

Partners Project Title Page

Proposal Type: GOES-R _____ NWS X

Does that work for you? Comprehension and Interpretation of NWS Weather Graphics by Urban and Rural Mid-South Residents


Title: _____

Date: Oct. 1, 2020


Signatures for University


University Name: University of Alabama

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Tuscaloosa, AL 35487

DocuSigned by:

Principal Investigator

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University Official (usually dept. chair)
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Title: Dean, College of Com. & Info. Science
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Title: Ass. VP of Research
Address: 157 Rose Administration Building
Tuscaloosa, AL 35487
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Signatures for NWC/NOAA


NWC Office: National Water Extension
Liaison


205 Hackberry Lane
Tuscaloosa, AL 35401

DocuSigned by:

Collaborator

Name: Karen Bareford
Telephone number: (205)347-1494
Email: Karen.Bareford@noaa.gov

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NWS Principal Investigator
Name: Gary Woodall
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Telephone number: (901) 544-0405

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Additional Collaborator
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Telephone number: (901)544-0401

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DocuSigned by:
Gregory Patrick
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STSD Chief
Name: Gregory Patrick

DocuSigned by:
Steven Cooper
ED307B006AF346A...

Regional Director
Name: Steven Cooper

SUMMARY OF BUDGET REQUEST:

COMET FUNDS: Year 1 \$15,000

NWS FUNDS: FY 1 _____ FY 2 _____

Introduction

This COMET Partners' Proposal study seeks to empirically measure risk perception and behavioral intention in rural and urban communities in the Southeastern United States. The aim is to examine individual responses to forecast and safety messaging during the outlook, watch and warning phases to better understand behavioral intention. Our focus is to develop, compare and test specific messaging surrounding tornadoes for comprehension and interpretation. From this information, the outcome and deliverables will be specific visuals and terminology that NWS meteorologists and media personnel can employ when providing disaster preparedness information to consumers. This project can be transformative in its outcomes for disaster-preparedness planning.

One segment of the FEMA National Preparedness Goal includes an examination of public information and warning of imminent danger—this is the focus of the project. We will develop an experiment that tests how language choices, visual cues and messages surrounding impending tornadic activity may impact an individual's risk perception and, thus, decision-making in the situation. In particular, we plan to examine the types of visual messages and cues most effective in influencing decision-making. For example, how do individuals react when seeing color-coded weather graphics or probabilistic warning models? Which makes them more likely to act, if either? These are important questions that this study seeks to answer.

Prior work in this area (e.g., Dash and Gladwin, 2007) has suggested that a key element of pre-disaster planning includes understanding more about what individuals process and how they interpret warning messages. Researchers have found that most weather-related graphics in the United States give too much attention in describing the events while failing to contain vital information for the public to make appropriate decisions. The lack of information tends to include the estimated landfall time, procedure and moment to take action, as well as other critical problems, such as inconsistency between sources and forecasting error (Sattler & Marshall, 2002; Radford, Senkbeil, & Rockman, 2013).

That focus has mainly been on broadcast meteorological graphics, but this study focuses specifically how messages in severe weather directly from the NWS are interpreted. For example, recent work has found that public consumers wish for more specific information regarding the timing and intensity of precipitation and adverse events in extended forecast graphics (EFG) (Reed, & Senkbeil, 2020). This study hopes to dig more deeply into that idea to test specific images, texts and other tornado forecast briefings.

Further, this project extends their line of research into the rural south, comparing urban and rural areas for differences in comprehension and interpretation for tornados. Residents in rural areas have significantly different circumstances for individuals in making decisions during severe weather outbreaks, such as access to resources and storm shelters. Individuals from both small and large communities—within different metropolitan areas—will be surveyed within this study to examine their points of community reliance when severe weather is imminent. Recent work on from researchers in Tennessee suggests that residents in Tennessee found a disconnect between

messaging needs of the public and NWS forecaster information (see Walters et al, 2020). This project plans to delve more deeply into that potential divide, advancing that research.

Research Questions

In particular, the specific research questions addressed in this proposal include:

1. What visual and textual elements in the messaging platforms of outlooks, watches and warnings are most effective/ineffective in increasing an individual's likelihood to take shelter from immediate or predicted tornadic activity?
2. How does community size and makeup contribute to the effectiveness of the message?

These will be examined through a survey of NWS-Memphis stakeholders and general public in Memphis-NWS serving area to determine most effective visual cues for tornado-related information, when severe weather is imminent. The survey would focus on the kinds of information that individuals respond to, given the rapid development nature of tornadoes and quick responses needed.

The objective is to learn more about the visual cues (maps, text, other NWS products) that stakeholders respond to, which would allow the NWS-Memphis to tweak tornado-related material in response to feedback from the survey. In particular, the plan is to gather information from the public related to the various language and cues employed by NWS-Memphis and determine how respondents are interpreting the information—and from what sources. Results would be presented to NWS-Memphis in a workshop format to talk through improvements as needed. We would have roughly equal respondents from urban and rural areas, as defined through NWS-Memphis service areas. Those locations will be selected in consultation with NWS personnel.

Organizations

Like other WFOs, WFO Memphis operates around the clock, 365 days of the year. Dedicated employees provide IDSS, forecasts and warnings in keeping with the agency mission to protect lives and property. The office has a long history of serving the citizens and core partners across the Mid-South.

Specifically, WFO Memphis:

- Began taking observations as part of the U.S. Army Signal Corps on February 28, 1871.
- Prior Locations:
 - 1871-1964 – Various locations in Downtown Memphis, became the River District Office
 - 1931 – Another weather office at the Memphis Airport added, moved downtown in 1944, then back to the airport in 1955.
 - 1964 – River District Office and Airport office combine at the Memphis Airport.

- 1971 – A Radar observation (WSR-57) office established in Millington.
- Mid-1980s all NWS Offices combine at the Agricenter International.

WFO Memphis service area:

- The office covers 55 counties over 4 states serving around 2.7 million people.
- Critical: Major stakeholders are county and state emergency management, including the Shelby County Emergency Management/Homeland Security. Additional major stakeholders include the USACE – Memphis District, U.S. Coast Guard, land management agencies such as the U.S. Department of Agriculture, Department of the Interior and associated state agencies, as well as the Tennessee Valley Authority and local levee districts. Major challenges include river forecasting for the Mississippi River and its tributaries and severe local storms, including flash floods and tornadoes. The Mid-South is one of the most active regions of the country for deadly tornadoes. Consequently, quality impact decision support services, warnings and accurate forecasting with preparedness partners such as SCOP and the USACE must be robust if the citizens of the region are to be protected and their livelihoods secured.

National Water Center

NWC is the first national water resources facility in the country serves as a catalyst for the Integrated Water Resources Science and Services (IWRSS) partnership. The IWRSS, which consists of NOAA; the US Geological Survey (USGS); and the Army Corps of Engineers as its initial members, will unify and leverage each agency's expertise and investments to improve water resource forecasts, understand how water moves across the land and rivers, and facilitate creative and informed decisions--all utilizing the best available science.

Approximate Task Timeline

Time	Task (NWS)	Task (UA)
Jan-Feb. 2021	Identify the test products for evaluation	Develop the survey questionnaire
March 2021	Identify specific target areas for study	Test the survey questionnaire
April 2021	Conduct the pilot test of survey	Data examination and qualitative analysis to improve the questionnaire
May-June 2021	Prepare the full survey	Conduct full survey data and conduct initial survey results
July-August 2021	Assist Analysis and finding the results	Conduct Analysis
September-October 2021	Discuss and discern results in stakeholder workshop	Develop and present final analysis in workshop
Nov. – Dec. 2021	Assist the final report writing	Write the final report

Study Personnel: PI

1. Name and Academic Rank: Cory L. Armstrong, PhD., Professor and Chair, Department of Journalism & Creative Media, University of Alabama
2. Contact Information:
Box 870172, 490 Reese Phifer Hall
Tuscaloosa, Alabama 35487
Email: cory.l.armstrong@ua.edu
Office Phone: (205) 348-9684
3. Degrees with fields, institution and date:
 - i. Ph.D. Mass Communication, University of Wisconsin-Madison, 2004
 - ii. M.A. Journalism & Mass Communication, University of Wisconsin-Madison, 2001
 - iii. B.A., English-Journalism, Miami University, 1991.
4. Number of years of service on this faculty, including date of original appointment and dates of advancement in rank:
 - i. Professor and Chair, July 2016-present
Years of Service – 4
5. Other related experience - teaching, industrial, etc:
 - University of North Texas, Director, School of Journalism 2014-16
 - University of Florida, Assistant/Associate Professor (with tenure) 2004-2014.
 - News Journalist 1991-1999: various Ohio newspapers.
6. Principal Publications of last five years:
 - Armstrong, C.L., Hou, J., and Towery, N. The ‘Michael’ Effect: Risk Perception and Behavioral Intentions through Varying Lenses, in press at Journal of Extreme Events.
 - Van Dyke, M., Armstrong, C.L. and Bareford, K. (2020). How Risk Decision-Makers Interpret and Use Flood Forecast Information: Assessing the Mississippi River Outlook Email Product, Journal of Risk Research. <https://doi.org/10.1080/13669877.2020.1819390>
 - Cain, J, Armstrong, C.L., and Hou, J. (2020). Somebody Google a Doctor!: Urgent Health Information Seeking Habits of Young Adults, Online Journal of Communication and Media Technologies, 10(2):1-14. Available online at: <http://www.ojcmnt.net/>
 - Armstrong, C.L., Cain, J, and Hou, J. (2021) Ready for disaster: information seeking, media influence, and disaster preparation for severe weather outbreaks, Atlantic Journal of Communication, DOI: 10.1080/15456870.2020.1731512

- Armstrong, C.L., Hou, J. and McLeod. K. (2020) Is Ellen DeGeneres a “DeGenerate?” How public support for same-sex marriage dictated news coverage of the TV’s first out lesbian, Electronic News, 14(1): 3-21. DOI: 10.1177/1931243120910483.
- Xu. Q. and Armstrong, C.L. (2019). #SELFIES at the 2016 Rio Olympics: Comparing Self-Representations of Male and Female Athletes from the U.S. and China, Journal of Broadcasting & Electronic Media, 63(2):322-228.
- Armstrong, C.L., and Mahone, J. (2017). Putting Myself Out There: Factors Predicting One’s Willingness to Share Information Online, Online Journal of Communication and Media Technologies, 7(3): 88-110. Available online at: <http://www.ojcmnt.net/>
- Armstrong, C.L., and Mahone, J. (2017) “It’s on us.” The role of media and rape culture in individual willingness to mobilize against sexual assault. Mass Communication & Society, 20(1): 92-115.

7. Honors, Grants and Awards:

- National Hazards Center, Boulder, Co (Grant Award: \$2,500) 2018
- Mississippi-Alabama Sea Grant Consortium (Grant Award: \$10,000) 2018
- AEJMC Mary Ann Yodelis Smith Award (Award: \$500) 2013
for Feminist Research (CSW)
- University of Florida Research Professorship (Grant Award: \$5,000 annual stipend;
\$3,000 grant funds) 2011
- University of Florida (Grant Award: \$13,000) 2011
- University of Florida: Jack Wessel Excellence Award for Assistant Professors Grant
Award: \$5,000 for research support 2009.

Contribution by Organization

Contribution by NWS

- Identify test graphics and language
- Identify target population for survey
- Assist the questionnaire survey
- Host Stakeholder Workshop
- Microsoft Word or PowerPoint to help prepare/edit final paper/presentation

All of these contributions are at very little cost to the government.

Contribution by University of Alabama

Description	Contribution Dollars
5% of Dr. VanDyke’s time and fringe during year	5% Academic Salary = \$3,350 + 32% fringe \$1,072 = \$4,422.

18 % Dr. Armstrong summer time and fringe	Salary: \$7,676 Fringe (32%) = \$2,456 Total = \$10,132
Total Cost-Share	\$14,554

Expected Outcome: COMET areas of interest

The COMET areas of interest for this proposal are:

- **Activities to assist operational forecasters in enhancing their educational backgrounds and staying abreast of developments in research**
- **Activities to increase the university research community's awareness of operational problems and needs**

The results of this study will provide essential material to the NWS-Memphis forecasters, as they work to provide live-saving information to the public when imminent danger is approaching. The collaboration between UA and NWS-Memphis will further develop work on improving messaging to the public. An effective forecast requires three elements: 1) The correct science is used; 2) The prediction is accurate and issued to public; and finally, 3) The public understands the message. This partnership will allow us to focus on the third element. The intention is conduct the survey and then hold a workshop with NWS-Memphis personnel and stakeholders to discuss ways the forecasts can be improved.

On the university's end, this work is a continuation of prior work by the principal investigator in examining the effectiveness of media messages on the public to determine risk perception and behavioral intention. Prior grants obtained in this area, include a \$10,000 grant from the Mississippi-Alabama Sea Grant Consortium to look at public views of hurricanes along the Gulf Coast, and a Natural Hazards Center grant to review information sources related to Hurricane Michael. Two social science publications have come from this work: peer-reviewed articles in *Journal of Risk Research* and *Journal of Extreme Events*.

Finally, this research is an extension into media messaging and rural populations of prior work completed as part of a VORTEX-SE related work (See Walters et al, 2020).

Personnel

Cory Armstrong, Ph.D.

Professor and Chair, Department of Journalism and Creative Media

University of Alabama

Ph.D. Mass Communication, University of Wisconsin-Madison, 2004

M.A. Journalism and Mass Communication, University of Wisconsin-Madison,, 2001

B.A. English/Journalism, Miami University, 1991

Mr. James E. Belles

Meteorologist-in-Charge
NWS Memphis, Tennessee
M.S. Meteorology, Penn State University, 1990
B.S. Meteorology, State University of New York, College at Brockport, 1987

Mr. Thomas L. Salem Jr.
Science and Operations Officer
NWS Memphis, Tennessee
M.S. Meteorology, Penn State University, 1992
B.S. Meteorology, Penn State University, 1988

Karen Bareford, Ph.D.
National Water Extension Liaison
National Water Center
University of Alabama, Tuscaloosa, Alabama
Ph.D. Urban and Regional Planning, Florida State University, 2016
M.S. Outdoor Recreation, Indiana University, 2004
B.S. Public Affairs, Indiana University, 1996

Matthew S. VanDyke, Ph.D.
Assistant Professor, Department of Advertising and Public Relations
University of Alabama
Ph.D. Media and Communication, Texas Tech University, 2016
M.A. Communication, Virginia Tech, 2012
B.A. Communication, Virginia Tech, 2010

Gary Woodall
Warning Coordination Meteorologist
National Weather Service Memphis
M.S. Meteorology, University of Oklahoma, 1988
B.S. Meteorology, Florida State University, 1985

G. Mike Johnson
Lead Forecaster
National Weather Service Memphis
B.S. Meteorology, University of Oklahoma, 2000

	COMET Funds	NWS Contributions
University Senior Personnel		
1. Dr. Cory Armstrong, UA		NA
Other University Personnel		
1. Graduate Student (\$20 X 10 hours X 8 weeks)	\$3,200	NA
Tuition (in-state) on University Personnel	\$500* 3 = \$1,500 (1 sum class)	NA
Fringe on University Personnel (7.7%)	\$246	
Total Salaries + Fringe Benefits	\$4,946	NA
NWS/NOAA Personnel		
1. Dr. Karen Bareford, NWC	NA	
2. Jim Belles, WFO Memphis	NA	75
3. Thomas Salem, WFO Memphis	NA	75
4. Gary Woodall, WFO Memphis	NA	75
Travel		
1. Research Trips (To Memphis)	\$1,500	
2. Conference Trips	\$1,000	
3. Other		
Total Travel	\$2,500	
Other Direct Costs		
1. Materials & Supplies	\$271	NA
2. Publication Costs (put in the NWS column if a co-author will be an NWS employee)	\$500	
3. Other Data		
4. NWS Computers & Related Hardware	NA	
5. Other (specify): Survey Panel Data	\$3,990	
Total Other Direct Costs	\$4,768	
Indirect Costs		NA
1. Indirect Cost Rate	26%	
2. Applied to which items?	All items except for tuition based on MTDC of \$10,714	
Total Indirect Costs	\$2,786	NA
Total Costs (Direct + Indirect)	\$15,000	

Budget Justification:

1. **Graduate student funding:** This project will include significant work during the summer months; therefore \$4,946 will go toward funding a graduate student on an hourly basis during the summer months, including fringe and the opportunity of one class.

Travel

2. The PI will need to travel to NWS-Memphis to work with the collaborators and develop the survey, as well as to present the data in the workshop. This is budgeted at \$750 per trip.
3. The PI plans to attend and present this material at a peer-reviewed AMS conference, such as Sixth Conference on Weather Warnings and Communication in June 2021. The budgeted cost is \$1,000.

Other Costs

4. The largest expense here aside from the funding of a graduate student is the purchase of panel data of respondents within the Memphis coverage area. The quote is attached at \$3,990 to receive 600 respondents (300 in urban areas and 300 in rural areas).
5. Incidentals, such as journal publications (\$500) and materials/supplies for the workshops are set for \$768. These are estimates based on current plans for distribution and the workshop.

Indirect Costs

6. UA has agreed to lower its general IDC costs from 49% to 26% as noted above. This results in \$2,786 in IDCs, excluding student tuition.

References

- Dash, N. & Gladwin, H. (2007). Evacuation Decision Making and Behavioral Responses: Individual and Household, *Natural Hazards Review*, 8(3): 69-77.
- Radford, L., Senkbeil, J. C., & Rockman, M. (2013). Suggestions for alternative tropical cyclone warning graphics in the USA. *Disaster Prevention and Management: An International Journal*, 22(3), 192-209.
- Reed, J.R. and Senkbeil, J.C. (2020 February). Perception and comprehension of the extended forecast graphic: A survey of broadcast meteorologists and the public. *Bulletin of the American Meteorological Society*, E221-E236.
- Sattler, D. N., & Marshall, A. L. (2002). Hurricane preparedness: Improving television hurricane watch and warning graphics. *International journal of mass emergencies and disasters*, 20(1), 41.
- Walters, J.E., Reyes Mason, L., Ellis, K., & Winchester, B. (2020). Staying Safe in a tornado: A qualitative inquiry into public knowledge, access and response to tornado warnings, *Weather and Forecasting*, 35:67-81.

Actions Before Proposal is Submitted to COMET	YES	NO	DATE
1. Did NWS office staff and university staff meet to discuss and form outline and scope of project?	X		9/18/20
2. Did NWS office consult Scientific Services Division (SSD) staff?	X		
3. Was Statement of Work and budget formulated as a team effort between university and NWS staffs?	X		9/29/20
4. Was proposal submitted to SSD for review?	X		10/1/20
5. Did SSD forward copies of proposals dealing with WSR-88D data to Radar Operations Center (ROC), Applications Branch Chief for review?	NA		
6. Did SSD forward copies of proposals dealing with hydrometeorology to the Senior Scientist of OHD for review?	NA		
7. Did SSD review the data request for project to ensure its scope and criticality for proposal?	NA		
8. Is all data for the project being ordered by NWS offices through the National Climatic Data Center's (NCDC) Research Customer Service Group free of charge?	NA		
9. Does budget include publication charges and travel costs for NWS employees to present results at scientific conferences?		X	
10. Does budget separate NWS costs into fiscal year costs and university costs into calendar year costs?	X		

11. Does proposal include a separate justification for university hardware purchases which are usually not funded by the COMET Outreach Program?		NA	
12. Have the following people signed off on the proposal cover sheet: - MIC/HIC? - SSD Chief? - Regional Director?	X		10/15/20
13. Is a letter of endorsement signed by regional director attached?	X		10/13/20

Actions after Endorsement by NWS	YES	NO	DATE
1. University submits proposal to the COMET Program.			
2. Proposal acknowledgment letter sent by the COMET Program to submitting university with copies to SSDs and NWS office.			
3. COMET review of proposal (internal review for Partners Project proposals and formal review for Cooperative Project proposals).			
4. The COMET Program sends acceptance, rejection, or modification letters to university with copies to SSD, NWS office, and OST12.			
5. The COMET Program allocates funds for university.			
6. OST12 obligates funds for NWS offices.			
7. SSD/NWS office orders data from NCDC.			
8. NWS office or SSD calls OST12 for accounting code for expenses.			
9. NWS office sends copies of all travel vouchers and expense records to OST12.			
10. NWS office or SSD sends copies of publication page charge forms to OST12.			

11. NWS office keeps SSD informed of progress on the project and any results or benefits derived from the project.



Research Services Quote

Qual1827-1005TNCounties

333 W River Park Drive
Provo, UT 84604
US

08-Oct-2020

Expires after 30 days

Phone: (801) 374-6682

Payment Terms Net 30 from invoice

Fax: (866) 562-9828

DESCRIPTION

Research Services: USD 3990

TOTAL AMOUNT DUE TO QUALTRICS USD 3990

Summary:

300n from the following counties: Shelby and Madison County TN; and Craighead County, AR.

300n from these counties:

- AR
- Clay
- Greene
- Poinsett
- Mississippi
- Cross
- Crittenden
- St. Francis
- Lee
- Phillips

Missouri Counties

- Dunklin
- Pemiscott

Tennessee Counties

- Lake
- Obion
- Weakley
- Henry
- Dyer
- Gibson
- Carroll
- Benton
- Lauderdale
- Crockett
- Tipton
- Haywood
- Henderson

Amanda Oswald

amandao@qualtrics.com

(801) 374-6682



Research Services Quote

Qual1827-1005TNCounties

Decatur
Fayette
Hardeman
Chester
McNairy
Hardin

Mississippi Counties

Desoto
Tunica
Tate
Marshall
Benton
Tippah
Alcorn
Prentiss
Tishomingo
Coahoma
Quitman
Panola
Lafayette
Union
Pontotoc
Lee
Itawamba
Tallahatchie
Yalobusha
Calhoun
Chickasaw
Monroe

Sample Size: 600

Length of Survey: 30 Minutes or less.

Incidence or Qualifying Rate: 65%

Amanda Oswald

amandao@qualtrics.com

(801) 374-6682



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Weather Service Southern Region Headquarters
819 Taylor Street, Room 10E09
Fort Worth TX 76102

October 14, 2020

MEMORANDUM FOR: Ms. Lorrie Alberta
COMET Outreach Program Administrator
3085 Center Green Drive
Boulder CO 80301

FROM: Steven Cooper, Director
NWS Southern Region Headquarters

SUBJECT: Letter of Support for COMET Partners Proposal

National Weather Service, Southern Region Headquarters, fully supports the COMET Partners Proposal titled “Does that work for you? Comprehension and Interpretation of NWS Weather Graphics by Urban and Rural Mid-South Residents.”

SRH and our Science and Technology Services Division are pleased to endorse this joint University of Alabama (UA) and WFO Memphis COMET Partners Proposal. In addition to the potential science and service improvement benefits, this proposal, if funded, will continue to support a growing professional relationship between NWS and the University of Alabama. A healthy and robust relationship would help future scientists, and not just environmental scientists, at UA understand some of the challenges with messaging hazardous weather information.

This proposal will have the potential to apply and build on some of the recent findings from VORTEX-SE social science research. Specifically, this proposal addresses a key operational research question that is pertinent to many NWS Southern Region Weather Forecast Offices: What visual or textual elements in the NWS messaging arsenal relating to potential tornadic activity are ***most likely to result in an individual taking appropriate action or shelter?***

We expect the results of this proposed research will benefit not only WFO Memphis, but also many other offices that experience challenges with messaging a tornado threat. The proposed project will focus on not only the warning time scale, but also the outlook and watch phases of tornado prediction. The potential benefits could therefore have more widespread implications and applications within NWS as our agency strives to create a Weather Ready Nation.

