US NAVAL HOSPITAL SHIPS FOR DISASTER RESPONSE

INTERNATIONAL TSUNAMI DISASTER PREVENTION SOCIETY
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DISCLAIMER

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AGENDA

- HISTORY
- MISSION
- CAPABILITIES & PLANNING ASSUMPTIONS
- MISSION CONSIDERATIONS
  - PATIENT MOVEMENT
  - WATER
  - VENTILATION
  - ACCESSIBILITY
  - INFORMATION TECHNOLOGY
  - DEGRADED COMMUNICATION

MERCY CLASS OF SHIPS (T-AH)

History

Total cost, including purchase of 2 San Clemente Class oil tankers and retrofit into hospital ships = $560 million in 1984 ($1.4 billion in 2020)

US NAVY HOSPITAL SHIPS
Mission

- Provide health services in support of US Department of Defense designated combatant command missions across the full range of military operations, including the support of medical stability operations and diplomatic efforts.

US NAVY HOSPITAL SHIPS
Mission

- A secondary mission is to provide mobile surgical hospital service and acute medical care for use by US Government agencies involved in disaster or humanitarian relief or limited humanitarian care incident to the mission or peacetime military operations.
- Ensure activation of the ship to a full operating status tertiary care Medical Treatment Facility within 5 days.

T-AH Historical Mission Days

MERCY MISSIONS			
	START DATE	END DATE	TOTAL DAYS
PHILLIPINES, SOUTHPAC DEPLOYMENT	27-Feb-87	13-Jul-87	136
OPERATION DESERT SHIELD/STORM	15-Aug-90	23-Apr-91	251
OPERATION UNIFIED ASSISTANCE TSC/TSUNAMI	5-Jan-05	8-Jul-05	154
THEATER SECURITY COOPERATION 2006	25-Apr-06	27-Sep-06	156
PACIFIC PARTNERSHIP 2008	1-May-08	19-Sep-08	148
PACIFIC PARTNERSHIP 2010	1-May-10	21-Sep-10	150
PACIFIC PARTNERSHIP 2012	1-May-12	14-Sep-12	138
RIMPAC 2014	16-Jun-14	9-Aug-14	54
PACIFIC PARTNERSHIP 2015	17-May-15	27-Sep-15	133
PACIFIC PARTNERSHIP 2016	11-May-16	30-Sep-16	142
PACIFIC PARTNERSHIP 2018	23-Feb-18	2-Jul-18	129
RIMPAC 2018	3-Jul-18	20-Jul-18	18
MCE WEST TF-LA	23-Mar-20	15-May-20	54
	MERCY Total Days:		**1663**

COMFORT MISSIONS			
	START DATE	END DATE	TOTAL DAYS
OPERATION DESERT SHIELD/STORM	11-Aug-90	15-Apr-91	247
OPERATION SEA SIGNAL - JAMAICA	1-Jun-94	10-Aug-94	71
OPERATION UPHOLD DEMOCRACY - HAITI	11-Sep-94	14-Oct-94	33
BALTIC CHALLENGE 98	15-Jun-98	12-Aug-98	58
OPERATION NOBLE EAGLE, 9-11	12-Sep-01	1-Oct-01	19
RESCUER/MEDCEUR 2002	7-Jun-02	16-Aug-02	70
OPERATION IRAQI FREEDOM	6-Jan-03	12-Jun-03	157
HURRICANES KATARINA/RITA	5-Sep-05	13-Oct-05	38
CONTINUING PROMISE 2007	15-Jun-07	22-Oct-07	129
CONTINUING PROMISE 2009	1-Apr-09	31-Jul-09	120
OPERATION UNIFIED RESPONSE – HAITI 2010	16-Jan-10	19-Mar-10	61
CONTINUING PROMISE 2011	8-Apr-11	4-Sep-11	150
CONTINUING PROMISE 2015	1-Apr-15	30-Sep-15	183
PUERTO RICO 2017	29-Sep-17	20-Nov-17	53
ENDURING PROMISE 2018	11-Oct-18	20-Dec-18	71
CONTINUING PROMISE 2019	14-Jun-19	15-Nov-19	154
MCE EAST - TF-NY	27-Mar-20	2-May-20	35
	COMFORT Total Days:		**1,649**

DESIGN CHARACTERISTICS

Length overall	894 feet
Beam	105 feet 9 inches
Designed draft	32 feet 9 inches
Scantling draft	38 feet
Displacement	69,360 long tons
Diesel fuel tankage (DFM/F76)	42,000 barrels 1,779,624 gallons
Fuel consumption (at anchor/in port)	260 barrels/day
Fuel consumption (underway: 13 knots (kts))	600 barrels/day 1.7 barrels/mile
Fuel consumption (underway: 17 kts)	975 barrels/day 2.1 barrels/mile
Fuel endurance: economical (9 kts)	95 days
Fuel endurance: maximum	44 days
Range (JP5/F44 tankage)	13,420 nautical miles (760 barrels/31,080 gallons)
Fresh water storage	460,000 gallons
Main propulsion: single screw	Steam turbine
Shaft horsepower	24,500
Sustained speed	17 knots
Electric generators (diesel): for MTF (3)	2,000 kilowatt (kW)

DESIGN CHARACTERISTICS

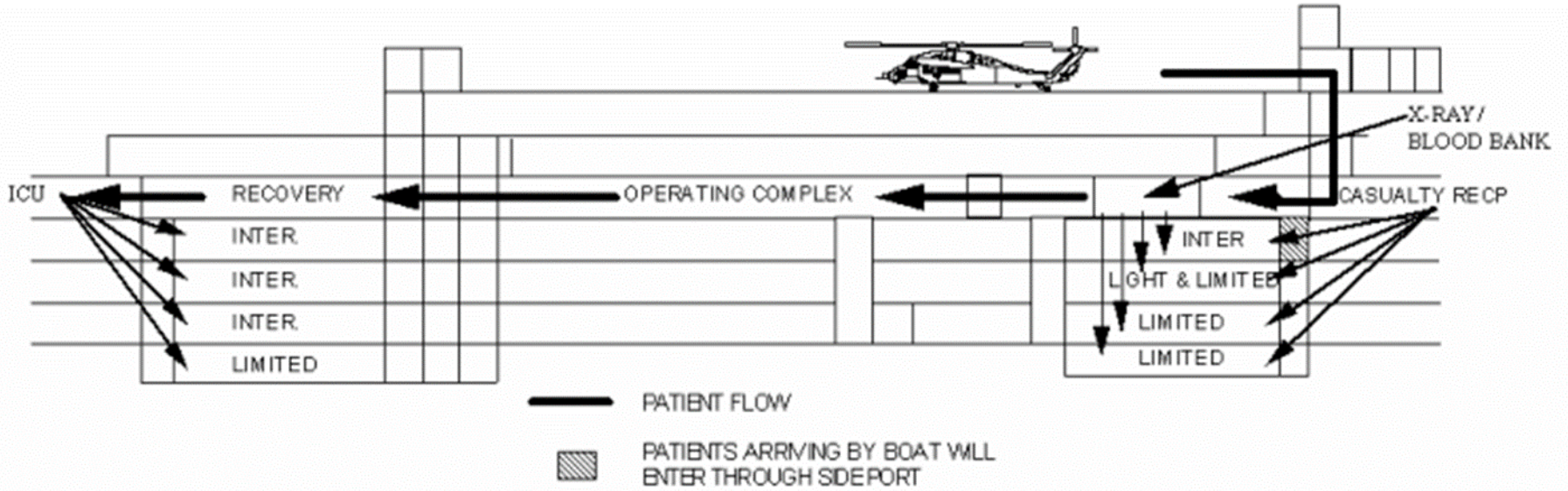
Wards	
Casualty receiving (CASREC) beds	50 (not included in total bed count)
Intensive care unit beds	68
Post-surgical recovery beds	20
Respiratory isolation beds	11
Intermediate care beds	400
Minimal care/convalescence beds	500
Total	999

Accommodations:	
CIVMAR	
Master	1
Officer	17
Senior unlicensed	13
Junior unlicensed	40
Total	71
Military personnel (MTF)	
Officer	272
CPO	50
Enlisted	893
Total	1,215

1,286 Total Staff

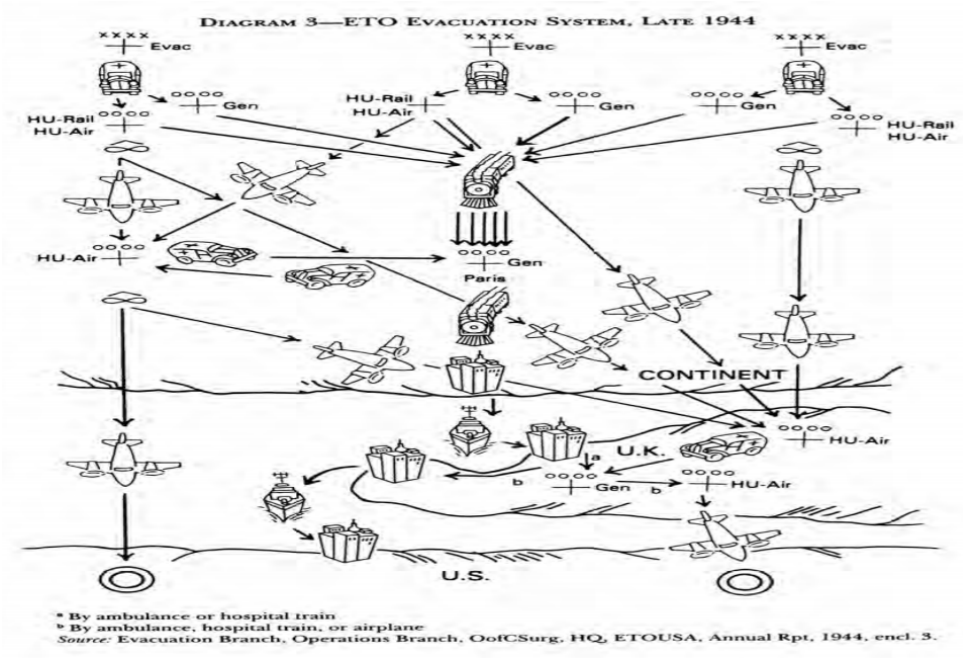
PLANNING ASSUMPTIONS

- Receive Patients
  - 300 patients per day for 1 day
  - 200 patients per day for 3 days
  - 100 patients per day sustained



PLANNING ASSUMPTIONS

Average length of stay will be 5 to 7 days



In disaster relief, the average length of stay may be longer for host-nation or foreign-national patients when evacuation to a shore-based hospital maybe not be readily available.

PLANNING ASSUMPTIONS

- Hospital ships are designed for sustained operations starting from 30 days without major resupply.

- Provide all ancillary and support services required to meet maximum patient workload
  - Laundry up to 56 tons per week
  - Galley up to 7,500 meals per day

- Produce O_2 to supply piping system at maximum patient demand and provide ongoing refill for all depleted ward O_2 cylinders.

CASUALTY RECEIVING

50 BEDS

SURGICAL CAPABILITIES

- Nine Main Operating Rooms
  - Trauma
  - Orthopedic
  - Spine
  - Neurosurgery
  - General
  - Urology
  - ENT/OMFS
  - GYN
  - Pediatric

- One angiography suite
- Two dental operating rooms

CLINICAL SUPPORT CAPABILITIES

- Radiology
  - CT Scan: Contrast, Non-Contrast
  - Angiography suite
- Pharmacy
  - TPN (Premix)
  - IV Admixture
- Physical Therapy
- Inpatient Dietician

- Lab
  - Blood Bank (5,000 frozen units)
  - Chemistry
  - Immunochemistry
  - Urinalysis
  - Hematology
  - Histology
  - Microbiology

INTENSIVE CARE UNIT

68 beds distributed in 3 spaces

20 post-surgical recovery beds

MEDICAL/SURGICAL WARD

- Open Bay
- 400 intermediate care beds

- 500 minimal care or convalescence beds

PATIENT MOVEMENT

Vertical Patient Transport

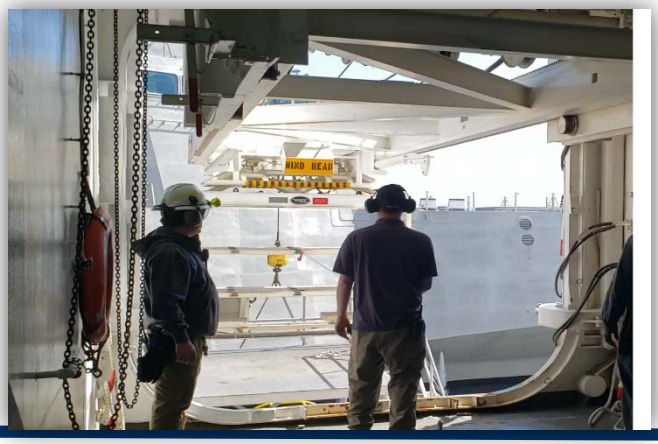
- Flight decks currently optimized for H-60, expanding to V-22

Boat

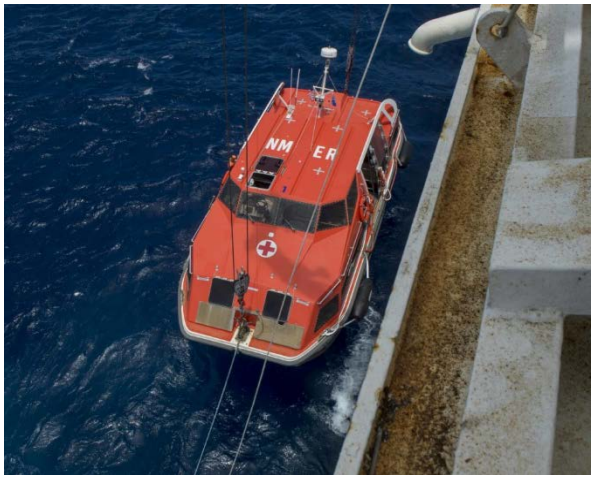
- Small Boat Transfer/Receipt of Critically-Wounded Patients

Patient Litter Hoist

- Movement of Patients ashore via Portside Litter Hoist



PATIENT MOVEMENT



PATIENT MOVEMENT

PATIENT MOVEMENT

WATER

- 300,000 gallons/day produced
  - 75,000 gallons/day/distiller
- 75,000 gallons/day stored (pipe size limiting)
- ≈100,000 gallons/day can be made available for distribution ashore to affected populations
- 460,000 gallon water storage tanks
- 60,000 gallons/day consumed
- Naval Ships Technical Manual 533-2.4.2
- Advanced water testing

VENTILATION

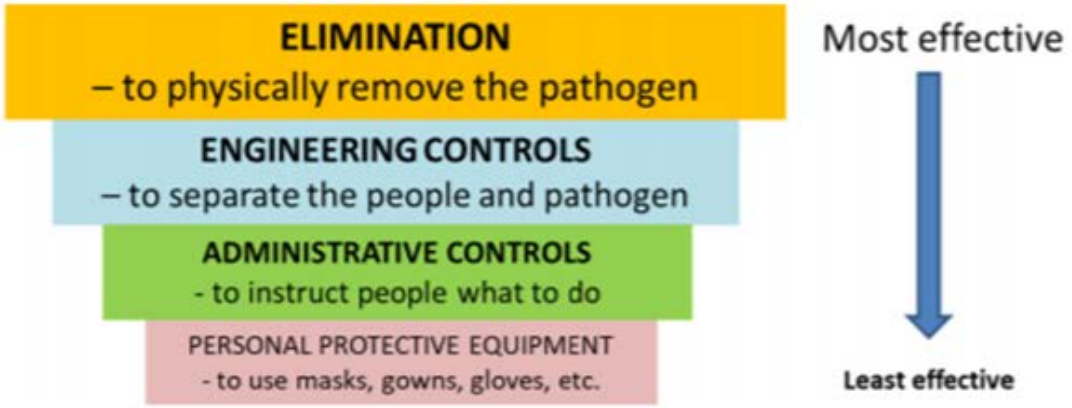


Fig. 1. Traditional infection control pyramid adapted from the US Centers for Disease Control (CDC, 2015).

- Air in operating theatres is kept at a higher pressure than in corridors and adjacent areas
- HEPA filters used to reduce risk of surgical site infections
- Air recirculation systems in the MTF serve multiple compartments

Morawska, Lidia, et al. "How can airborne transmission of COVID-19 indoors be minimised?." (2020).

VENTILATION

- To isolate COVID-19 patients from the rest of the ship
  - Area with an airtight boundary
  - Negative pressure
  - Served solely by its own supply, exhaust, recirculation system

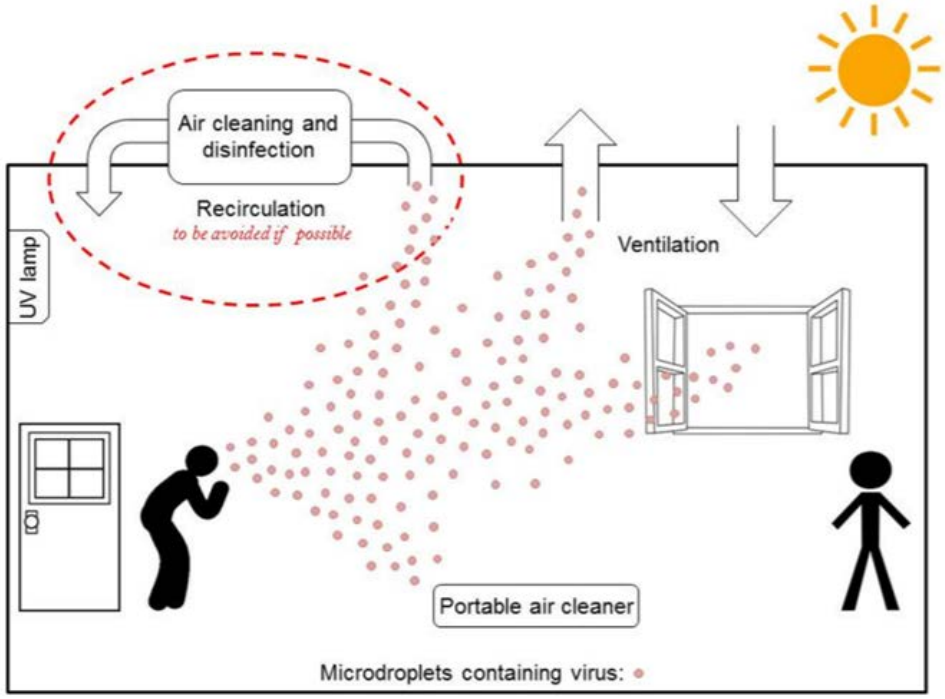


Fig. 2. Engineering level controls to reduce the environmental risks for airborne transmission.

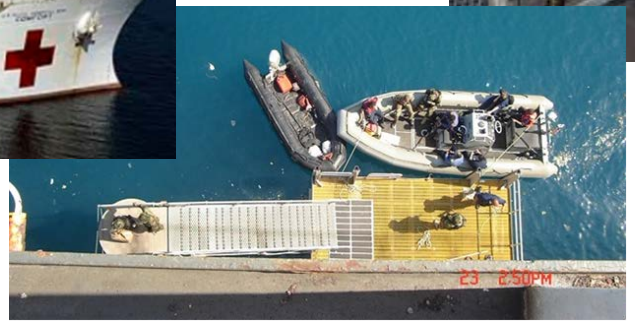
Morawska, Lidia, et al. "How can airborne transmission of COVID-19 indoors be minimised?." (2020).

ACCESSIBILITY

- Scene safety
  - Submerged objects in harbor
  - Piers

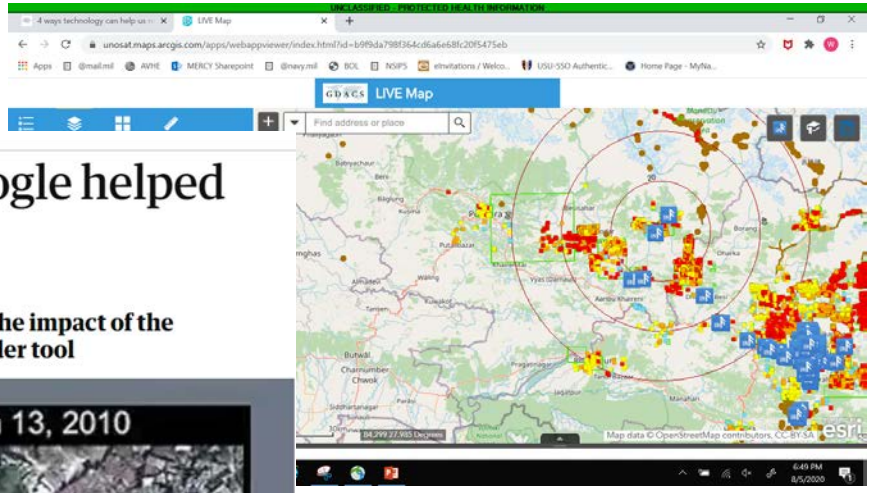
- Flight deck
- Port brow
- Starboard side port
- 9 Elevators
- Ramps

ACCESSIBILITY



INFORMATION TECHNOLOGY

- GPS
- Geographic information system (GIS)
- Remote sensing technology to create maps of the disaster areas



PDA
Google

Haiti earthquake: how Google helped save lives

After the disaster Google detailed maps showing the impact of the earthquake and then helped develop a person finder tool

Jemima Kiss
@jemimakiss
Wed 12 Jan 2011 09.42 EST

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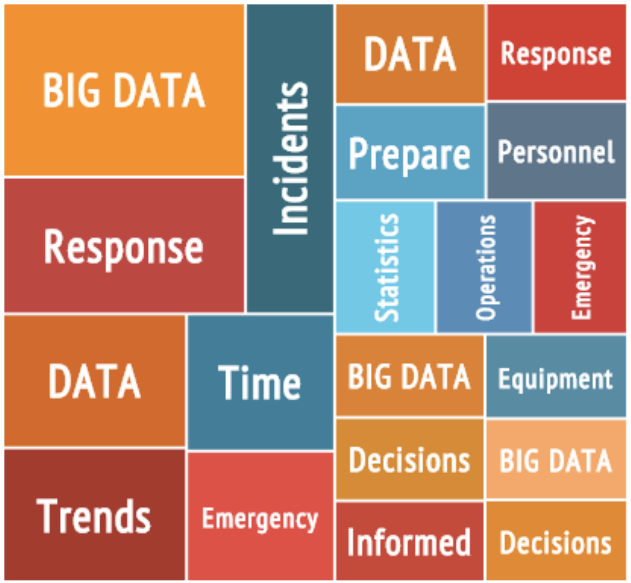
INFORMATION TECHNOLOGY

- Data mining of social media
- Information transferred from mobile phone apps, smart watches or connected medical devices



How Big Data Can Help in Disaster Response

Technology is enabling better management of risks and crises

By Amir Elichai on December 13, 2018

DEGRADED COMMUNICATION

Capability

- MERCY has three (3) full time Amateur Radio Operators.
- The Amateur Radio Shack on MERCY operates on all civilian and military frequency ranges.
- Capabilities are not limited to voice communication (i.e. data, email etc.)
- MERCY can serve as information relay and send radio calls plus data to units around the world.

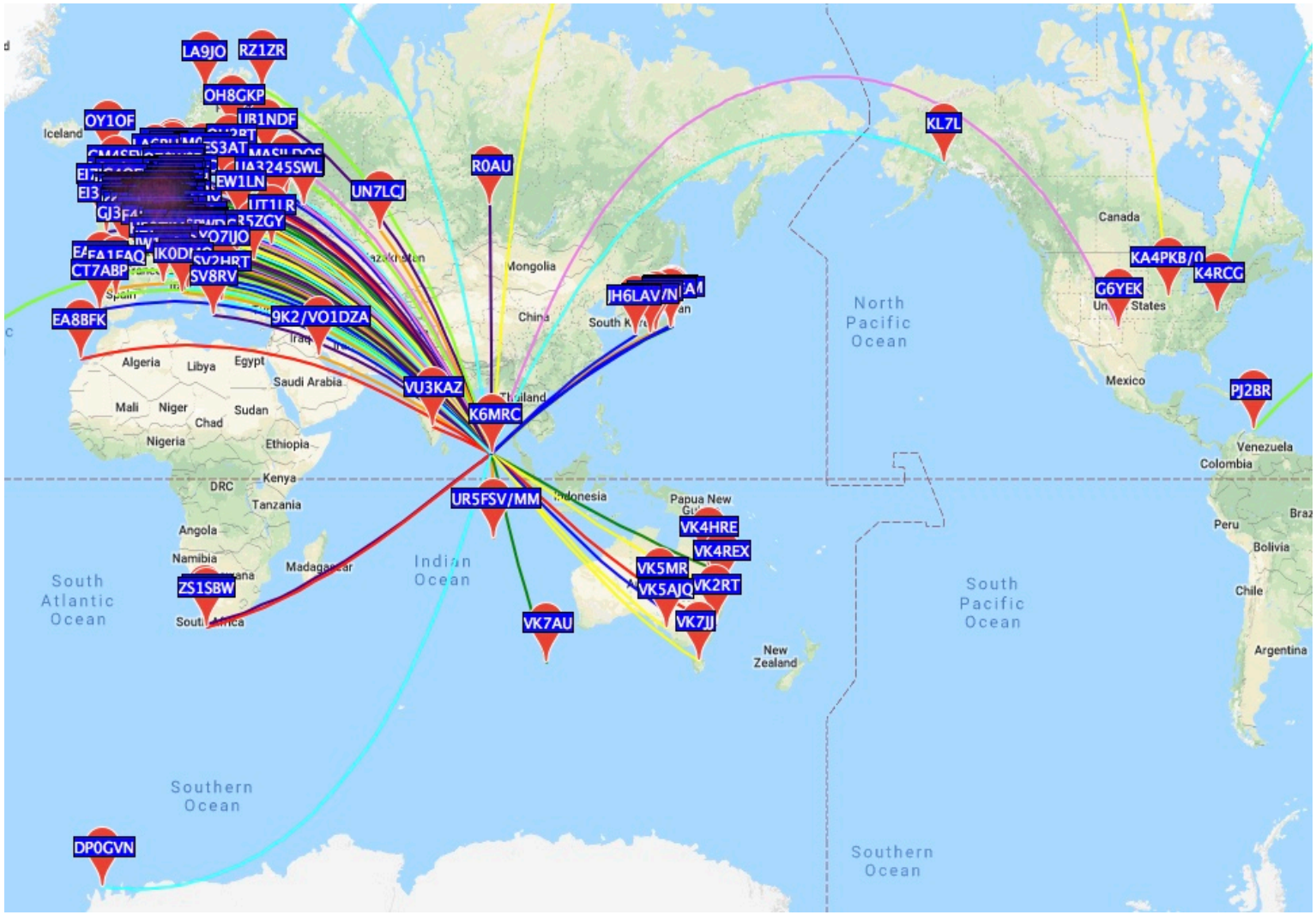
Execution

- RIMPAC 2014: USNS MERCY HAM radio participates.
- Pacific Partnership 2015: MERCY HAM radio operators trained local radio users on Emergency Radio Operations.
- Pacific Partnership 2018: MERCY used HF and WSPR (Weak Signal Propagation Reporting), to reach every continent in the world!
- RIMPAC 2018: MERCY was the primary coordination platform for the final HADR event.

Discussion

- Amateur radio operators can provide a vital communication platform during HADR efforts.
- MERCY participates in local Southern California Healthcare Network drills, simulating how our Hospital Ship could be used as a coordination platform for MIL/CIV communication partnership.
- "Radio MERCY" has been loaded into the Department of Homeland Security SHARES (Shared Resources) Disaster Response Network.
- Continue local SoCal and regional drill/exercise participation with state and local government.

MERCY HF and WSPR Amateur Radio Signal Reaching Every Continent!



QUESTIONS?