

# *Geospatial Dimensions of Emergency Response Symposium*

Seattle, Washington

09-13 March 2008

## Georeferencing for SAR Responders in Catastrophic Incidents



Rick Button  
Secretary

National Search and Rescue Committee

([www.uscg.mil/nsarc](http://www.uscg.mil/nsarc))



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# Agenda

## 1. Framing the Issue:

- National SAR Committee (NSARC) – What is it?
- Georeferencing through the lens of Katrina

## 2. Background: Catastrophic Incident SAR

- U.S. Search and Rescue (SAR) Documents
- Catastrophic Incident SAR

## 3. NSARC – Catastrophic Incident Georeferencing

- Georeferencing Matrix
- Lat/Long – USNG - GARS
- Assumptions



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**Aeronautical SAR**

**Maritime SAR**

**1. Framing the Issue:  
National SAR Committee (NSARC)**



**What is it?**

**Urban SAR**

**Land SAR**

# National SAR Committee (NSARC)

**FEDERAL REGISTER, VOL. 39, NO. 114—WEDNESDAY, JUNE 12, 1974**



## **DEPARTMENT OF TRANSPORTATION**

**Office of the Secretary**

### **INTERAGENCY COMMITTEE ON SEARCH AND RESCUE (SAR)**

#### **Notice of Establishment**

This notice announces the establishment of the Interagency Committee on Search and Rescue (SAR) under the sponsorship of the Commandant of the Coast Guard, Department of Transportation.

The purpose of the Committee is to oversee the National Search and Rescue Plan and to act as a coordinating forum for national search and rescue matters.



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# National SAR Committee (NSARC)

## Current Membership:

DOD, DOC, DOT, DOI, DHS, FCC, NASA



NSARC Chair: USCG



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# National SAR Committee (NSARC)

## Committee objectives:

- “. . . provide a standing committee to oversee the National SAR Plan and coordinate interagency SAR matters.”
- “. . . provide a forum for preliminary development of interagency positions in SAR matters.”
- “. . . provide for an interface with other national agencies involved with emergency services.”



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# Framing the Issue:

Georeferencing through the lens  
of Hurricane Katrina

# Katrina SAR Responders: 3 Georeferencing Issues

1. How do SAR Responders navigate when landmarks, such as street signs, are destroyed?
2. How do SAR Responders communicate position in a common language?

(ref: Talbot Brooks, *Importance of USNG and Land Navigation* [article on-line]; available from: <http://mississippi.deltastate.edu/>.)



# Katrina SAR Responders: Three Georeferencing Issues

(cont'd)

3. Resource deconfliction: multiple SAR responders/resources working in a common operating area

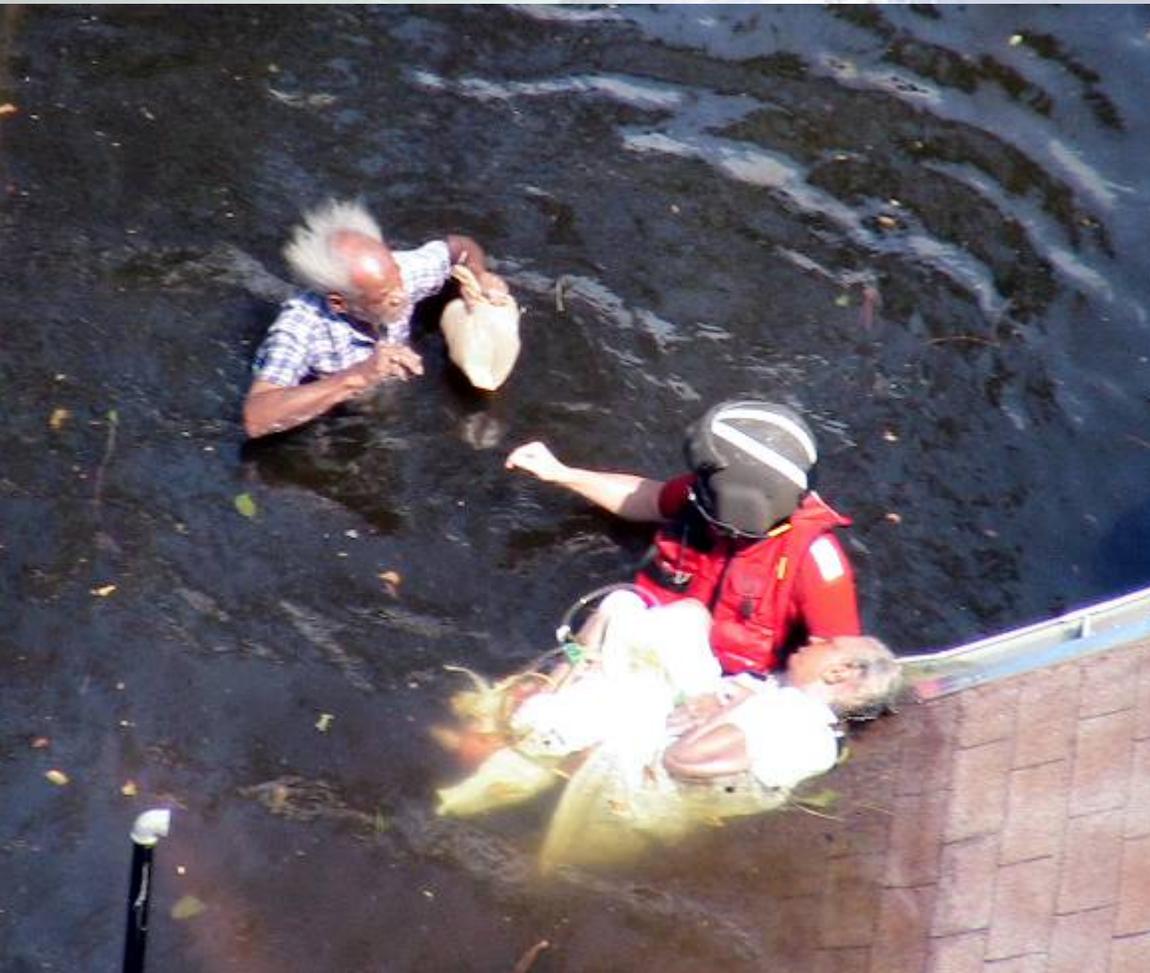


# Katrina: Communicating Location - Problems

1. Local knowledge
2. Limited knowledge of U.S. National Grid
3. Lat/Long stated three different ways:
  - DD.d
  - DD-MM-SS
  - DD-MM.mm



## 2. Background: Catastrophic Incident SAR – NSARC and Georeferencing



# White House Report on Hurricane Katrina

<http://www.whitehouse.gov/reports/katrina-lessons-learned.pdf>

## Recommendation 45:

“The National SAR Committee should revise the National SAR Plan (NSP) to include disaster response operations...”

THE FEDERAL RESPONSE TO  
HURRICANE  
KATRINA  
LESSONS LEARNED



FEBRUARY 2006

# United States: 3 Primary SAR Documents

1. (NSARC) National SAR Plan (2007)  
(Rewrite completed last year!)
2. (DHS/FEMA) National Response Framework  
( Rewrite completed Jan 08)
3. (NSARC) National SAR Supplement to the IAMSAR Manual  
(Ongoing!)



# National Search and Rescue Plan of the United States

2007

- 19-Page Plan: for “...coordinating SAR services to meet domestic needs and international commitments.”
- *Key*: Harmonized the NSP to Nat’l Response Framework



## National Response Framework

January 2008



Homeland  
Security

National SAR Plan:  
<http://www.uscg.mil/nsarc.htm>

# National Response Framework (NRF)

<http://www.fema.gov/emergency/nrf/mainindex.htm>



## National Response Framework

January 2008



Homeland  
Security

- Federal govt plan for responding to **Catastrophic Incidents**



# National SAR Supplement (NSS) to the IAMSAR Manual

- Implements the Nat'l SAR Plan
- Provides guidance to federal agencies in support of the IAMSAR Manual and the IMO/ICAO SAR conventions.

National SAR Supplement:  
<http://www.uscg.mil/nsarc.htm>

**United States**  
**National Search and Rescue Supplement**  
to the  
**International Aeronautical and Maritime**  
**Search and Rescue Manual**



National Search and Rescue Committee  
Washington DC

May 2000

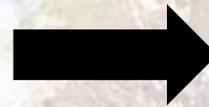
# NSARC National SAR Supplement (NSS) Task Force

**United States  
National Search and Rescue Supplement**  
to the  
**International Aeronautical and Maritime  
Search and Rescue Manual**



National Search and Rescue Committee  
Washington DC

May 2000



**Catastrophic  
Incident  
SAR  
Addendum**

# What is a Catastrophic Incident?

## Defined in the National Response Framework:

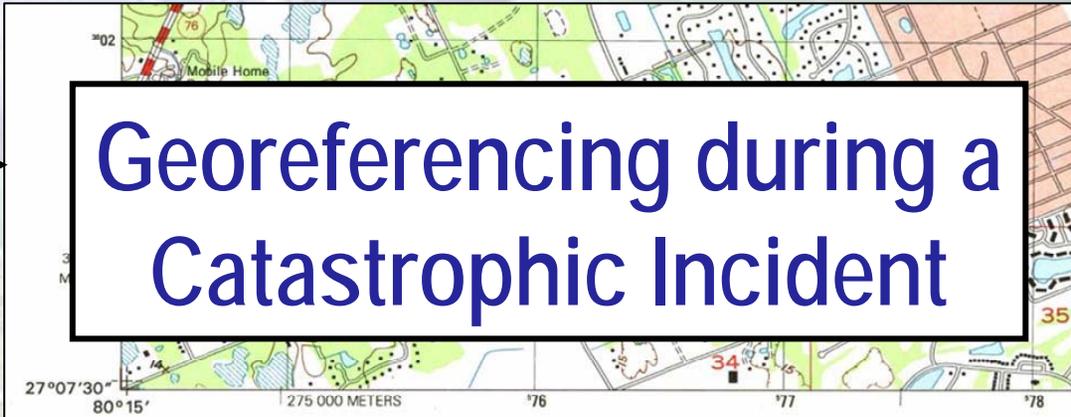
A catastrophic incident is defined as any natural or manmade incident, including terrorism, that results in extraordinary levels of mass casualties, damage, or disruption severely affecting the population, infrastructure, environment, economy, national morale, and/or government functions.

(National Response Framework, pg 42)



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# Catastrophic Incident SAR Addendum



Georeferencing during a Catastrophic Incident



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Catastrophic  
Incident  
SAR

# 3. NSARC – Catastrophic Incident Georeferencing

## The Matrix



# NSARC Georeferencing Matrix: Catastrophic Incident SAR

Georeference System User	USNG	Latitude/Longitude DD-MM.mmm(1)	GARS
Land SAR Responder(2)	Primary	Secondary	N/A
Aeronautical SAR Responders (3)	Secondary	Primary	Tertiary
Air Space Deconfliction (4)	N/A	Primary	N/A
Land SAR Responder/ Aeronautical SAR Responder Interface (5)	Primary	Secondary	N/A
Incident Command: Air SAR Coordination Land SAR Coordination	Secondary Primary	Primary Secondary	N/A N/A
Area organization and accountability (6)	Secondary	Tertiary	Primary

# NSARC Georeferencing Matrix: “The Footnotes”

1. During CIS operations, Lat/Long will be in one standard format: **DD-MM.mmm**.
2. Land SAR Responders *must* use USNG; however, a good familiarity with lat/long is necessary to ensure effective interface between Land and Air SAR Responders.



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# NSARC Georeferencing Matrix:

## “The Footnotes”

3. Air SAR Responders will use lat/long.
4. Air space deconfliction: *only* in Lat/Long.
5. *Air SAR Responders working with Land SAR Responders have primary responsibility of coordinating SAR using USNG (Both need to know USNG and Lat/Long.)*
6. GARS (Global Area Reference System): used for CIS response leadership situational awareness.



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# Lat/Long, USNG and GARS

# Lat/Long – USNG - GARS

## Lat/Long:

*Keeping it simple* ~ for Catastrophic Incident SAR, the commonly described “Latitude and Longitude” describes what a SAR responder will use on a standard chart/map and what is displayed in a GPS receiver.



# Lat/Long – USNG - GARS

## United States National Grid (USNG):

- Ground-based gridded coordinate system based on Universal Transverse Mercator (UTM) System.
- Basic unit of measure is the meter; positions reported as distance north from equator and distance from the zone central meridian.
- Purpose: provide a seamless, standardized ref system for nationwide use during times of crisis.

(Talbot Brooks, *US National Grid* [article online]; <http://mississippi.deltastate.edu/>)



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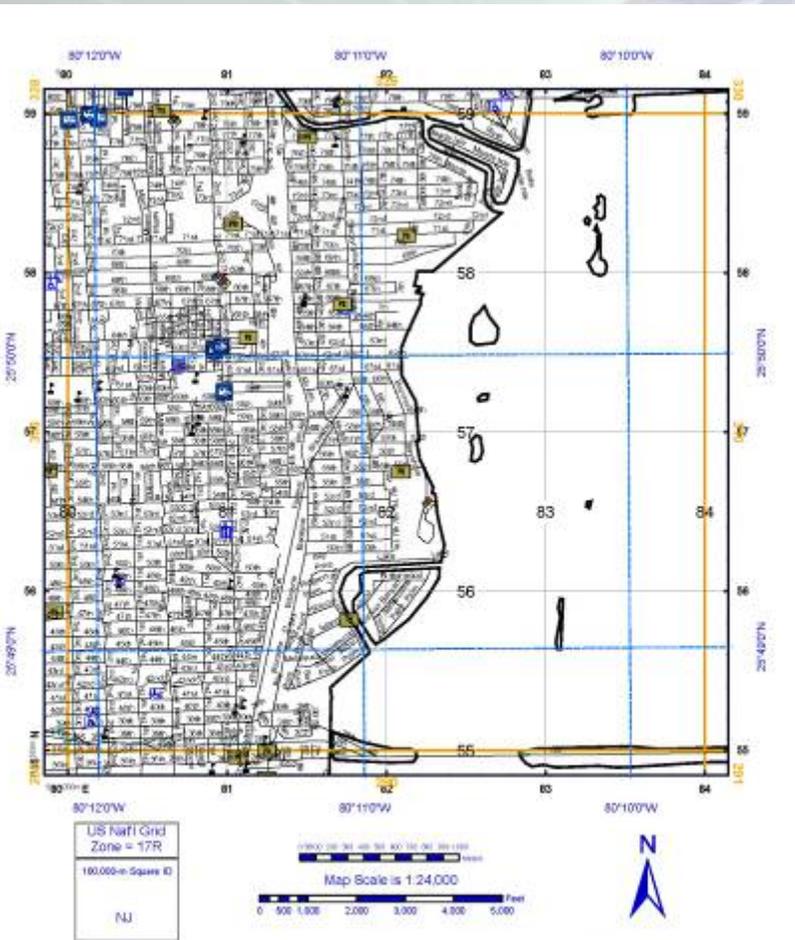
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# Lat/Long – USNG - GARS

## United States National Grid (USNG)

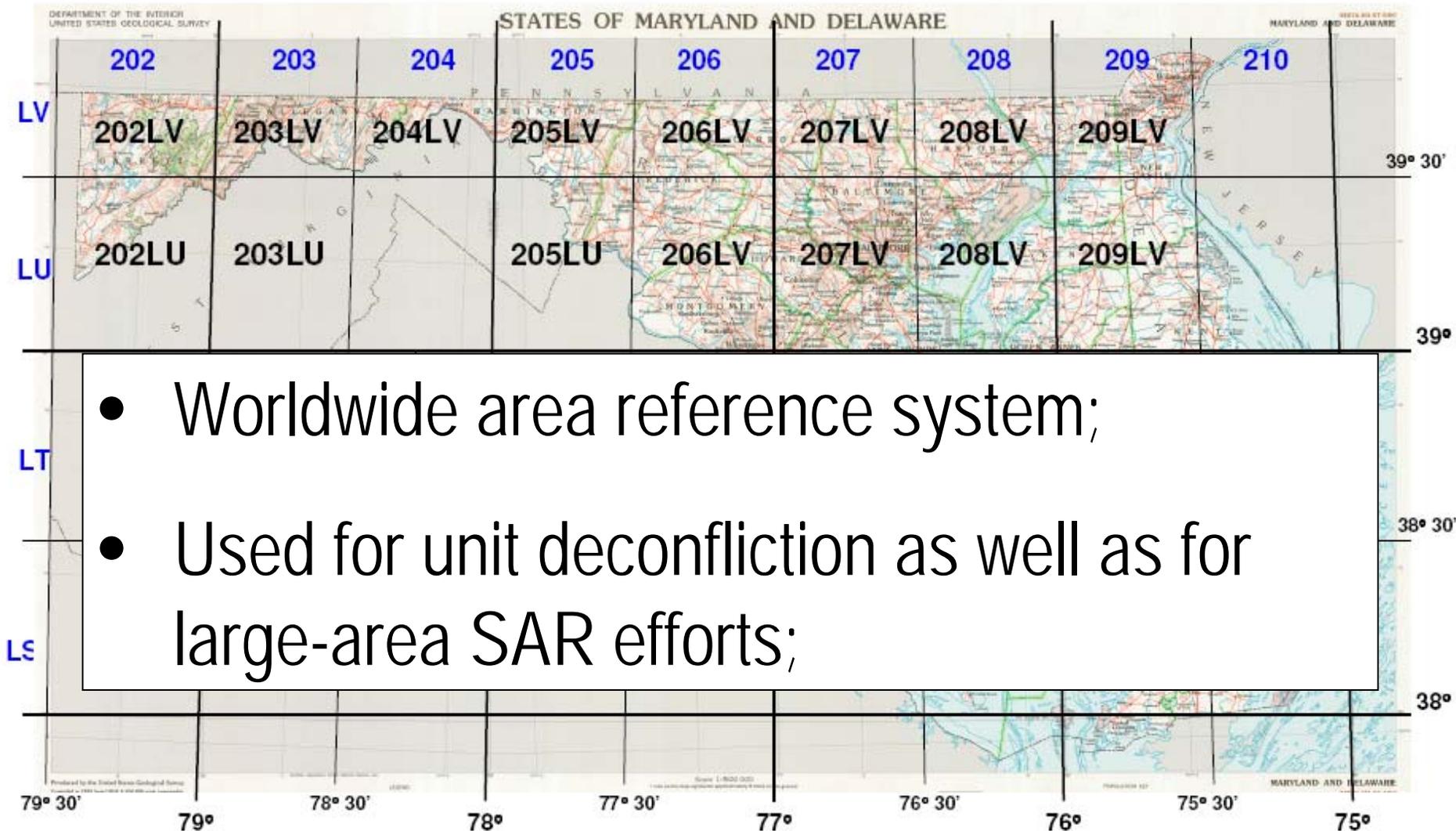
(continued):

- USNG is the U.S. civil standard (FGDC-STD-011-2001)
- Functionally equivalent to the Military Grid Reference System (MGRS)



# Lat/Long – USNG - GARS

## Global Area Reference System (GARS):



# Lat/Long – USNG - GARS

## Global Area Reference System (GARS)

(continued):

- GARS divides world into 30-min by 30-min cells and further subdivides those cells into 15-min by 15-min quadrants that are further subdivided into 5- min by 5-min cells.
- GARS is an overlay area reference system based on standard Latitude/Longitude.
- Proposal to further subdivide GARS into 1-min by 1-min quadrants to further facilitate SAR ops.



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Catastrophic  
Incident  
SAR

# Assumptions used to develop the Matrix



**Catastrophic  
Incident  
SAR**

# Assumption #1:

**No single map/chart projection or  
coordinate/grid system will be perfect for  
all SAR applications.**

**(Urban, Land, Aeronautical and Maritime)**



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Catastrophic  
Incident  
SAR

# Assumption #2:

Matrix is for NSARC member  
agency SAR Responders



- NSARC won't impose georeferencing standards on volunteer, local, or State SAR Responders; however:
- Need to be aware of what to expect when a Catastrophic Incident is declared and NSARC member agencies conduct SAR operations.



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# Assumption #3:

Matrix will be implemented when a Catastrophic Incident occurs.

(As defined in the NRF)

Catastrophic  
Incident  
SAR

# Assumption #4:

Effective interface  
between the Incident  
Command, and Land  
(or maritime)/Air SAR  
responders is vital to a  
successful CIS  
response.



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# Implementation and Marketing:



Ongoing...

[www.uscg.mil/nsarc](http://www.uscg.mil/nsarc)



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*Questions?*