

# A 50-Year Journey in Ocean Wave Monitoring

**Innovations from  
On-Premises to AWS**

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Hailey Johnson*

IOOS DMAC  
April 2025

UC San Diego

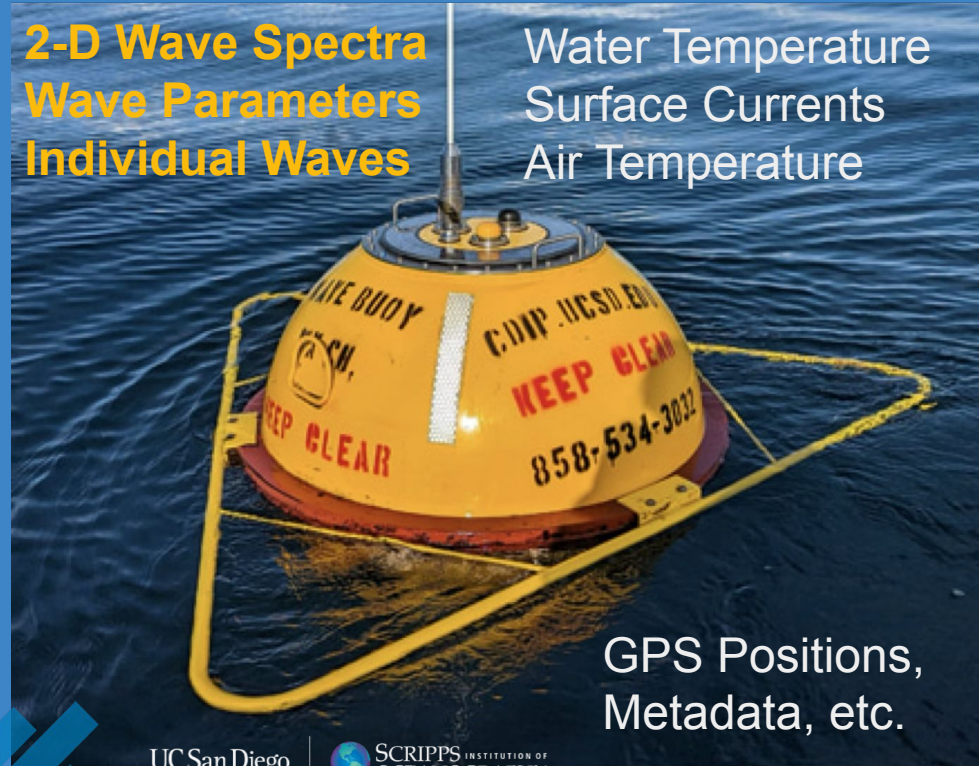


SCRIPPS INSTITUTION OF  
OCEANOGRAPHY

# Introduction to



- USACE requires accurate historical and near-real time coastal process data to complete coastal storm risk management and navigation planning, engineering, and operational projects within project constraints.
- Readily-available, high-quality coastal wave data are required for risk-based engineering design and adaptive management for USACE projects.

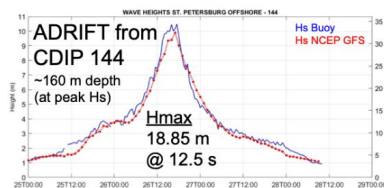
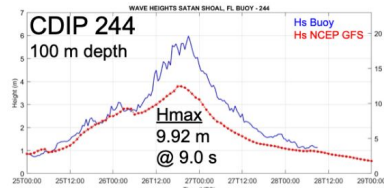
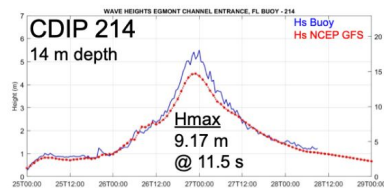




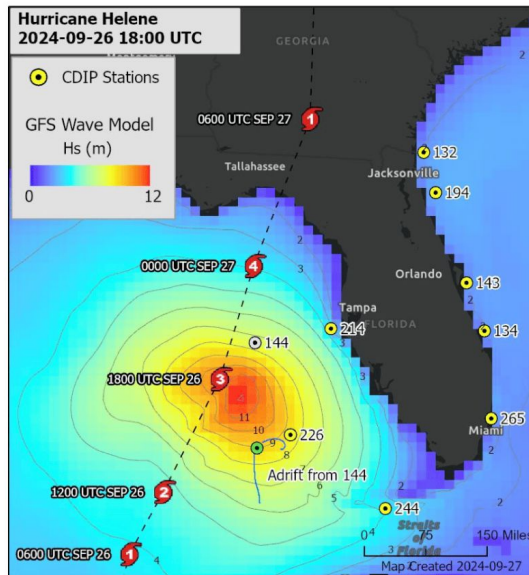
From issuing annual printed reports of data tables, to being able to publish detailed bulletins of significant wave events in near-real time, with climatological context.

How did we get here?

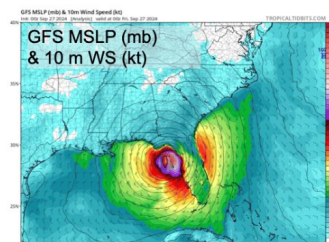
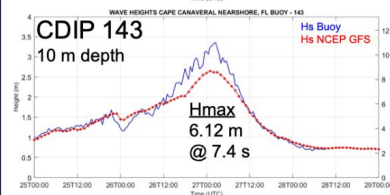
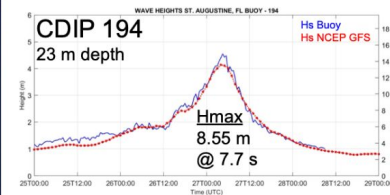
# CDIP Wave Observations: Hurricane Helene September 26 - 27, 2024



**Hmax** = largest individual wave  
**Hs** = significant wave height  
**Tp** = period of peak wave energy



- Hurricane Helene made landfall as category 4 with max winds of 220 km/h (140 mph) and minimum pressure of 938 mbar, after rapid intensification aided by high sea surface temperatures and low wind shear. It was the strongest storm on record to make landfall in the Big Bend region of FL, consistent with historically powerful CDIP station data.
- At CDIP 226 Pulley Ridge, FL (est. 2016), peak Hs = 9.13 m (30') at Tp = 12 s set a new station record by nearly a meter, and is the largest Hs ever from a CDIP station in the Gulf of Mexico.
- Similarly at 214 Egmont Channel Entrance, FL (est. 2015), operated by partners at USF, peak Hs = 5.50 m (18') at Tp = 13 s was a new station record by a wide margin.
- The buoy recently adrift from CDIP 144 St. Petersburg, FL, was closest to the storm center. Peak Hs exceeded 10 m (33') at Tp = 14 s in ~160 m water depth, with maximum individual wave heights reaching 18.85 m (62').



- CDIP 244 Satan Shoal, FL (est. 2019), measured its 2nd highest station Hs at 6 m (Tp = 11 s).
- Tp measured at CDIP stations during Helene was several seconds longer than during previously observed tropical storms in the Gulf of Mexico.
- Storm surge raised water levels to the highest ever measured, by several feet, at NOAA tide gauges in Tampa Bay and Cedar Key.

CDIP wave bulletins:  
[cdip.ucsd.edu/themes/cdip?d2=p12](http://cdip.ucsd.edu/themes/cdip?d2=p12)

# History and Origins

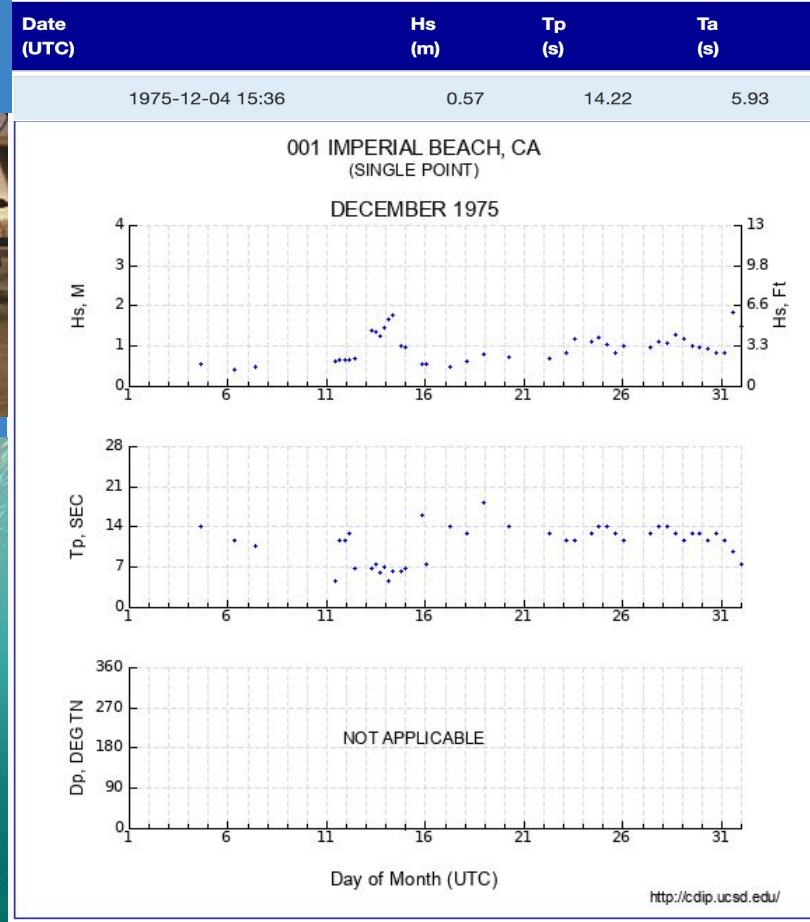
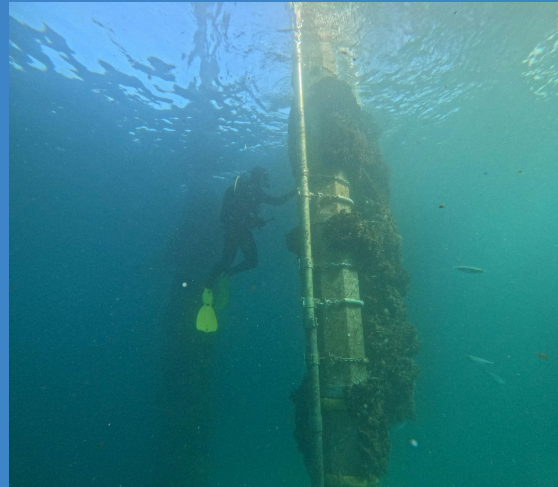
**1975**

Single point gauge  
mounted on a tripod




**2025**

Single point gauge  
is presently still in  
use at Scripps Pier





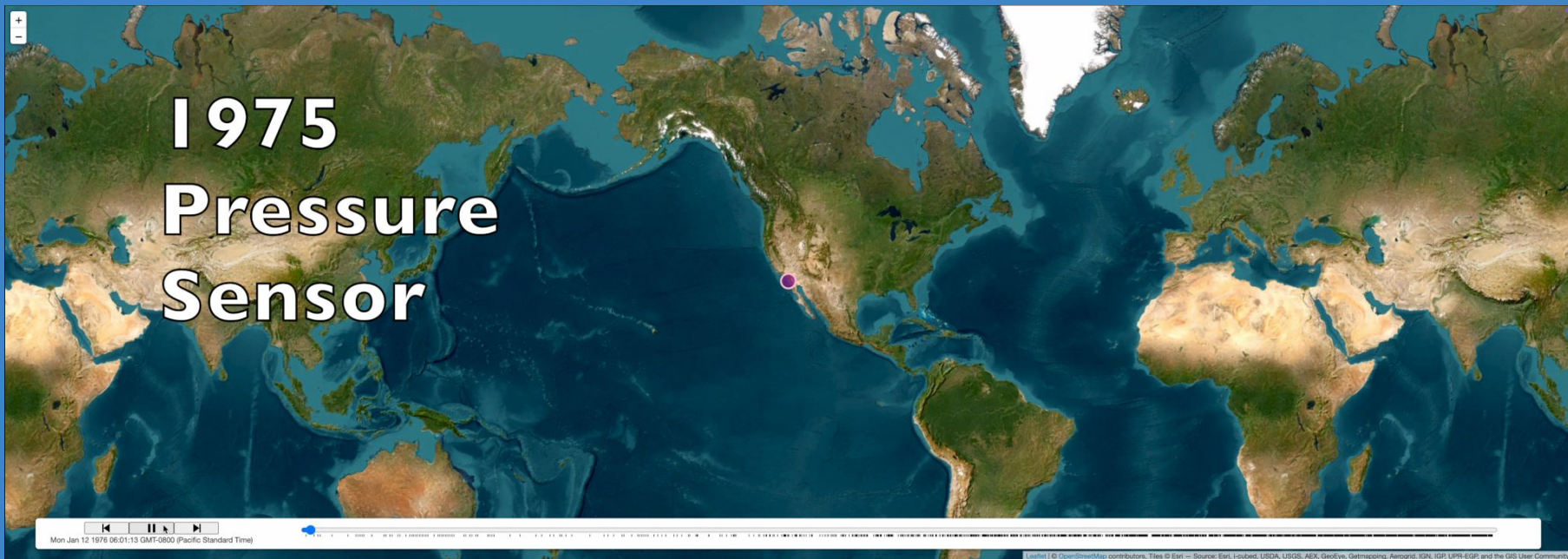
A world map with a red dot in the Pacific Ocean. The text "1995 Hello World" is overlaid on the map.

1995  
Hello World

<http://cdip.ucsd.edu>



# 1975 Pressure Sensor



• 1975-11-01 - 001 IMPERIAL BEACH, CA



# 1978 NonDirectional Buoys

Sun Oct 01 1978 17:48:04 GMT-0700 (Pacific Daylight Time)

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- 1978-08-01 - 014 MISSION BAY ENTRANCE, CA
- 1978-08-01 - 018 SEALCLIFF, CA
- 1978-08-01 - 048 POINT CONCEPTION OFFSHORE, CA
- 1978-08-01 - 016 MARINERS BASIN, CA
- 1978-04-01 - 015 QUIVIRA BASIN, CA
- 1978-04-01 - 019 POINT ARGUELLO HARBOR INNER, CA
- 1978-04-01 - 015 QUIVIRA BASIN, CA
- 1978-04-01 - 120 POINT ARGUELLO HARBOR OUTER, CA
- 1978-04-01 - 019 POINT ARGUELLO HARBOR INNER, CA
- 1978-02-01 - 009 MOSS LANDING, CA
- 1978-02-01 - 011 POINT CONCEPTION, CA
- 1978-01-01 - 008 SANTA CRUZ PIER, CA
- 1977-12-01 - 010 MONTEREY HARBOR, CA
- 1977-12-01 - 007 CAPITOLA PIER, CA
- 1977-08-01 - 006 SANTA CRUZ HARBOR, CA
- 1976-12-01 - 005 CHANNEL ISLANDS, CA
- 1976-06-01 - 004 OCEANSIDE, CA
- 1976-05-01 - 073 SCRIPPS PIER LA JOLLA, CA
- 1976-03-01 - 002 OCEANOGRAPH PIER, CA

# 1980 East Coast Great Lakes Hawaii



Sun Jun 21 1981 04:34:56 GMT-0700 (Pacific Daylight Time)

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- 1981-06-01 - 033 VIRGINIA BEACH, VA
- 1981-06-01 - 033 VIRGINIA BEACH, VA
- 1981-06-01 - 033 VIRGINIA BEACH, VA
- 1981-03-01 - 010 MONTREY HARBOR, CA
- 1980-11-01 - 027 SUNSET BEACH, CA
- 1980-09-01 - 026 CREC DUCK, NC
- 1980-08-01 - 025 SILVER BAY, MN
- 1980-08-01 - 024 SILVER BAY, MN
- 1980-08-01 - 023 PACIFIC, CA
- 1980-07-01 - 015 QUINRA BASIN, CA
- 1980-05-01 - 021 STINSON BEACH, CA
- 1980-03-01 - 012 HUMBOLDT BAY INNER, CA
- 1979-10-01 - 017 SANTA BARBARA, CA
- 1979-10-01 - 017 SANTA BARBARA, CA
- 1979-10-01 - 017 SANTA BARBARA, CA
- 1978-08-01 - 014 MISSION BAY ENTRANCE, CA
- 1978-04-01 - 015 QUINRA BASIN, CA
- 1978-04-01 - 015 QUINRA BASIN, CA
- 1978-04-01 - 119 POINT ARGUELLO, CA
- 1978-01-01 - 008 SANTA CRUZ PIER, CA
- 1977-12-01 - 010 MONTREY HARBOR, CA
- 1977-08-01 - 006 SANTA CRUZ HARBOR, CA
- 1976-12-01 - 004 CHANNEL ISLANDS, CA
- 1976-05-01 - 003 OCEANSIDE, CA
- 1976-05-01 - 003 SCRIPPS PIER LA JOLLA, CA



• 1986-07-01 - 059 BARBERS POINT ENTRANCE, HI  
 • 1986-06-01 - 060 BARBERS POINT HARBOR, HI  
 • 1986-06-01 - 060 BARBERS POINT HARBOR, HI  
 • 1986-06-01 - 060 BARBERS POINT HARBOR, HI  
 • 1986-06-01 - 159 BARBERS POINT OFFSHORE, HI  
 • 1986-06-01 - 060 BARBERS POINT HARBOR, HI  
 • 1986-06-01 - 060 BARBERS POINT HARBOR, HI  
 • 1986-03-01 - 055 SAN FRANCISCO WHARF-45, CA  
 • 1986-01-01 - 080 SANTA CRUZ CANYON, CA  
 • 1986-09-01 - 051 DEL MAR, CA  
 • 1983-08-01 - 054 LONG BEACH, WA  
 • 1983-08-01 - 055 COQUILLE RIVER, OR  
 • 1983-07-01 - 055 IMPERIAL BEACH NORTH, CA  
 • 1983-07-01 - 052 SAN CLEMENTE, CA  
 • 1982-12-01 - 040 SAN FRANCISCO ALIOTOS, CA  
 • 1982-12-01 - 040 SAN FRANCISCO ALIOTOS, CA  
 • 1982-10-01 - 039 BAKING SANDS, HI  
 • 1982-07-01 - 038 KAUAI, HI  
 • 1982-01-01 - 037 COQUILLE RIVER INNER, OR  
 • 1981-11-01 - 034 MAKAUULU POINT, HI  
 • 1981-08-01 - 034 MAKAUULU POINT, HI  
 • 1980-09-01 - 026 CERC DEJACK, NC  
 • 1980-07-01 - 014 MISSION BAY ENTRANCE, CA  
 • 1979-10-01 - 044 NORTH MONTEREY BAY, CA  
 • 1978-08-01 - 014 MISSION BAY ENTRANCE, CA  
 • 1978-04-01 - 119 POINT ARGUELLO, CA  
 • 1977-08-01 - 006 SANTA CRUZ HARBOR, CA  
 • 1976-06-01 - 004 OCEANSIDE, CA  
 • 1976-05-01 - 073 SCRIPPS PIER, LA JOLLA, CA

- [illegible]

# 1991 Directional Waverider



Time Oct 22 1991 07:08:58 GMT-0700 (Pacific Daylight Time)



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- 1991-10-12 - 071 MARVEST, CA
- 1991-07-01 - 070 OCEANSIDE B DOCK, CA
- 1991-07-01 - 069 OCEANSIDE O DOCK, CA
- 1991-07-01 - 068 OCEANSIDE CHANNEL ENTRANCE, CA
- 1991-04-23 - 067 SAN NICOLAS ISLAND, CA
- 1991-09-01 - 140 SAN NICOLAS ISLAND BARGE LANDING, CA
- 1990-09-01 - 054 LONG BEACH, WA
- 1986-12-01 - 063 MARVEST PLATEFORM, CA
- 1986-12-01 - 062 MARVEST P, CA
- 1986-12-01 - 061 MARINA, CA
- 1983-08-01 - 054 LONG BEACH, WA
- 1983-08-01 - 055 COQUILLE RIVER, OR
- 1983-07-01 - 052 SAN CLEMENTE, CA
- 1983-10-01 - 039 BARKING SANDS, HI
- 1982-07-01 - 006 SANTA CRUZ HARBOR, CA
- 1982-01-01 - 047 PARALLON ISLANDS, CA
- 1981-11-01 - 037 COQUILLE RIVER INNER, OR
- 1981-08-01 - 034 MAKAUU POINT, HI
- 1976-06-01 - 006 SANTA CRUZ HARBOR, CA
- 1976-06-01 - 004 OCEANSIDE, CA
- 1976-05-01 - 003 SCRIPPS PIER LA JOLLA, CA



# 1995 Hello World

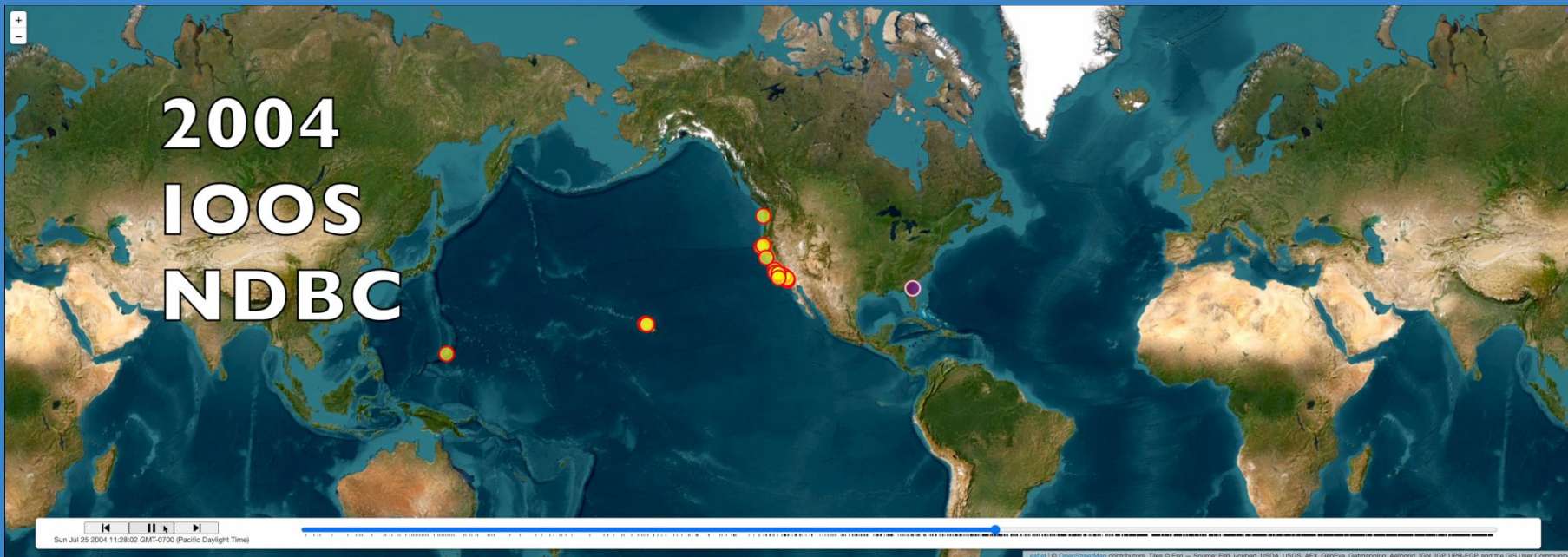
<http://cdip.ucsd.edu>

Wed Nov 29 1995 11:04:24 GMT-0800 (Pacific Standard Time)

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- 1995-11-29 071 HARVEST, CA
- 1995-10-25 091 POINT LOMA, CA
- 1995-10-11 089 SANTA CRUZ ISLAND EAST, CA
- 1995-10-12 088 SANTA CRUZ ISLAND WEST, CA
- 1995-10-12 090 MONTECITO, CA
- 1995-10-11 087 SANTA ROSA ISLAND, CA
- 1995-07-01 085 KINGS BAY, GA
- 1995-05-11 095 GRAYS HARBOR, WA
- 1995-07-01 073 HUNTINGTON BEACH, CA
- 1992-02-01 070 OCEANSIDE B DOCK, CA
- 1991-07-01 069 OCEANSIDE CHANNEL ENTRANCE, CA
- 1986-12-01 063 HARVEST PLATFORM, CA
- 1983-08-01 054 LONG BEACH, WA
- 1983-07-01 055 IMPERIAL BEACH NORTH, CA
- 1983-07-01 052 SAN CLEMENTE, CA
- 1982-10-01 039 BARKING SANDS, HI
- 1981-11-01 037 COQUILLE RIVER INNER, OR
- 1981-08-01 034 MAKAPUU POINT, HI
- 1977-08-01 005 SANTA CRUZ HARBOR, CA
- 1976-05-01 073 SCRIPPS PIER LA JOLLA, CA

# 2004 IOOS NDBC



Sun Jul 25 2004 11:28:02 GMT-0700 (Pacific Daylight Time)

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- 2004-07-20: 067 SAN NICOLAS ISLAND, CA
- 2004-07-13: 036 GRAYS HARBOR, WA
- 2004-06-16: 107 GOLETA POINT, CA
- 2004-06-16: 121 IRIAN, GUAM
- 2004-05-19: 098 MOKAPU POINT, HI
- 2004-05-06: 071 HARVEST, CA
- 2004-04-11: 029 POINT REYES, CA
- 2004-04-15: 045 OCEANSIDE OFFSHORE, CA
- 2004-03-16: 125 EL PORTO NEARSHORE, CA
- 2004-03-09: 092 SAN PEDRO, CA
- 2004-03-06: 091 POINT LOMA, CA
- 2004-01-12: 090 PUNTA ANA, CA
- 2004-01-16: 094 CAVE MEXICO, CA
- 2004-01-15: 028 SANTA MONICA BAY, CA
- 2003-11-03: 106 MANILA BAY, HI
- 2003-10-10: 096 DANA POINT, CA
- 2003-10-02: 124 SCRIPPS CANYON SOUTHWEST NCEX, CA
- 2003-09-01: 111 ANACAPA PASSAGE, CA
- 2003-08-25: 122 SCRIPPS CANYON MIDPOINT NCEX, CA
- 2003-08-12: 116 SCRIPPS CANYON SOUTH NCEX, CA
- 2003-06-18: 100 TORREY PINES OUTER, CA
- 2003-03-04: 095 POINT LA JOLLA, CA
- 1995-07-01: 083 KINOS BAY, CA
- 1976-05-01: 073 SCRIPPS PIER LA JOLLA, CA



# 2010 Iridium Comms

Sat May 08 2010 10:33:53 GMT-0700 (Pacific Daylight Time)

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- 2010-04-29 166 OCEAN STATION PAPA
- 2010-05-05 164 BARBERS POINT 19NM SW HI
- 2010-05-05 159 PEARL REEF HI
- 2010-04-06 137 CAPE HENRY VA
- 2010-04-18 163 KAUAI MANUHO MARSHALL ISLANDS
- 2010-03-24 169 VENTURA NEARSHORE CA
- 2010-03-10 142 SAN FRANCISCO BAY CA
- 2010-02-22 106 WAHIA BAY HI
- 2010-01-24 043 CAMP PENDLETON NEARSHORE CA
- 2010-02-03 045 OCEANSIDE OFFSHORE CA
- 2010-02-04 094 CAPE MENDOCINO CA
- 2010-02-06 168 HUMBOLDT BAY NORTH SPIT CA
- 2010-02-04 128 HUMBOLDT BAY SOUTH SPIT CA
- 2010-01-31 098 MOKAPU POINT HI
- 2010-01-06 096 DNA POINT HI
- 2010-01-06 132 PENLAND BEACH FL
- 2010-01-06 167 SAN JUAN CA
- 2009-11-17 111 ANACAPA PASSAGE CA
- 2009-11-03 431 CHRISTIANSTEDT ST CROIX VI
- 2009-09-23 162 CLATSOP SPIT OR
- 2009-09-24 144 ST. PETERSBURG OFFSHORE FL
- 2009-09-30 154 BLOCK ISLAND RI
- 2009-09-03 167 SAN NICOLAS ISLAND NORTH CA
- 2009-07-29 107 GOLETA POINT CA
- 2009-07-29 150 MASONBORO INLET ILM2 NC
- 2009-08-04 134 PORT PIERCE FL
- 2009-06-25 092 SAN PEDRO CA
- 2009-06-01 158 CABRILLO POINT NEARSHORE CA
- 2009-06-11 086 GRAYS HARBOR WA
- 2009-05-19 099 POINT LOMA SOUTH CA
- 2009-05-19 099 POINT LOMA SOUTH CA
- 2009-05-12 191 POINT LOMA SOUTH CA
- 2009-04-19 161 SAN ELIJO NEARSHORE CA
- 2009-04-23 028 SANTA MONICA BAY CA
- 2009-03-31 139 LIMPOLIA OFFSHORE OR
- 2009-03-31 430 DUCK PFR 26M NC
- 2009-03-31 071 HARVEST CA
- 2008-11-04 156 MONTEREY CANYON OUTER CA
- 2008-09-17 076 DIABLO CANYON CA
- 2008-04-24 121 PAPA GUAM
- 2008-02-15 143 CAPE CANVERAL NEARSHORE FL
- 2007-06-26 093 MISSION BAY OFFSHORE CA
- 1976-05-01 093 SCRIPPS PIER LA JOLLA CA

# 2010 Iridium Comms

Wed Dec 29 2010 14:07:52 GMT-0800 (Pacific Standard Time)

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- 2010-12-01 028 SANTA MONICA BAY, CA
- 2010-11-30 071 HAWAII, CA
- 2010-11-15 177 LAKE WASHINGTON NORTH, WA
- 2010-11-16 096 DANA POINT, CA
- 2010-11-15 022 PENNSYLVANIA BEACH, RI
- 2010-11-15 024 CANNON POINT, CA
- 2010-11-04 100 TORREY PINES OUTLET, CA
- 2010-09-30 093 MISSION BAY OFFSHORE, CA
- 2010-10-05 165 BARBERS POINT, HI
- 2010-09-13 029 POINT REYES, CA
- 2010-09-17 191 POINT LOMA SOUTH, CA
- 2010-09-20 158 CABRILLO POINT NEARSHORE, CA
- 2010-08-26 174 SOUTH HECKATE STRAIT, CANADA
- 2010-08-19 076 DALLAS CANYON, CA
- 2010-08-11 094 CAPE MENDOCINO, CA
- 2010-07-29 161 SAN ELLIO NEARSHORE, CA
- 2010-07-18 142 SAN FRANCISCO BAY, CA
- 2010-06-16 095 GRAYS HARBOR, WA
- 2010-06-26 021 PENNSYLVANIA BEACH, RI
- 2010-06-26 150 MONSIEUR CANNON OUTLET, CA
- 2010-06-28 432 BARBERS POINT, HI
- 2010-05-31 160 JEFFERYS LEDGE, NH
- 2010-05-09 170 SOUTH BAMEIA ISLAND, CANADA
- 2010-05-19 430 DUCK HBR, CAN, NC
- 2010-04-29 166 OCEAN STATION PAPA
- 2010-04-06 147 CAPE HENRY, VA
- 2010-04-16 157 POINT SUR, CA
- 2010-04-18 163 KALO, MAJURO, MARSHALL ISLANDS
- 2010-03-24 169 VENTURA NEARSHORE, CA
- 2010-02-22 106 WAIKANA BAY, HI
- 2010-02-03 045 OCEANSHORE OFFSHORE, CA
- 2010-02-03 046 OCEANSHORE OFFSHORE, CA
- 2010-02-04 128 HUMBOLDT BAY SOUTH SPIIT, CA
- 2010-12-04 067 SAN NICOLAS ISLAND, CA
- 2009-11-17 111 ANACAPA PASSAGE, CA
- 2009-09-23 162 CLATSOP SPIIT, OR
- 2009-09-24 144 ST. PETERSBURG OFFSHORE, RI
- 2009-09-30 154 BLOCK ISLAND, RI
- 2009-09-03 167 SAN NICOLAS ISLAND NORTH, CA
- 2009-07-13 107 GOLETA POINT, CA
- 2009-07-29 150 MASONBORO INLET, ILL, NC
- 2009-08-04 134 PORT PIERCE, CA
- 2009-06-25 092 SAN PEDRO, CA
- 2009-03-31 139 OAKVIA OFFSHORE, OR
- 1976-05-01 003 SCRIPPS PIER LA JOLLA, CA



# 2012 AWS EC2 Data Acq

May 18 2012 09:16:27 GMT-0700 (Pacific Daylight Time)

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- 2012-04-30 143 CAVE CANAVERA NEARSHORE, FL
- 2012-05-03 196 GRAYS HARBOR, WA
- 2012-05-01 175 CENTRAL COOK INLET, AK
- 2012-04-18 193 SAN PEDRO WEST, CA
- 2012-04-20 028 SANTA MONICA BAY, CA
- 2012-04-13 190 NEW RIVER INLET, NC
- 2012-04-26 165 BARBERS POINT, HI
- 2012-04-26 195 LA PEROUSE BANK, CANADA
- 2012-04-02 186 CAVE CHARLES, VA
- 2012-04-07 192 OREGON INLET, NC
- 2012-04-03 142 SAN FRANCISCO BAY, CA
- 2012-03-09 096 DANA POINT, CA
- 2012-03-12 50 DUCKENBOND INLET, ILL, NC
- 2012-03-11 150 PENNSYLVANIA, PA
- 2012-03-20 009 POINT REYES, CA
- 2012-03-15 093 MISTON BAY OFFSHORE, CA
- 2012-02-29 188 HILO, HAWAII, HI
- 2012-02-06 100 TORREY PINES OUTER, CA
- 2012-02-13 045 OCEANSIDE OFFSHORE, CA
- 2012-01-31 191 POINT LOMA SOUTH, CA
- 2012-01-13 156 MONTEREY CANYON OUTER, CA
- 2012-01-06 106 WAIMEA BAY, HI
- 2012-01-10 107 GOLETA POINT, CA
- 2011-12-08 043 CAMP PENDLETON NEARSHORE, CA
- 2011-12-02 187 PALUWELA, MAUI, HI
- 2011-11-20 154 BLOCK ISLAND, RI
- 2011-11-20 192 SAN JOAQUIN OFFSHORE, OR
- 2011-10-18 092 HUMBOLDT BAY SOUTH SPIRIT, CA
- 2011-10-17 094 CAVE MEMOCINO, CA
- 2011-10-03 176 HALIFAX HARBOR, CANADA
- 2011-09-13 167 SAN NICOLAS ISLAND NORTH, CA
- 2011-09-22 185 MONTEREY BAY WEST, CA
- 2011-09-14 067 SAN NICOLAS ISLAND, CA
- 2011-08-31 147 CAVE HENRY, VA
- 2011-08-04 132 FERNANDINA BEACH, FL
- 2011-08-20 121 PAN, GUAM
- 2011-07-21 111 ANACAPA PASSAGE, CA
- 2011-06-12 151 POINT SUR, CA
- 2011-05-27 161 SAN ELIJO NEARSHORE, CA
- 2011-05-06 194 SAN JUAN DE LOS RIOS SOUTH, CA
- 2011-04-25 134 PORT PIERCE, WA
- 2011-04-25 146 KALAMAYUL, YANU, HI
- 2011-04-27 162 CLATSOP SPIRIT, OR
- 2011-04-07 179 ASTORIA CANYON, OR
- 2011-03-29 144 ST. PETERSBURG OFFSHORE, FL
- 2011-02-09 180 SAN FRANCISCO OFFSHORE, CA
- 2011-01-31 098 MOKAPU POINT, HI
- 2010-11-30 071 HAWVEST, CA
- 2010-09-20 158 CABRILLO POINT NEARSHORE, CA
- 2010-08-19 166 OCEANO STATION 199A
- 2010-04-29 165 OCEANO STATION 199A
- 1976-05-01 003 SCRIPPS PIER LA JOLLA, CA

# 2014 AWS Glacier Backups

Time Jul 22 2014 03:29:56 GMT-0700 (Pacific Daylight Time)

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- 2014-07-09 093 MISSION BAY OFFSHORE, CA
- 2014-07-11 211 REE OF SHOALS, NH
- 2014-07-17 067 SAN NICOLAS ISLAND, CA
- 2014-07-29 163 KALO, MAURO, MARSHALL ISLANDS
- 2014-06-23 146 KAUAI, LA PAUL, LANAI, HI
- 2014-06-24 181 RINCON, PUERTO RICO
- 2014-07-01 155 MONTEREY CANYON OUTER, CA
- 2014-07-01 185 MONTEREY BAY WEST, CA
- 2014-06-26 094 CAVE MENDOCINO, CA
- 2014-06-09 154 BLOCK ISLAND, RI
- 2014-06-12 100 TORREY PINES OUTER, CA
- 2014-06-15 043 CAMP PENDLETON NEARSHORE, CA
- 2014-06-11 210 OFFSHORE WIND ENERGY AREA, VA
- 2014-05-28 153 CAVE CANVERVAL NEARSHORE, RI
- 2014-05-19 305 BETTON ISLAND, KETCHIKAN, AK
- 2014-05-06 147 CAVE HENRY, VA
- 2014-05-02 111 ANACAPA PASSAGE, CA
- 2014-05-08 158 CABRILLO POINT NEARSHORE, CA
- 2014-04-10 096 DANA POINT, CA
- 2014-04-14 121 IPAN, GUAM
- 2014-03-24 165 BARBERS POINT, HI
- 2014-03-27 198 KAUOHE BAY, HI
- 2014-03-13 150 MASONBORO INLET, ILM2, NC
- 2014-03-09 190 NEW RIVER INLET, NC
- 2014-03-14 196 UNIOUA OFFSHORE, OR
- 2014-01-16 79 ESTONIA POINT, GUAM
- 2014-01-16 197 EASTON CAUSEWAY, OR
- 2013-12-18 028 SANTA MONICA BAY, CA
- 2013-12-05 144 ST. PETERSBURG OFFSHORE, RI
- 2013-12-05 134 PORT PIERCE, RI
- 2013-12-17 132 FERNANDINA BEACH, FL
- 2013-11-13 107 GOLETA POINT, CA
- 2013-11-18 098 MOKAPU POINT, HI
- 2013-11-01 071 HAWVEST, CA
- 2013-10-16 029 POINT REYES, CA
- 2013-10-18 157 POINT SUR, CA
- 2013-10-22 160 EFFRENS LEDGE, NH
- 2013-10-13 036 GRAYS HARBOR, WA
- 2013-09-20 045 OCEANSIDE OFFSHORE, CA
- 2013-09-11 186 CAVE CHARLES, VA
- 2013-08-27 076 DAVITO CANYON, CA
- 2013-08-26 168 HUMBOLDT BAY NORTH SPRT, CA
- 2013-08-12 191 POINT LOMA SOUTH, CA
- 2013-07-12 201 SCRIPPS NEARSHORE, CA
- 2013-07-08 192 OREGON INLET, OR
- 2013-06-24 092 SAN PEDRO, CA
- 2013-06-19 142 SAN FRANCISCO BAR, CA
- 2013-05-09 433 DUCK PFR 17M, NC
- 2013-05-08 106 WAMBA BAY, HI
- 2012-10-03 166 OCEAN STATION 99A
- 1976-05-01 073 SCRIPPS PIER LA JOLLA, CA



# 2018 AWS RDS Meta API

Sat Jan 06 2018 11:51:23 GMT-0800 (Pacific Standard Time)

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- 2018-01-04 191 POINT LOMA SOUTH, CA
- 2017-12-07 157 PAINTE LA WALK, HI
- 2017-12-13 150 PAINTE LA WALK, HI
- 2017-11-13 220 MISSION BAY WEST, CA
- 2017-11-27 143 CAVE CANAVERA, NEARSHORE, FL
- 2017-11-17 144 ST. PETERSBURG OFFSHORE, FL
- 2017-11-27 154 BLOCK ISLAND, RI
- 2017-11-16 203 SANTA CRUZ BASIN, CA
- 2017-11-01 214 EGMONT CHANNEL ENTRANCE, FL
- 2017-11-02 490 DUCK FHR-25M, NC
- 2017-11-07 228 CHESTER SHOAL, FL
- 2017-11-13 217 ONSLOW BAY OUTER, NC
- 2017-11-01 168 HUMBOLDT BAY NORTH SPIT, CA
- 2017-10-23 225 KAUOHE BAY, WEIS, HI
- 2017-10-23 225 KAUOHE BAY, WEIS, HI
- 2017-10-24 185 MONTREY BAY, WEST, CA
- 2017-09-27 235 FORT BRAGG SOUTH, CA
- 2017-10-05 221 CAVE COD BAY, MA
- 2017-09-25 157 POINT SUR, CA
- 2017-09-13 121 IPAN, GUAM
- 2017-09-19 234 SANTA BARBARA ISLAND NORTH, CA
- 2017-08-24 162 CLATSOP SPIT, OR
- 2017-07-31 236 KODIAK, AK
- 2017-08-08 076 DIABLO CANYON, OR
- 2017-07-15 200 WILMINGTON HARBOR, NC
- 2017-07-18 493 DUCK FHR-17M, NC
- 2017-07-24 222 SANTA LUCIA ENCAMPMENT, CA
- 2017-07-24 222 SANTA LUCIA ENCAMPMENT, CA
- 2017-06-29 096 GRAYS HARBOR, WA
- 2017-06-26 098 MOKAPU POINT, HI
- 2017-06-08 188 HILO, HAWAII, HI
- 2017-06-16 147 CAVE HENRY, VA
- 2017-06-16 226 PULLEY RIDGE, FL
- 2017-05-29 233 PEARL HARBOR ENTRANCE, HI
- 2017-05-03 139 UMIQUA OFFSHORE, OR
- 2017-05-02 028 SANTA MONICA BAY, CA
- 2017-04-27 196 BITTIDIAN POINT, GUAM
- 2017-03-23 192 OREGON INLET, NC
- 2017-03-29 189 ANULU, AMERICAN SAMOA
- 2017-03-31 281 LAKESIDE, OR
- 2017-04-05 280 PAINTE LA WALK, HI
- 2017-03-27 194 ST. AUGUSTINE, FL
- 2017-02-24 158 CABRILLO POINT NEARSHORE, CA
- 2017-03-04 142 SAN RANCSO BAR, CA
- 2017-03-04 171 VIRGINIA BEACH OFFSHORE, VA
- 2017-01-31 045 OCEANSIDE OFFSHORE, CA
- 2016-12-08 106 WAMBA BAY, HI
- 2016-12-15 204 LOWER COOK INLET, AK
- 2016-12-13 134 PORT PIERCE, FL
- 2016-11-14 132 FERNANDINA BEACH, FL
- 2016-11-16 197 TANAPAG, SAIPAN, MNH
- 2016-09-26 067 SAN NICOLAS ISLAND, CA
- 2016-10-03 094 CAVE KENDONCO, CA
- 2016-08-30 150 MASONBRO INLET, ILMZ, NC
- 2016-06-23 224 WALLONS ISLAND, VA
- 2016-06-03 071 HARVEST, CA
- 2016-06-02 043 CAMP PENDLETON NEARSHORE, CA
- 2016-05-03 163 KALO, MAUI, HI
- 2016-05-02 213 SAN PEDRO SOUTH, CA
- 2016-02-03 111 ANACAPA PASSAGE, CA
- 2015-06-26 100 TORREY PINES OUTER, CA
- 2015-01-07 215 LONG BEACH CHANNEL, CA
- 2014-12-31 166 OCEAN STATION PAIN
- 1976-05-01 073 SCRIPPS PIER LA JOLLA, CA



Thu Aug 20 2020 20:37:37 GMT-0700 (Pacific Daylight Time)

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- |            |   |            |   |
|------------|---|------------|---|
| 2020-08-03 | 155 IMPERIAL BEACH NE SHORE, CA         | 2020-08-03 | 155 IMPERIAL BEACH NE SHORE, CA         |
| 2020-08-10 | 247 GRAND ISLE OUTER LA                 | 2020-08-10 | 247 GRAND ISLE OUTER LA                 |
| 2020-08-08 | 181 PINCONA PUERTO RICO                 | 2020-08-08 | 181 PINCONA PUERTO RICO                 |
| 2020-08-17 | 103 TOPANAGA NE SHORE, CA               | 2020-08-17 | 103 TOPANAGA NE SHORE, CA               |
| 2020-08-17 | 213 SAN PETER SOUTH, CA                 | 2020-08-17 | 213 SAN PETER SOUTH, CA                 |
| 2020-07-20 | 223 PIER HARBOR ENTRANCE HI             | 2020-07-20 | 223 PIER HARBOR ENTRANCE HI             |
| 2020-07-20 | 143 CAVE CANNIVAL NE SHORE, HI          | 2020-07-20 | 143 CAVE CANNIVAL NE SHORE, HI          |
| 2020-07-20 | 209 BARBERS PT, MAJALDEA, HI            | 2020-07-20 | 209 BARBERS PT, MAJALDEA, HI            |
| 2020-07-27 | 158 CARILLI O POINT NE SHORE, CA        | 2020-07-27 | 158 CARILLI O POINT NE SHORE, CA        |
| 2020-07-20 | 132 FERRARI O POINT NE SHORE, CA        | 2020-07-20 | 132 FERRARI O POINT NE SHORE, CA        |
| 2020-07-07 | 266 OCEAN STATION PARK, FL              | 2020-07-07 | 266 OCEAN STATION PARK, FL              |
| 2020-06-11 | 252 KANAKAS PASS CHANNEL ENTRANCE S, TX | 2020-06-11 | 252 KANAKAS PASS CHANNEL ENTRANCE S, TX |
| 2020-06-21 | 240 THIMBLE ISLAND, VA                  | 2020-06-21 | 240 THIMBLE ISLAND, VA                  |
| 2020-06-15 | 230 ISLE ROYALE EAST, MI                | 2020-06-15 | 230 ISLE ROYALE EAST, MI                |
| 2020-06-24 | 228 BARBERS POINT, KAUAI, OA, HI        | 2020-06-24 | 228 BARBERS POINT, KAUAI, OA, HI        |
| 2020-06-23 | 204 LOWERS COOK INLET, AK               | 2020-06-23 | 204 LOWERS COOK INLET, AK               |
| 2020-05-25 | 157 POINT SUIS, CA                      | 2020-05-25 | 157 POINT SUIS, CA                      |
| 2020-06-03 | 144 ST. PETERBURG OFFSHORE, FL          | 2020-06-03 | 144 ST. PETERBURG OFFSHORE, FL          |
| 2020-06-04 | 227 VIRGINIA BEACH OFFSHORE, VA         | 2020-06-04 | 227 VIRGINIA BEACH OFFSHORE, VA         |
| 2020-06-04 | 226 PULASKI RIDGE, FL                   | 2020-06-04 | 226 PULASKI RIDGE, FL                   |
| 2020-02-19 | 137 KALANANAPA'OHU SHIPW, HI            | 2020-02-19 | 137 KALANANAPA'OHU SHIPW, HI            |
| 2020-01-29 | 319 KALANANAPA'OHU SOUTHWEST, KAUAI, HI | 2020-01-29 | 319 KALANANAPA'OHU SOUTHWEST, KAUAI, HI |
| 2020-01-29 | 106 WAKES BAY, HI                       | 2020-01-29 | 106 WAKES BAY, HI                       |
| 2020-01-14 | 191 POINT LOMA SOUTH, CA                | 2020-01-14 | 191 POINT LOMA SOUTH, CA                |
| 2020-12-19 | 036 GARDEN HARBOR, HI                   | 2020-12-19 | 036 GARDEN HARBOR, HI                   |
| 2020-11-26 | 202 HAAHELE, KAUAI, HI                  | 2020-11-26 | 202 HAAHELE, KAUAI, HI                  |
| 2020-12-04 | 179 ASTORIA CANYON, OR                  | 2020-12-04 | 179 ASTORIA CANYON, OR                  |
| 2020-12-04 | 241 NOME, AK                            | 2020-12-04 | 241 NOME, AK                            |
| 2020-12-03 | 166 OCEAN STATION PARK, HI              | 2020-12-03 | 166 OCEAN STATION PARK, HI              |
| 2020-11-27 | 196 BILTMORE POINT, GUAM                | 2020-11-27 | 196 BILTMORE POINT, GUAM                |
| 2020-11-15 | 214 EGMONT CHANNEL ENTRANCE, FL         | 2020-11-15 | 214 EGMONT CHANNEL ENTRANCE, FL         |
| 2020-11-14 | 142 SAN FRANCISCO BAR, CA               | 2020-11-14 | 142 SAN FRANCISCO BAR, CA               |
| 2020-11-14 | 153 DEL MAR WINEHOUSE, CA               | 2020-11-14 | 153 DEL MAR WINEHOUSE, CA               |
| 2020-10-17 | 200 WEST LAKE OUTER, CA                 | 2020-10-17 | 200 WEST LAKE OUTER, CA                 |
| 2020-10-02 | 030 POINT PIERES, CA                    | 2020-10-02 | 030 POINT PIERES, CA                    |
| 2020-09-18 | 200 WILKINGTON HARBOR, NC               | 2020-09-18 | 200 WILKINGTON HARBOR, NC               |
| 2020-08-07 | 198 KANDOE BAY, HI                      | 2020-08-07 | 198 KANDOE BAY, HI                      |
| 2020-07-25 | 028 SANTA MONICA BAY, CA                | 2020-07-25 | 028 SANTA MONICA BAY, CA                |
| 2020-07-31 | 187 PALMULEIA, MAUI, HI                 | 2020-07-31 | 187 PALMULEIA, MAUI, HI                 |
| 2020-07-09 | 223 PIER HARBOR ENTRANCE, HI            | 2020-07-09 | 223 PIER HARBOR ENTRANCE, HI            |
| 2020-07-09 | 203 SANTA CRUZ BASIN, CA                | 2020-07-09 | 203 SANTA CRUZ BASIN, CA                |
| 2020-06-26 | 433 DUCK REEF TTM, NC                   | 2020-06-26 | 433 DUCK REEF TTM, NC                   |
| 2020-06-26 | 168 HUMBOLDT BAY NORTH SPIT, CA         | 2020-06-26 | 168 HUMBOLDT BAY NORTH SPIT, CA         |
| 2020-06-17 | 150 WASHINGTON INLET, ILLINOIS, NC      | 2020-06-17 | 150 WASHINGTON INLET, ILLINOIS, NC      |
| 2020-06-18 | 071 HARVEST, CA                         | 2020-06-18 | 071 HARVEST, CA                         |
| 2020-06-28 | 092 SAN PEDRO, CA                       | 2020-06-28 | 092 SAN PEDRO, CA                       |
| 2020-06-28 | 132 FERRARI O POINT NE SHORE, CA        | 2020-06-28 | 132 FERRARI O POINT NE SHORE, CA        |
| 2020-06-05 | 132 FERRARI O POINT NE SHORE, CA        | 2020-06-05 | 132 FERRARI O POINT NE SHORE, CA        |
| 2020-06-16 | 189 LUNDAUN, AMERICAN SAMOA             | 2020-06-16 | 189 LUNDAUN, AMERICAN SAMOA             |
| 2020-06-16 | 430 DUCK REEF, NC                       | 2020-06-16 | 430 DUCK REEF, NC                       |
| 2020-03-28 | 205 BELTON ISLAND, KETCHIKAN, AK        | 2020-03-28 | 205 BELTON ISLAND, KETCHIKAN, AK        |
| 2020-03-31 | 076 DELTA CANYON, CA                    | 2020-03-31 | 076 DELTA CANYON, CA                    |
| 2020-04-01 | 217 ONSLOW BAY OUTER, NC                | 2020-04-01 | 217 ONSLOW BAY OUTER, NC                |
| 2020-03-31 | 163 KALO, HAUWAO, MAHAIHAI ISLANDS      | 2020-03-31 | 163 KALO, HAUWAO, MAHAIHAI ISLANDS      |
| 2020-03-31 | 225 KANDOE BAY, WETS, HI                | 2020-03-31 | 225 KANDOE BAY, WETS, HI                |
| 2020-03-03 |   |            |   |



# 2021 AWS EFS ERDDAP

Thu May 03 2022 18:17:07 GMT-0800 (Pacific Standard Time)

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- 2022-02-14 240 THIMBLE SHOAL, VA
- 2022-02-15 238 BARBERS POINT, KAUAI, HI
- 2022-02-16 237 BARBERS POINT, KAUAI, HI
- 2022-02-18 160 JEFFERS LODGE, HI
- 2022-02-25 433 DUCK FEE TMA, NC
- 2022-03-03 213 SAN PEDRO SOUTH, CA
- 2022-02-22 254 POINT SANTA CRUZ, CA
- 2022-02-14 147 CAPE HENRY, VA
- 2022-01-31 196 BITTIAN POINT, GUAM
- 2022-01-31 098 MOHAKU POINT, HI
- 2022-02-10 045 OCEANSIDE OFFSHORE, CA
- 2022-02-13 142 SAN FRANCISCO BAR, CA
- 2022-02-08 181 PAUWELA, MAUI, HI
- 2022-01-09 134 PORT PIERCE, FL
- 2022-01-13 171 VIRGINIA BEACH OFFSHORE, VA
- 2022-01-06 029 POINT REYES, CA
- 2022-01-11 154 MASONBORO INLET, WA
- 2021-12-07 244 STANN SHOAL, FL
- 2021-11-17 190 MASONBORO INLET, ILM2, NC
- 2021-12-02 191 POINT LOMA SOUTH, CA
- 2021-11-29 036 GRAYS HARBOR, WA
- 2021-10-31 106 WAMUKA BAY, HI
- 2021-10-31 233 PEARL HARBOR ENTRANCE, HI
- 2021-11-04 201 SCRIPPS NEARSHORE, CA
- 2021-11-09 222 SANTA LUCIA ESCARPMENT, CA
- 2021-11-05 101 TORREY PINES INNER, CA
- 2021-11-01 144 ST. PETERSBURG OFFSHORE, FL
- 2021-11-11 162 CLATSOP SPIT, OR
- 2021-10-14 139 OAHU OFFSHORE, OR
- 2021-11-12 153 HONOLULU OFFSHORE, HI
- 2021-11-11 197 HANAKOPE SEAPAN, HI
- 2021-09-28 219 MCGARRARD BARTLEDOOR, PALAU
- 2021-10-06 143 CAPE CANAVERAL NEARSHORE, FL
- 2021-09-14 200 WILMINGTON HARBOR, NC
- 2021-08-19 243 MAGS HEAD, NC
- 2021-08-15 252 ARANAS PASS CHANNEL ENTRANCE S, TX
- 2021-08-23 181 RINCON, PUERTO RICO
- 2021-07-26 092 SAN PEDRO, CA
- 2021-06-30 250 CAPE HATTERAS EAST, NC
- 2021-07-02 189 AUNULU, AMERICAN SAMOA
- 2021-07-06 185 MONTEREY BAY WEST, CA
- 2021-06-30 188 HILO, HAWAII, HI
- 2021-06-11 264 LOVEN COOK INLET, AK
- 2021-06-11 253 TONGVA, CA
- 2021-06-13 198 KANDIHE BAY, HI
- 2021-05-18 214 EGMONT CHANNEL ENTRANCE, FL
- 2021-05-17 194 ST. AUGUSTINE, FL
- 2021-04-21 241 MORE, AK
- 2021-04-22 028 SANTA MONICA BAY, CA
- 2021-04-13 213 SAN PEDRO SOUTH, CA
- 2021-04-05 256 SOUTHWEST PASS ENTRANCE W, LA
- 2021-03-17 158 CABRILLO POINT NEARSHORE, CA
- 2021-03-23 202 HANAIE, KAUAI, HI
- 2021-02-23 203 SANTA CRUZ BASIN, CA
- 2021-02-16 100 TORREY PINES OUTER, CA
- 2021-01-27 250 CAPE HENRY, NC
- 2021-01-27 250 CAPE HENRY, NC
- 2021-11-23 121 BAN, GUAM
- 2020-11-24 167 SAN NICOLAS ISLAND, CA
- 2020-11-23 187 PAUWELA, MAUI, HI
- 2020-12-03 217 ONSLOW BAY OUTER, NC
- 2020-10-23 154 BLOCK ISLAND, RI
- 2020-09-29 076 DIABLO CANYON, CA
- 2020-10-13 220 MISSION BAY WEST, CA
- 2020-10-02 249 ARECIBO, PUERTO RICO
- 2020-09-22 160 JEFFERS LEVEE, NH
- 2020-09-09 045 OCEANSIDE OFFSHORE, CA
- 2020-08-25 179 ASTORIA CANYON, OR
- 2020-09-01 164 CAPE PERDUOCH, CA
- 2020-07-20 228 BAYBERRY POINT, KAUAI, HI
- 2020-07-20 209 BAYVIEW, N
- 2020-07-30 132 FERNANDINA BEACH, FL
- 2020-05-22 157 POINT SUR, CA
- 2020-06-04 226 PULLEY RIDGE, FL
- 2020-05-18 192 OREGON INLET, NC
- 2020-05-05 224 WALLOPS ISLAND, VA
- 2020-02-05 215 LONG BEACH CHANNEL, CA
- 2019-11-14 153 DEL MAR NEARSHORE, CA
- 2019-10-02 029 POINT REYES, CA
- 2019-06-26 168 HUMBOLDT BAY NORTH SPRT, CA
- 2019-06-18 071 BAYVIEW, CA
- 1976-05-01 073 SCRIPPS PIER, LA JOLLA, CA



# 2025 AWS CDIP: Web Processing Models

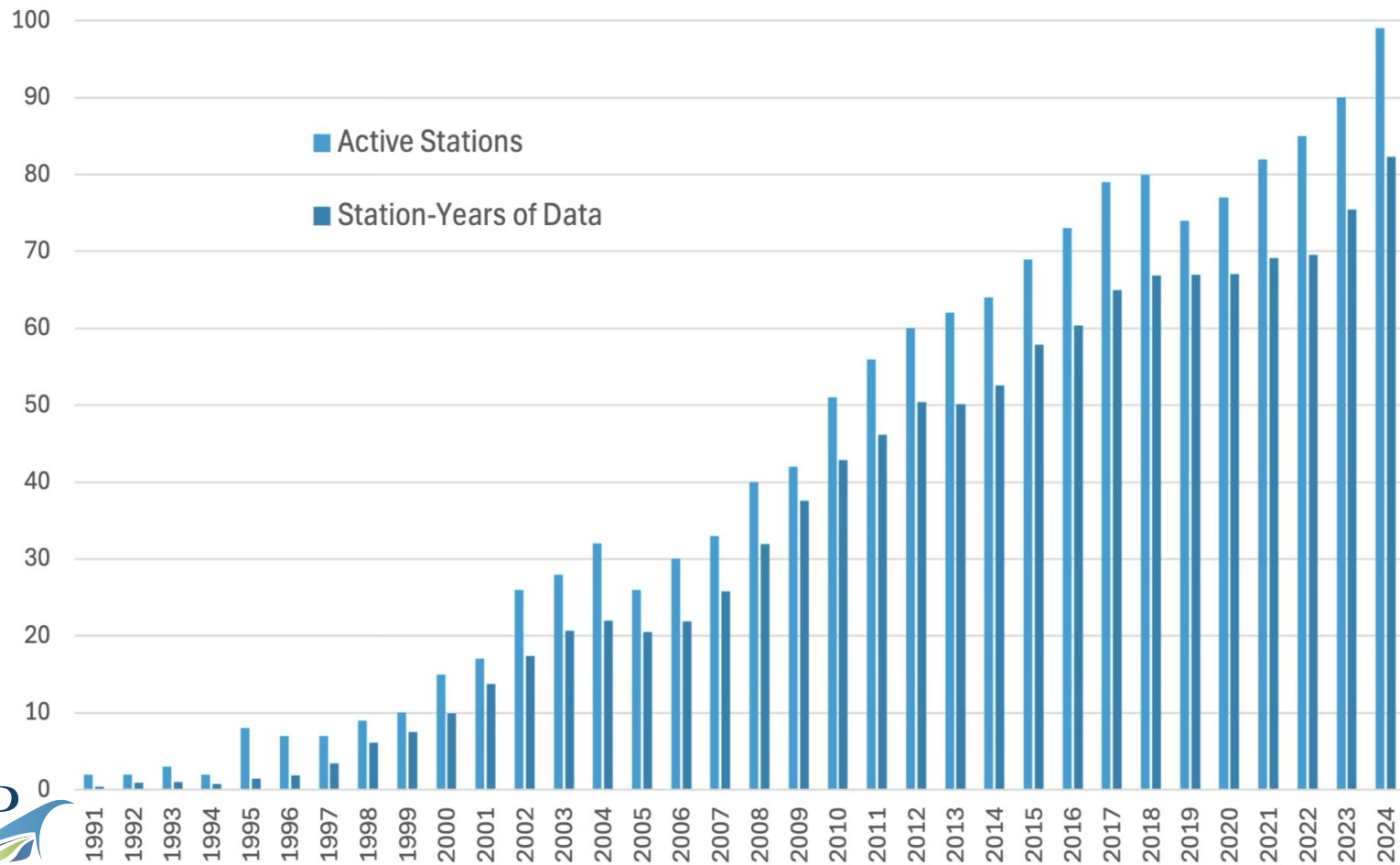
Mon Apr 14 2025 16:06:26 GMT-0700 (Pacific Daylight Time)

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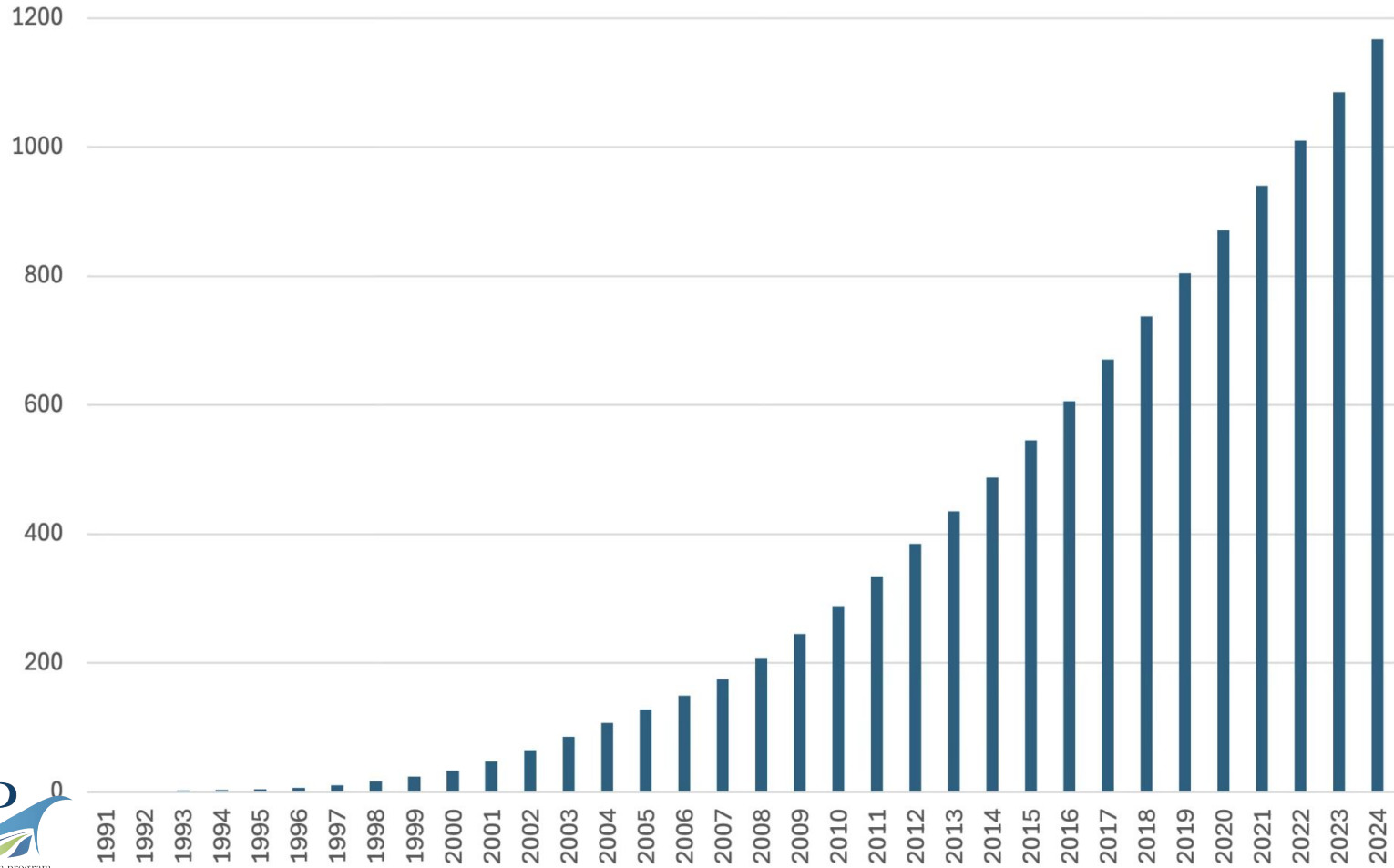
- 2025-04-01 045 OCEANSIDE OFFSHORE, CA
- 2025-04-04 158 HUMBOLDT BAY NORTH SPRT, CA
- 2025-04-04 098 MOKAHE POINT, HI
- 2025-04-02 269 BAWLEY POINT EAST, MI
- 2025-03-31 166 OCEAN STATION PASS, HI
- 2025-03-18 283 WEST BABELDAOB, PALAU
- 2025-03-10 252 KANAKAS PASS CHANNEL ENTRANCE S, TX
- 2025-03-25 268 GRAND ISLAND NORTH, MI
- 2025-03-20 274 OSWEGO, NY
- 2025-02-28 139 UMPOUA OFFSHORE, OR
- 2025-03-09 244 SATINA SHOAL, FL
- 2025-03-03 256 SOUTHWEST PASS ENTRANCE W, LA
- 2025-02-20 201 SCRIPPS NEARSHORE, CA
- 2025-02-12 169 KAUAI, AMERICAN SAMOA
- 2025-02-06 165 KAUAI BAY, HI
- 2025-01-22 191 POINT LOMA SOUTH, CA
- 2025-01-16 155 IMPERIAL BEACH NEARSHORE, CA
- 2025-01-24 219 NGARAAOB, BABELDAOB, PALAU
- 2025-01-03 271 GREEN BEACH OFFSHORE, CA
- 2025-01-02 265 HOLLYWOOD BEACH, FL
- 2025-01-13 156 MONTEREY CANYON OUTER, CA
- 2024-12-10 279 CHANDELEUR ISLANDS SE, LA
- 2024-12-15 198 KAUOHE BAY, HI
- 2024-12-23 217 ONSLOW BAY OUTER, NC
- 2024-12-19 028 SANTA MONICA BAY, CA
- 2024-11-27 270 HONOLULU, HI
- 2024-12-04 225 KAUOHE BAY INNER, HI
- 2024-12-02 223 SANTA LUCIA ESCARPMENT, CA
- 2024-11-22 160 FERRIS LEDGE, NH
- 2024-12-06 281 SOQUEL CODE SOUTH, CA
- 2024-11-08 226 PULLEY RIDGE, FL
- 2024-11-17 233 PEARL HARBOR ENTRANCE, HI
- 2024-11-20 029 POINT REYES, CA
- 2024-11-20 094 CAPE MENDOCINO, CA
- 2024-11-13 280 YAUQUA CHANNEL SW, OR
- 2024-10-27 215 LONG BEACH CHANNEL, CA
- 2024-10-28 071 HARVEST, CA
- 2024-10-28 154 BLOCK ISLAND, RI
- 2024-10-28 200 WILMINGTON HARBOR, NC
- 2024-10-28 154 HONOLULU, HI
- 2024-10-25 192 OREGON INLET, OR
- 2024-09-30 263 BETHANY BEACH, DE
- 2024-09-30 132 FERRANDIA BEACH, FL
- 2024-10-01 168 HUMBOLDT BAY NORTH SPRT, CA
- 2024-10-01 266 PALARO BEACH, CA
- 2024-09-23 153 DEL MAR NEARSHORE, CA
- 2024-09-23 144 ST. PETERSBURG OFFSHORE, FL
- 2024-09-23 139 UMPOUA OFFSHORE, OR
- 2024-09-05 255 TRINITY SHOAL, LA
- 2024-09-05 214 EGOMT CHANNEL ENTRANCE, FL
- 2024-08-07 143 CAPE CANAVERAL NEARSHORE, FL
- 2024-08-21 248 ANGELES POINT, WA
- 2024-08-21 121 BAY GUANO, WA
- 2024-07-31 161 RINCÓN, PUERTO RICO
- 2024-07-28 178 NORTH POINT, PONAPE, MICRONESIA
- 2024-07-01 150 MASONBORO INLET, ILL, NC
- 2024-07-03 250 CAPE HATTERAS EAST, NC
- 2024-07-16 253 MCGUIPIN POINT NORTH, MI
- 2024-07-08 430 DUCK FRF, ZSM, NC
- 2024-06-25 264 RED BEACH NEARSHORE, CA
- 2024-06-13 171 VIRGINIA BEACH OFFSHORE, VA
- 2024-06-28 094 CAPE MENDOCINO, CA
- 2024-06-03 092 SAN PEDRO, CA
- 2024-06-09 169 ANUNUI, AMERICAN SAMOA
- 2024-06-04 271 NAKABO, SAMOA, NI, OR
- 2024-06-04 270 NAKABO, SAMOA, NI, OR
- 2024-04-23 165 OCEAN STATION PASS, HI
- 2024-04-22 278 NEWPORT PASS SOUTH, OR
- 2024-04-26 221 CAPE COD BAY, MA
- 2024-03-03 276 UTOE, KOSRAE, MICRONESIA
- 2024-03-20 158 CABRILLO POINT NEARSHORE, CA
- 2024-02-27 239 KAUAILAUAU SOUTHWEST, LANAI, HI
- 2024-03-05 067 SAN NICOLAS ISLAND, CA
- 2024-03-06 262 ELUCADIA NEARSHORE, CA
- 2024-02-08 238 BARBERS POINT, KAUAI, HI
- 2024-02-12 188 HILLO, HAWAII, HI
- 2024-02-12 162 CLATSOP SPRT, OR
- 2024-02-15 202 KAUAI, KAUAI, HI
- 2024-01-24 200 WILSON BAY, MI
- 2024-01-17 230 WILSON BAY, MI
- 2024-01-17 134 PORT PIERCE, FL
- 2023-12-19 273 KING POLCA, AMERICAN SAMOA
- 2023-11-29 147 CAPE HENRY, VA
- 2023-12-08 209 BARNEGAT, NJ
- 2023-11-09 203 SANTA CRUZ BASIN, CA
- 2023-11-14 272 RUMJUNG, VAN, MICRONESIA
- 2023-11-09 160 FERRIS LEDGE, NH
- 2023-10-31 224 WALLTOPS ISLAND, VA
- 2023-10-03 194 ST. AUGUSTINE, FL
- 2023-10-15 076 DIABLO CANYON, CA
- 2023-10-15 219 NGARAAOB, BABELDAOB, PALAU
- 2023-10-11 483 DUCK FRF, TN, NC
- 2023-08-11 157 POINT SHIP, CA
- 2023-08-11 144 ST. PETERSBURG OFFSHORE, FL
- 2023-08-18 103 TORANCA NEARSHORE, CA
- 2023-08-08 187 PALMER, A, MAU, HI
- 2023-08-04 204 LOWER COOK INLET, AK
- 2023-06-23 243 MACS HEAD, NC
- 2023-06-27 267 PALARO BEACH SOUTH, CA
- 2023-03-16 163 KALO, MAJURO, MARSHALL ISLANDS
- 2022-12-21 100 TORREY PINES OUTER, CA
- 2022-03-03 213 SAN PEDRO SOUTH, HI
- 2022-01-31 098 MOKAHE POINT, HI
- 2022-01-05 029 POINT REYES, CA
- 1976-05-01 073 SCRIPPS PASS, LA POLCA, CA



## CDIP Stations Instrumented with Directional Waverider Buoys



## CDIP Directional Waverider Station-Years of Data, Cumulative





# Why AWS instead of On-Prem?

2011 Southwest Blackout



+

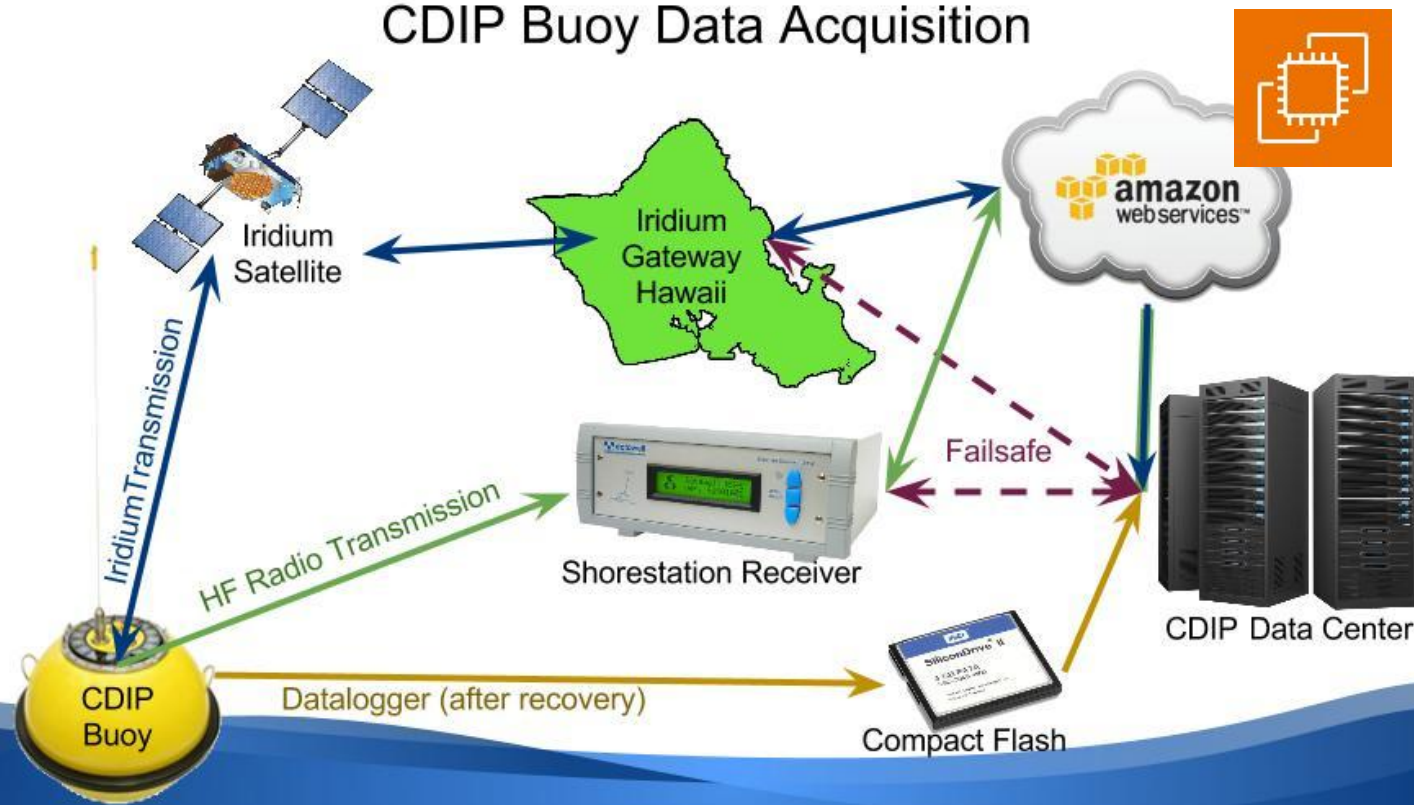
Local Power and Network outages



# 2012 AWS EC2



## CDIP Buoy Data Acquisition





# 2014 AWS Glacier



- Disaster Recovery
- Legato NetWorker DLT Tape backups



Monthly  
Snapshots



AWS Glacier

# 2018 AWS RDS



- Centralized store for CDIP operations metadata (deployments, inventory, contacts and reports)
- Manages deployments through their lifecycle.
- Provides a standard REST API for programmatic interaction
- Easy interface for changing buoy and deployment settings
- Easy interface for managing data back-fills
- Metadata API



[GUDB Home](#)

## Welcome to GUDB!

[Manage Deployments](#)

[CDIP Contacts](#)

[GUDB Admin](#)

[DRF docs](#)

[Inventory](#)

[Reports](#)

## Manage CDIP deployments

Deployment: [New](#) | [Duplicate](#) | [Change station](#) | [Update](#) | [Split](#) | [Add-spare](#)

Station: [New](#) | [Update](#) | [Decomm](#) | [Events](#) | [RXC](#)

Buoy: [Offsite](#) | [Recovered](#) | [Datahold](#) | [Comm](#) | [Show](#)

Backfills: [Auto](#) | [Manual](#)

[List pending deployments](#) **16**

[List unfinished deployments](#)





Pending deployments **16** Done

April 16, 02:23 UTC

011881641487872, text: 881641487872@msg.irisium.com

Legend: **Red** - Do it now! **Orange** - Warning **Green** - Done

[Spare buoy list](#)

# CDIP metadata DB

## Manage deployment lifecycles

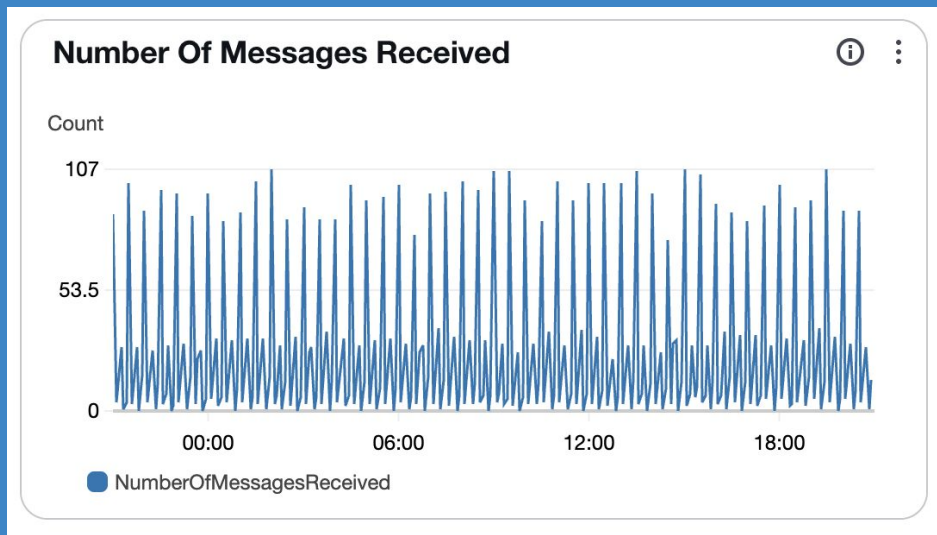
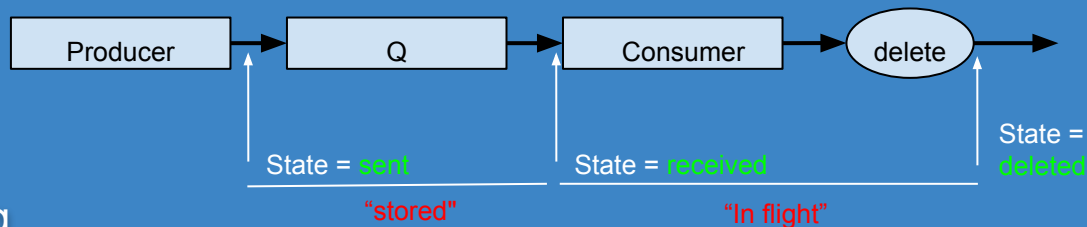
Search:

Station	Deployment README	Mooring	On site Time	Recovered Time	Field Contact	Shore Contact	Pre Check	Saved RT	Data Check	Notes	Deployment Stage
274 OSWEGO, NY <i>Dep: #2 2025-03-20</i> <i>Mission</i>	IDLE STN NEW ANCHOR NEW MOORING	✓	April 25 12:00 1 w 2 d	NA	Weston Cross 716-796-4720 weston.p.cross@usace.army.mil	Ross 619-818-8387	✓	✓	View data	4 10 h 44 m	READY Click if mission is a definite go, up to 24 hours in advance 108.770 nm
94 CAPE MENDOCINO, CA <i>Dep: #21 2024-11-20</i> <i>Mission</i>	IDLE STN OLD ANCHOR NO MOORING	+	+	NA	Jim Long 707-672-5579 jml7001@humboldt.edu	Corey 858-405-2046	✓	✓	×	12 5 d 3 h	NOT READY Fill-in all +
29 POINT REYES, CA <i>Dep: #26 2024-11-20</i> <i>Mission</i>	ACTIVE STN NEW ANCHOR NEW MOORING	✓	+	Wait to set	+	Grant 858-735-4303	✓	Wait for recovery	×	3 4 mo 3 w	NOT READY Fill-in all +
160 JEFFREYS LEDGE, NH <i>Dep: #12 2024-11-22</i>	ACTIVE STN NEW ANCHOR NEW MOORING	✓	+	Wait to set	Shawn Shellito 603-767-7924 Shawn.Shellito@unh.edu	Randy 858-997-5124	✓	Wait for recovery	×	4 2 w 1 d	NOT READY Fill-in all +
265 HOLLYWOOD BEACH, FL	+	✓	+	NA	+	Hailey	✓	✓	×	2	NOT READY

# 2020 AWS SQS



- Realtime Processing Queue
- Purpose: efficient and scalable redundant buoy data processing
- AWS Simple Q Service (SQS) allows multiple “workers” - scalable
- Produces redundant processed buoy data in EFS (AWS Elastic File System)
- Python wrapper for time-tested CDIP FORTRAN code





# 2021 AWS EFS

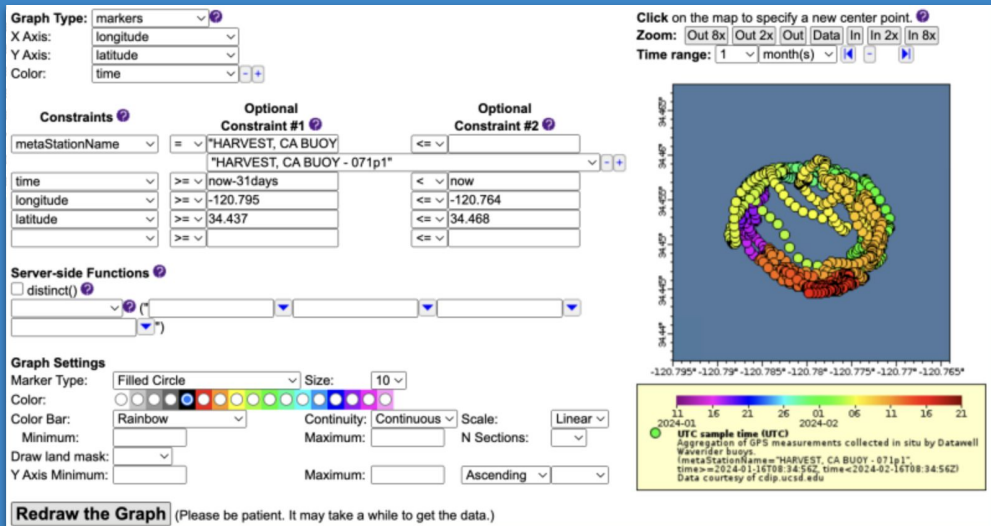
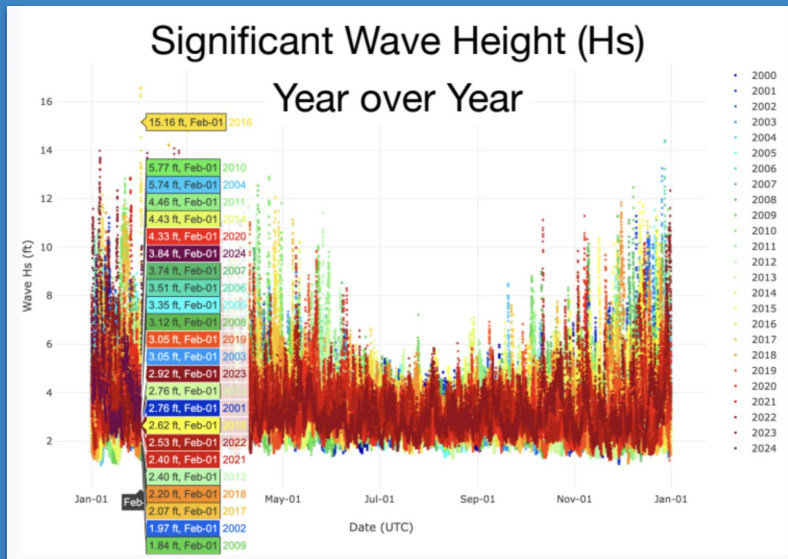


- ERDDAP aggregates realtime and historic netCDF on EFS

## ERDDAP > List of All Datasets

6 matching datasets, listed in alphabetical order.

Grid DAP Data	Sub-set	Table DAP Data	Make A Graph	W M S	Source Data Files	Title	Summary	FGDC, ISO, Metadata	Background Info	RSS	E mail	Institution	Dataset ID
	set	data	graph			* The List of All Active Datasets in this ERDDAP *						CDIP	allDatasets
	set	data	graph	files		Aggregation of Air measurements collected in situ by Datawell Waverider buoys.		F I M	background	<a href="#">RSS</a>	<a href="#">Email</a>	cdip.ucsd.edu	cat4_agg
	set	data	graph	files		Aggregation of GPS measurements collected in situ by Datawell Waverider buoys.		F I M	background	<a href="#">RSS</a>	<a href="#">Email</a>	cdip.ucsd.edu	gps_agg
	set	data	graph	files		Aggregation of SST measurements collected in situ by Datawell Waverider buoys.		F I M	background	<a href="#">RSS</a>	<a href="#">Email</a>	cdip.ucsd.edu	sst_agg
	set	data	graph	files		Aggregation of Surface Current measurements collected in situ by Datawell Waverider buoys.		F I M	background	<a href="#">RSS</a>	<a href="#">Email</a>	cdip.ucsd.edu	acm_agg
	set	data	graph	files		Aggregation of Wave measurements collected in situ by Datawell Waverider buoys.		F I M	background	<a href="#">RSS</a>	<a href="#">Email</a>	cdip.ucsd.edu	wave_agg



# 2025 AWS



## CDIP Entire Stack moved to AWS

- Website
- THREDDS
- Processing
- Models
- Calibration

The screenshot displays the CDIP (Coastal Data Information Program) website. The header includes the CDIP logo, the tagline "Monitoring and Prediction of Waves and Shoreline Change", and logos for SIO, USACE, and DPR. Navigation links include "CDIP", "About", "Observations", "Wave Models", and "More...". A search bar is located on the right. The main content area features a "Welcome to CDIP" message and four prominent buttons: "Recent Observations", "California Wave Model", "Station Map", and "Extreme Wave Events". Below these is a link for "Additional Projects". A paragraph describes the CDIP's mission: "The Coastal Data Information Program (CDIP) measures, analyzes, archives and disseminates coastal environment data for use by coastal engineers, planners and managers, as well as scientists and mariners". A "Selected region of interest" dropdown is set to "All". The footer section contains three featured articles: "CDIP Data Provider Spotlight" (dated Thu, 13 Mar 2025), "Pacific Northwest Winter Cyclone" (dated Fri, 28 Feb 2025), and "Monterey Bay Station" (dated Tue, 04 Feb 2025). Each article includes a thumbnail image and a "Read more ..." link.



# 2025 AWS



EC2



S3 Glacier



RDS



SQS



EFS

## Challenges

- Time
- Moving data
- Realtime Operation data syncing
- BOTs / AI
- Cost
- Evolving Technologies and Services



CloudFormation



IAM



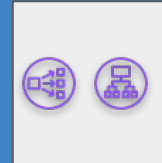
Certificate Manager



CloudTrail



WAF (Firewall)



Load Balancers



CloudWatch



Backup

# 2025 AWS



EC2



S3 Glacier



RDS



SQS



EFS



MySQL™



- ## Challenges
- Time
  - Moving data
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CloudFormation



IAM



Certificate Manager



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Load Balancers



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Backup



# Challenges

- Lift and Shift vs New
- Legacy Code
- Software/Hardware
- Staffing



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- Lift and Shift vs New
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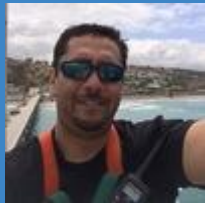




# Challenges



- Lift and Shift vs New
- Legacy Code
- Software/Hardware
- Staffing



# CDIP Web Stats

1.2 million  
Requests Daily

500k/day      Web

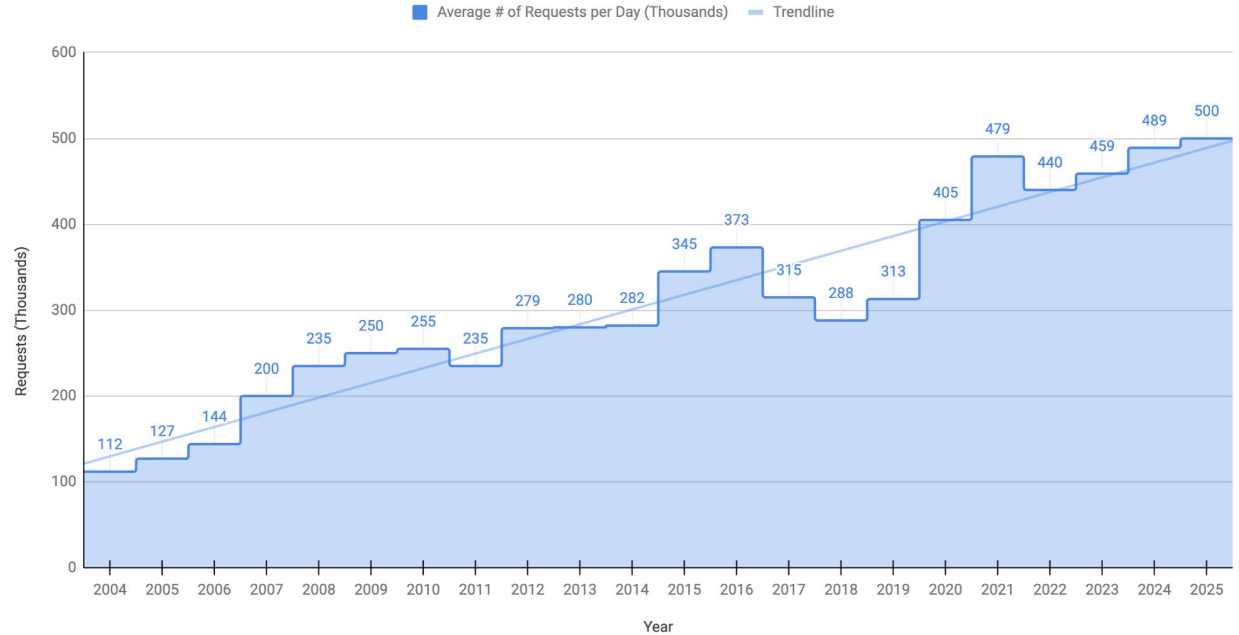
380k/day      API

330k/day      THREDDS

4k/day      ERDDAP

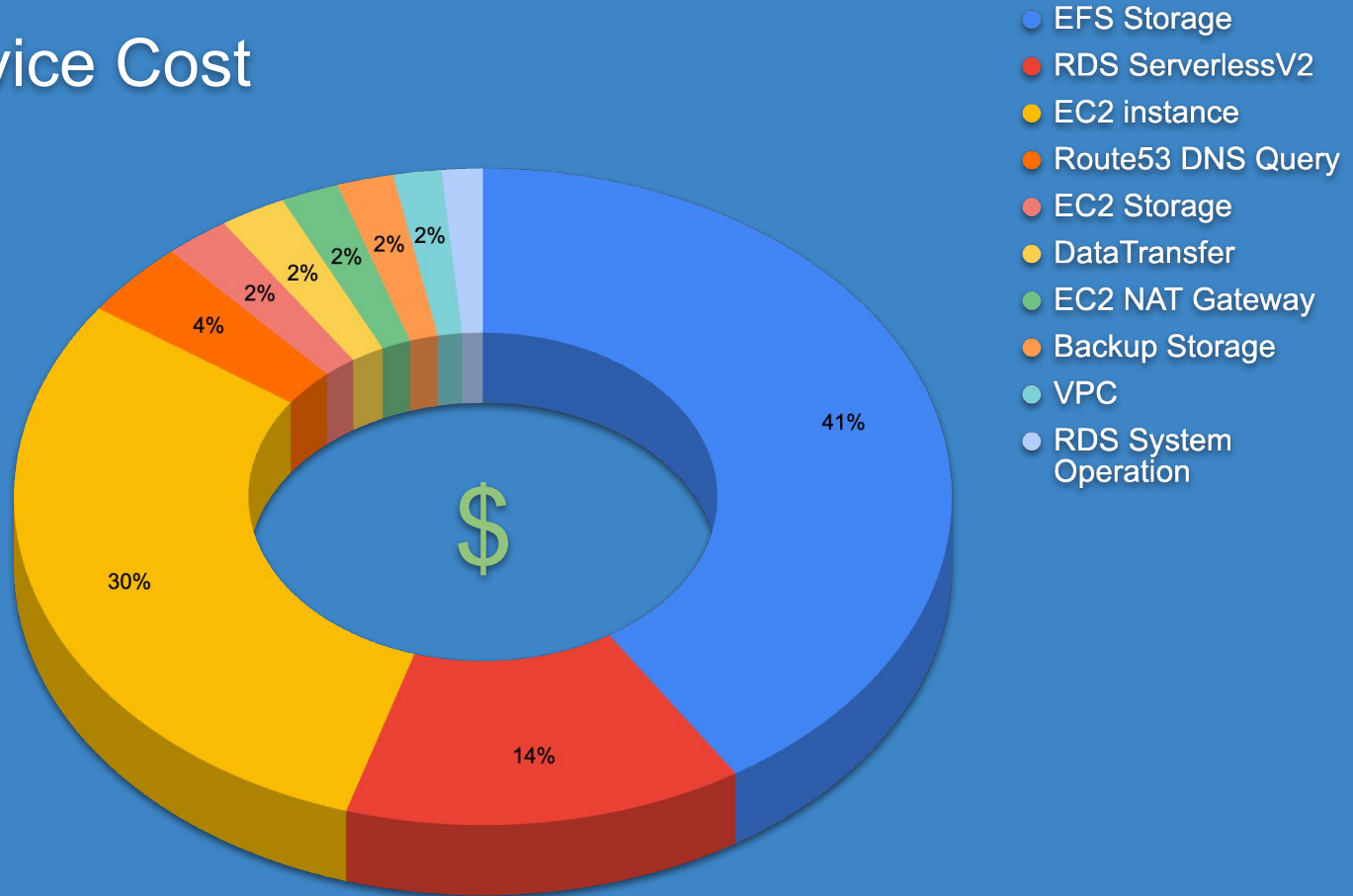
29k/day      Blocked

CDIP Website: Average # of Requests per Day





# AWS Service Cost



# A 50-Year Journey in Ocean Wave Monitoring

**THANK YOU**

UC San Diego



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OCEANOGRAPHY