

DYFI Winlink

Combining Amateur Radio and Citizen Science to promote Community Resilience

DYFI Winlink: ARES Alliance Collaboration

- ARES Groups from Southern California, Central California, Northern California, Oregon, Washington, Arizona, Nevada, Hawaii and Puerto Rico
- Winlink Development Team
 - Greg KG6SJT
 - Mike N6KZB
- USGS
 - David Wald (Geophysicist)
 - Vince Quitoriano (Programmer)



Scientific Background



The effect of an earthquake on the Earth's surface is called the intensity. The intensity scale consists of a series of certain key responses such as people awakening, movement of furniture, damage to chimneys, and finally - total destruction. The *intensity scale* currently used in the United States is the Modified Mercalli (MM) Intensity Scale.

The Modified Mercalli Intensity value assigned to a specific site after an earthquake has a more meaningful measure of severity to the nonscientist than the magnitude because intensity refers to the effects actually experienced <u>at that place</u>.

Source: https://www.usgs.gov/natural-hazards/earthquake-hazards/science/modified-mercalli-intensity-scale

Intensity	Shaking	Description/Damage
L	Not felt	Not felt except by a very few under especially favorable conditions.
11	Weak	Felt only by a few persons at rest, especially on upper floors of buildings.
III	Weak	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
IV	Light	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
v	Moderate	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Strong	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Very strong	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Severe	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	Violent	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
x	Extreme	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.

Magnitude vs. Intensity



ATEURA

Magnitude = energy released by an earthquake Intensity = effects of an earthquake

Magnitude	Intensity	
Fixed Value	Varies with magnitude, distance, geology	
Measures energy released	Measures impact on humans and structures	
Objective	Subjective	and the second







How Can Amateur Radio Can Help?

- → "Donut" challenge
- → Amateur radio "mesh"
- \rightarrow Path neutrality
- → Robust communications
- → High quality data
 - "Not felt" Reports
 - GPS coordinates
 - ♦ Observations
 - ◆ Training & Exercises



USGS: Example of DYFI "donut hole" for the M5.7 Magna, Utah earthquake that affected Salt Lake City. Note the early-on gap in reporting the most strongly shaken area that gets later filled in. (Source: USGS White Paper, forthcoming)









Winlink DYFI Form

DYFI Report on Winlink

- Form collaboration by USGS, ۲ Winlink Development Team and ARES LAX Northeast and now... you and your group!
- Questionnaire format ullet
- Winlink data = Web form data •
- Simple: HTML form, JSON Output •
- Sent directly to USGS! •

USGS:

https://earthquake.usgs.gov/earthquakes/eventpage/tellus

Earthquake: Did You Feel it?					
Did You Feel It? (DYFI) collects information from people who felt an earthquake and creates maps that show what people experienced and the extent of damage, this information is sent to the USGS.					
Click here to go to the Web Site if you have Internet.					
Contact K6OLI with questions. What is DYFI					
>>>> This Earthquake report is an Exercise REAL EVENT This Prototype version currently under test.					
The two fields in RED are REQUIRED					
Did you feel it?					
○ Yes ○ No					
Time of earthquake (Local format: 1/31/2020 09:00 AM, or Relative Time 5 minutes ago)					
6/9/2020 09:12 AM (Opening this form inserts your current Date/Time, you may manually change)					
Your location when the earthquake occurred: *Address, partial address, or enter coordinates in the LAT LON BOXES BELOW* Enter optional GPS coordinates in the following decimal format: LAT [Example: 32.504891] LON [Example: -116.982466] If you have a Winlink Express connected GPS device, the LAT LON in decimal degrees will be entered for you. If the preside of this form is patients.					
r në remainuer oi uns iorin is opuonal. Help make a snaking intensity map by telling us about the snaking at your location.					
What was your situation during the earthquake?					
Not specified Inside a building Outside a building In a stopped vehicle In a moving vehicle Other Describe: Flease describe					
Were you asleep?					
○ Not specified ○ No ○ Slept through it ○ Woke up					
Did others nearby feel it?					
○ Not specified ○ No others felt it ○ Some felt it, most did not ○ Most felt it ○ Everyone/almost everyone felt it					

Why does it matter?

For USGS...

- Improve quality of data
- Fill gaps, especially during disasters ("donut")



For ARES and Amateur Radio...

- **Protect** our communities by improving science
- Collaborate with government agency/-ies
- Train operators to send quality data and use their equipment effectively

Winlink Form Features

Special Winlink Form Features

Exercise & REAL EVENT Buttons GPS import from Winlink capability JSON Lock

Felt Report - Tell Us! OMB No. 1028-0048 Expires 06/30/2021 Privacy Act State Unknown Event Select Language English Did you feel it? O Yes	THE PROOF	
O No	Winlink Version	
Time of earthquake	Earthquake: Did You Feel it?	
Local time (1/31/2008 9:00 AM), or Relative time (5 minutes ago) *	Did You Feel It? (DYFI) collects information from people who felt an earthquake and creates maps that show what people experienced and the extent of damage, this information is sent to the USGS.	
You have the automatic account of	Click here to go to the Web Site If you have Internet.	
Your location when the earthquake occurred	Contact K6OLI with questions. What is DYFI	
Address, partial address, or geographic coordinates *	>>>> This Earthquake report is an Exercise REAL EVENT This Prototype version currently under test. The two fields in RED are REQUIRED	
Use a map to input and/or verify your location		
The remainder of this form is optional. Help make a shaking intensity map by telling us about the shaking at your location.		
	Time of earthquake (Local format: 1/31/2020 09:00 AM, or Relative Time 5 minutes ago)	
Dravida additional datalla	6/9/2020 09:12 AM (Opening this form inserts your current Date/Time, you may manually change)	
FTUVIUE adulturitat uetalis	V - L - V - L - H H I	
What was your situation during the earthquake?	Your location when the earthquake occurred:	
LISCS Version	Address, partial address, or enter coordinates in the CALLON BOARS BELOW	
	If you have a Winlink Express connected GPS device, the LAT LON in decimal degrees will be entered for you.	
	The remainder of this form is optional. Help make a shaking intensity map by telling us about the shaking at your location.	
	What was your situation during the earthquake?	





Objectives:

Provide Quality Data to USGS Train Operators Have Fun!

Project Phases

Building Phase

- 1. Reach out to USGS & WDT
 - a. Need?
 - b. Willingness?
- 2. Build
 - a. Greg KG6SJT & Mike N6KZB (WDT)
 - b. Vince Quitoriano (USGS)
- 3. Alpha Testing
 - a. Small group testing (ARES LAX)



Testing Phase

- 1. Recruit Testers
 - a. "ARES Alliance"
 - b. Network of Trust
- 2. Feedback
 - a. USGS: data fields
 - b. AR Exercises
 - c. Examples : Bob KM6SO (MIRO), Richard KK6RJR (WKARES)
 - i. Systematic Approach
 - ii. Date fix, others
- 3. Gordo SuperEvent

Gordo SuperEvent Setup



In California the San Andreas, Garlock and Hayward faults jarred violently and triggered earthquakes in adjacent faults. In Washington, the Cascadia Subduction Zone released all the built-up tension in an enormous quake. Hawaii, that paradise in the Pacific, lit up with earthquakes like a Christmas tree....

Gordo SuperEvent Exercise

- 75 Stations from California, Hawaii, Washington & Mexico
- 24 hour notice (!)
- Near impossible, fun scenario (think "San Andreas" movie)







USGS Provided Gordo Figures





Intensity vs. Distance Plot (ID test20200703)



Then Life Imitates Exercise...

M4.3 - 13 km S of Fern Forest, HI

12 Hawaii ARES Operators report via Winlink

Benefits:

- Potentially unbiased sample
- Report "Not-felt"



GPS Options

1) Manual

- a) Smartphone
- b) List (predetermined)
- 2) Plug-in (USB)
 - a) U Blox 7 or higher (\$14)
 - b) GlobalSat (\$26 \$32)
 - c) Garmin (\$70+)
 - d) Your smartphone (Bluetooth)





Amateur Radio Contributors

ARES LAX (Los Angeles County) Auburn Area Emergency Communications Team (AAECT) Eastern Kern County ARES Baja CA Mexico Radio Club (CREBC) Hawaii ARES MIRO (Mercer Island Radio Operators) NBAT (North Bend Amateur Radio Emergency Services, North Bend, WA) PSEARES (Puget Sound Energy Amateur Radio Emergency Services, Bellevue, WA) San Diego Amateur Radio Emergency Service (SDG ARES) San Joaquin Valley ARES Sacramento Valley ARES Ventura County CA ACS-ARES Western Kern County Amateur Radio Emergency Service (WKCARES) Yavapai County ARES/RACES (Amateur Radio Emergency Service, Yavapai County, Arizona)





Future Plans

- Intensity Feedback Pop-up
- Spanish language version
- ShakeOut
- Training, training, training



Additional Resources

DYFI Winlink Form Training Video: <u>youtu.be/OutjBBflVF8</u>

Shakeout Videos: www.youtube.com/user/SCECmovies/videos

SCEC on Ridgecrest: mailchi.mp/scec/july-2020-scec-newsletter-34570

USGS Remembers Ridgecrest: www.facebook.com/watch/?v=677040199560313

About Earthquake Severity: pubs.usgs.gov/gip/earthq4/severitygip.html

About Earthquake Intensity:

<u>www.usgs.gov/natural-hazards/earthquake-hazards/science/modified-mercalli-intensity-</u> <u>scale</u>

IRIS: www.youtube.com/playlist?list=PL8FDF28B8FD0C2E56

