | | 1 | | | | | |
| BIMA, SUMBAWA ISLAND | | | | | | 1 | | | | | |
| 37 AMBON ISLAND -0.005831350628007 0.20296045152112 0.037999569663904 0.000253625413437 1 0.037616357299404 0.006748705165379 0.25495889835176 0.571576860361225 38 BALI ISLAND -0.006503932650903 0.087994382923983 0.042849438641244 0.000157922719383 1 0.018178850162149 0.003261445519922 0.123213940614028 0.918202256599086 39 PENANG ISLAND 0.007140129137264 0.132397866750581 0.563451329072587 0.00079187951993 1 0.03135002071706 0.00526446930819 0.251486464216604 0.4763035663 41 GENOA 0.070892949970053 0.01429101897202 0.14530515895479 0.000410246236801 1 0.037935773345179 0.00680601121811 0.25712385979389 0.576430355853618 | | | | | | 1 | | | | | |
| 8 BALI ISLAND -0.006503932650903 0.087994382923983 0.042849438641244 0.000157922719383 1 0.018178850162149 0.003261445519922 0.123213940514028 0.918202256598086 | | -0.019715320694663 | 0.276431289347855 | | | 1 | | | | | |
| 39 PENANG ISLAND 0.007140129137264 0.132397866750581 0.563451329072587 0.000979187951993 1 0.031350020771706 0.005624469308199 0.212486464216604 0.476360491323663 40 PHILADELPHIA, PENNSYLVANIA 0.064043412730288 -0.12047215185685 0.006412356718927 0.000210500525916 1 0.038086142070109 0.0048092675392 0.258143039938039 0.578715193883205 41 GENOA 0.070892949970053 0.014291001897202 0.14530515895479 0.000410246236801 1 0.037935773345179 0.006806011211811 0.25712385979389 0.576430355885618 | 37 AMBON ISLAND | -0.005831350628007 | 0.20296045152112 | 0.037999569663904 | 0.000253625413437 | 1 | 0.037616357299404 | 0.006748705165379 | 0.25495889835176 | | |
| 40 PHILADELPHIA, PENNSYLVANIA 0.064043412730288 -0.12047215185685 0.006412356718927 0.000210500525916 1 0.038086142070109 0.0048092675392 0.258143039938039 0.578715193883205 41 GENOA 0.070892949970053 0.014291001897202 0.14530515895479 0.000410246236801 1 0.037935773345179 0.006806011211811 0.25712385979389 0.576430355885618 | BALI ISLAND | -0.006503932650903 | 0.087994382923983 | 0.042849438641244 | 0.000157922719383 | 1 | 0.018178850162149 | 0.003261445519922 | | | |
| EGNOA 0.070892949970053 0.014291001897202 0.14530515895479 0.000410246236801 1 0.037935773345179 0.006806011211811 0.25712385979389 0.576430355853618 | PENANG ISLAND | | | | | 1 | | | | | |
| | 40 PHILADELPHIA, PENNSYLVANIA | 0.064043412730288 | -0.12047215185685 | 0.006412356718927 | 0.000210500525916 | 1 | 0.038086142070109 | 0.00048092675392 | 0.258143039938039 | 0.578715193883205 | ز |
| Z ANTIBES 0.06951629909176 0.011346338472448 0.14063067402471 0.000403662170358 1 0.037967035331464 0.006811619886959 0.257335749571521 0.576905378669548 | 41 GENOA | 0.070892949970053 | 0.014291001897202 | 0.14530515895479 | 0.000410246236801 | 1 | 0.037935773345179 | 0.006806011211811 | 0.25712385979389 | 0.576430355853618 | 3 |
| | 42 ANTIBES | 0.06951629909176 | 0.011346338472448 | 0.14063067402471 | 0.000403662170358 | 1 | 0.037967035331464 | 0.006811619886959 | 0.257335749571521 | 0.576905378669548 | 3 |

VISUALIZATIONS:







INSIGHTS FROM THE GRAPHS

- → The histogram shows that the maximum number tsunamis occur at region code 80-90.
- → The scatter plot has a slightly decreasing tendency which shows that as the height increases the distance decreases.

→

HYPOTHESIS TESTING

```
1)
NULL HYPOTESIS:mean latitude=23.141
p-value=0.201297892931
null hypothesis is plausible.
2)
NULL HYPOTESIS:mean longitude=52
p-value=0.290841542469
null hypothesis is plausible.
```

CORRELATATION

| | Heatmap of dataset | | | | | | | | | | | | | | | | | | | | | |
|----------------------------|--------------------|----------------|---------|---------|---------|---------------|------------|-------------|--------------|---------------|-------------|----------|---------------|------------|--------------|----------------|---------------|---------------|--------------|---------------|---------------|---------------|
| Unnamed: 0 - | 1 | 1 | 0.87 | -0.28 | -0.039 | 0.1 | 0.05 | 0.15 | -0.17 | -0.13 | 0.53 | 0.087 | 0.18 | -0.13 | 0.15 | 0.037 | 0.2 | 0.11 | 0.19 | 0.052 | 0.22 | 0.092 |
| Unnamed: 0.1 - | 1 | 1 | 0.87 | -0.28 | -0.039 | 0.1 | 0.05 | 0.15 | -0.17 | -0.13 | 0.53 | 0.087 | 0.18 | -0.13 | 0.15 | 0.037 | 0.2 | 0.11 | 0.19 | 0.052 | 0.22 | 0.092 |
| YEAR - | 0.87 | 0.87 | 1 | -0.18 | 0.03 | 0.029 | -0.0032 | 0.11 | -0.064 | -0.052 | 0.54 | -0.0067 | 0.11 | -0.14 | 0.055 | -0.019 | 0.13 | 0.096 | 0.11 | 0.045 | 0.15 | 0.079 |
| MONTH - | -0.28 | -0.28 | -0.18 | 1 | 0.29 | -0.4 | -0.17 | -0.13 | 0.084 | 0.059 | -0.089 | -0.028 | -0.096 | 0.11 | -0.052 | -0.043 | -0.055 | -0.072 | -0.064 | -0.11 | -0.073 | -0.079 |
| DAY - | -0.039 | -0.039 | 0.03 | 0.29 | 1 | -0.26 | -0.24 | -0.26 | 0.06 | 0.064 | 0.029 | -0.044 | -0.036 | 0.055 | -0.063 | 0.016 | -0.046 | 0.011 | -0.055 | -0.086 | -0.062 | 0.0089 |
| REGION_CODE - | 0.1 | 0.1 | 0.029 | -0.4 | -0.26 | 1 | 0.13 | 0.0045 | -0.011 | -0.018 | -0.19 | -0.017 | -0.013 | -0.091 | -0.0091 | -0.051 | -0.0039 | -0.022 | 0.0063 | 0.061 | 0.0024 | -0.028 |
| LATITUDE - | 0.05 | 0.05 | -0.0032 | -0.17 | -0.24 | 0.13 | 1 | 0.52 | -0.39 | -0.28 | -0.028 | 0.42 | 0.24 | 0.086 | 0.39 | 0.012 | 0.37 | 0.0069 | 0.41 | 0.078 | 0.39 | 0.00073 |
| LONGITUDE - | 0.15 | 0.15 | 0.11 | -0.13 | -0.26 | 0.0045 | 0.52 | 1 | -0.4 | -0.29 | 0.068 | 0.38 | 0.17 | 0.09 | 0.4 | 0.052 | 0.4 | 0.059 | 0.43 | 0.084 | 0.43 | 0.061 |
| DISTANCE_FROM_SOURCE - | -0.17 | -0.17 | -0.064 | 0.084 | 0.06 | -0.011 | -0.39 | -0.4 | 1 | 0.75 | -0.19 | -0.82 | -0.37 | -0.48 | -0.86 | -0.0079 | -0.8 | -0.097 | -0.88 | -0.1 | -0.86 | -0.1 |
| TRAVEL_TIME_HOURS - | -0.13 | -0.13 | -0.052 | 0.059 | 0.064 | -0.018 | -0.28 | -0.29 | 0.75 | 1 | -0.15 | -0.57 | -0.27 | -0.36 | -0.63 | -0.01 | -0.6 | -0.074 | -0.65 | -0.095 | -0.64 | -0.077 |
| MEASUREMENT_TYPE - | 0.53 | 0.53 | 0.54 | -0.089 | 0.029 | -0.19 | -0.028 | 0.068 | -0.19 | -0.15 | 1 | 0.11 | 0.21 | -0.063 | 0.16 | 0.047 | 0.2 | 0.1 | 0.2 | 0.0066 | 0.22 | 0.087 |
| PERIOD - | 0.087 | 0.087 | -0.0067 | -0.028 | -0.044 | -0.017 | 0.42 | 0.38 | -0.82 | -0.57 | 0.11 | 1 | 0.38 | 0.4 | 0.81 | -0.024 | 0.69 | 0.058 | 0.78 | 0.058 | 0.73 | 0.06 |
| MAXIMUM_HEIGHT - | 0.18 | 0.18 | 0.11 | -0.096 | -0.036 | -0.013 | 0.24 | 0.17 | -0.37 | -0.27 | 0.21 | 0.38 | 1 | 0.14 | 0.31 | -0.014 | 0.28 | 0.062 | 0.32 | 0.018 | 0.3 | 0.058 |
| HORIZONTAL_INUNDATION - | -0.13 | -0.13 | -0.14 | 0.11 | 0.055 | -0.091 | 0.086 | 0.09 | -0.48 | -0.36 | -0.063 | 0.4 | 0.14 | 1 | 0.3 | -0.056 | 0.21 | -0.0092 | 0.26 | 0.0075 | 0.23 | -0.0039 |
| FATALITIES - | 0.15 | 0.15 | 0.055 | -0.052 | -0.063 | -0.0091 | 0.39 | 0.4 | -0.86 | -0.63 | 0.16 | 0.81 | 0.31 | 0.3 | 1 | 0.016 | 0.76 | 0.069 | 0.84 | 0.085 | 0.83 | 0.068 |
| FATALITY_ESTIMATE - | 0.037 | 0.037 | -0.019 | -0.043 | 0.016 | -0.051 | 0.012 | 0.052 | -0.0079 | -0.01 | 0.047 | -0.024 | -0.014 | -0.056 | 0.016 | 1 | 0.007 | 0.21 | 0.0037 | 0.065 | 0.006 | 0.2 |
| DAMAGE_MILLIONS_DOLLARS - | 0.2 | 0.2 | 0.13 | -0.055 | -0.046 | -0.0039 | 0.37 | 0.4 | -0.8 | -0.6 | 0.2 | 0.69 | 0.28 | 0.21 | 0.76 | 0.007 | 1 | 0.14 | 0.92 | 0.12 | 0.92 | 0.13 |
| DAMAGE_ESTIMATE - | 0.11 | 0.11 | 0.096 | -0.072 | 0.011 | -0.022 | 0.0069 | 0.059 | -0.097 | -0.074 | 0.1 | 0.058 | 0.062 | -0.0092 | 0.069 | 0.21 | 0.14 | 1 | 0.12 | 0.38 | 0.12 | 0.97 |
| HOUSES_DAMAGED - | 0.19 | 0.19 | 0.11 | -0.064 | -0.055 | 0.0063 | 0.41 | 0.43 | -0.88 | -0.65 | 0.2 | 0.78 | 0.32 | 0.26 | 0.84 | 0.0037 | 0.92 | 0.12 | 1 | 0.12 | 0.98 | 0.13 |
| HOUSE_DAMAGE_ESTIMATE - | 0.052 | 0.052 | 0.045 | -0.11 | -0.086 | 0.061 | 0.078 | 0.084 | -0.1 | -0.095 | 0.0066 | 0.058 | 0.018 | 0.0075 | 0.085 | 0.065 | 0.12 | 0.38 | 0.12 | 1 | 0.11 | 0.39 |
| HOUSES_DESTROYED - | 0.22 | 0.22 | 0.15 | -0.073 | -0.062 | 0.0024 | 0.39 | 0.43 | -0.86 | -0.64 | 0.22 | 0.73 | 0.3 | 0.23 | 0.83 | 0.006 | 0.92 | 0.12 | 0.98 | 0.11 | 1 | 0.12 |
| USE_DESTRUCTION_ESTIMATE - | 0.092 | 0.092 | 0.079 | -0.079 | 0.0089 | -0.028 | 0.00073 | 0.061 | -0.1 | -0.077 | 0.087 | 0.06 | 0.058 | -0.0039 | 0.068 | 0.2 | 0.13 | 0.97 | 0.13 | 0.39 | 0.12 | 1 |
| | Unnamed: 0 - | Unnamed: 0.1 - | YEAR - | MONTH - | - DAY - | *EGION_CODE - | LATITUDE - | LONGITUDE - | ROM_SOURCE - | _TIME_HOURS - | REMENT_TYPE | PERIOD - | IMUM_HEIGHT - | INUNDATION | FATALITIES - | ITY_ESTIMATE - | ONS_DOLLARS - | GE_ESTIMATE - | ES_DAMAGED - | GE_ESTIMATE - | ¿_DESTROYED - | ON_ESTIMATE - |

CORRELATION

- DISTANCE_FROM_SOURCE AND TRAVEL_TIME_HOURS are highly correlated with an corr. value of 0.75. This is obvious because the larger the distance from source the more the time it takes.
- Their is a high correlation of PERIOD with fatalities, houses_damaged and houses destroyed. It can be inferred that a larger lasting tsunami is going to have a larger impact on the number of fatalities and economic losses.
- FATALITIES and HOUSES_DESTROYED also shares an high corr. 0.83 this implies that the more the number of houses are destroyed the more are the cases of fatalities.
- HOUSES_ DESTROYED and DAMAGE_MILLIONS of dollars has a high corr. Of 0.92 which is self explanatory because the houses_destroyed will lead to more economic loss.
- MONTH and DISTANCE_FROM SOURCE share a low corr. value because an tsunami is a random event based solely on tectonic activities and the month on which a tsuanmi ocuurs has nothing to do with the distance_from_source.

THANK YOU