



**U.S. DEPARTMENT OF COMMERCE**  
**National Oceanic and Atmospheric Administration**  
**National Weather Service, Central Region Headquarters**  
7220 NW 101 Terrace  
Kansas City, MO 64153

April 10, 2019

To Whom It May Concern:

The National Weather Service (NWS) welcomes the opportunity to collaborate with atmospheric science faculty in the School of Natural Resources at the University of Missouri. The NWS recognizes the potential value of investigating the downdraft convective inhibition (DCIN) parameter for use in forecasting severe criteria winds, especially as associated with pre-warm frontal and other elevated convection.

We understand that the principal investigator will be the University of Missouri. The NWS agrees to serve as a collaborator if funding is approved for this proposal. This collaboration will take the form of assisting with case study creation highlighting how the DCI can be used and assessing operational performance of the DCIN parameter. Dr. Greg Mann (NWS DTX) will be the point of contact for NWS.

Sincerely,

A handwritten signature in blue ink, appearing to read "Christopher S. Strager".

Christopher S. Strager  
Director  
National Weather Service Central Region



**PROPOSAL FOR AN NWS PARTNERS PROJECT**

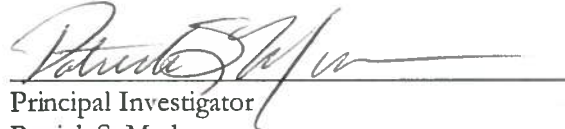
**TITLE: A Case Study of the Midwest Elevated Convective Wind Event of 13 April 2018**

**Date:** 26 November 2018

**University of Missouri**  
School of Natural Resources  
Atmospheric Science Program  
302 ABNR  
Columbia, MO 65211

**National Weather Service Forecast Office**  
Detroit/Pontiac, MI  
9200 White Lake Road  
White Lake, MI 48386

Signatures for University



Principal Investigator  
Patrick S. Market  
Associate Professor  
Voice: (573)882-1496  
e-mail: [marketp@missouri.edu](mailto:marketp@missouri.edu)

Signatures for NWS



Principal Investigator  
Dr. Greg Mann  
Science and Operations Officer  
Voice: (248) 625-3309 ext 766  
e-mail: [Greg.Mann@noaa.gov](mailto:Greg.Mann@noaa.gov)

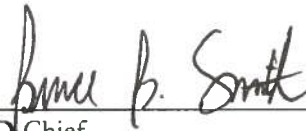


03/12/19

Pre-Award Manager and Authorized Signer  
Sponsored Programs Administration  
Karen M. Geren  
Voice: (573)882-7560 Fax: (573)884-4078  
e-mail: [grantsdc@spa.missouri.edu](mailto:grantsdc@spa.missouri.edu)



MIC  
Richard Wagenmaker  
Voice: (248) 625-3309 ext 624  
e-mail: [Richard.Wagenmaker@noaa.gov](mailto:Richard.Wagenmaker@noaa.gov)



SSD, Chief  
Bruce Smith  
Voice: (816) 268 - 3110  
e-mail: [Bruce.Smith@noaa.gov](mailto:Bruce.Smith@noaa.gov)

**SUMMARY OF BUDGET REQUEST**

COMET FUNDS: \$14,170

NWS FUNDS: \$0



Regional Director  
Christopher Strager  
Voice: (816) 268 - 3110  
e-mail: [Christopher.Strager@noaa.gov](mailto:Christopher.Strager@noaa.gov)

## 1. Summary of the Problem

On 13 April 2018, a significant wind event occurred across the upper Midwest and into the upper peninsula of Michigan and the northern portions of lower Michigan. This event was unique in that it occurred in conjunction with elevated convection, and involved winds that met (Iowa) and approached (northern Michigan) the National Weather Service severe criterion. The former events appear to have been the result of downdrafts from elevated convection, and these events will be investigated with the downdraft convective inhibition (DCIN; Market 2017) and its ratio with the downdraft convective available potential energy (DCAPE). With the latter, Great Lakes events, evidence exists that they were linked to the passage of an inertial-gravity wave (Fig. 1), with pressures varying dramatically from 1008.6 mb at 1612 UTC, to 1015.5 mb at 1618 UTC, and then returning to 1008.6 mb at 1624 UTC. This pressure feature corresponded to 36 knot gusts at 1618 UTC, the time of peak pressure. The pressure and wind feature also produced a meteotsunami episode (Anderson et al. 2012) within the Lake Michigan basin.

Although there has been work to better anticipate significant surface sensible weather as a result of gravity waves and bores (e.g., Koch and O'Handley 1997; Gaffin et al. 2003; Hartung et al. 2010; Coleman and Knupp 2011), less work exists on the specific topic of anticipating severe criterion winds at the surface in association with elevated convection (Kuchera and Parker 2006; Market et al. 2017; Grempler et al. 2018). The proposed work would allow us to expand both areas of inquiry, with an emphasis on further tests of the DCIN and the DCIN/DCAPE ratio as a means of discriminating areas prone to severe criterion winds from elevated convection.

With this proposal, we seek to examine the precise cause(s) of these wind reports, all of which occurred well on the cold side of a significant synoptic-scale frontal boundary. Support is

sought for a 1/4-time graduate student for a semester to complete the study, and take the results to a national conference.

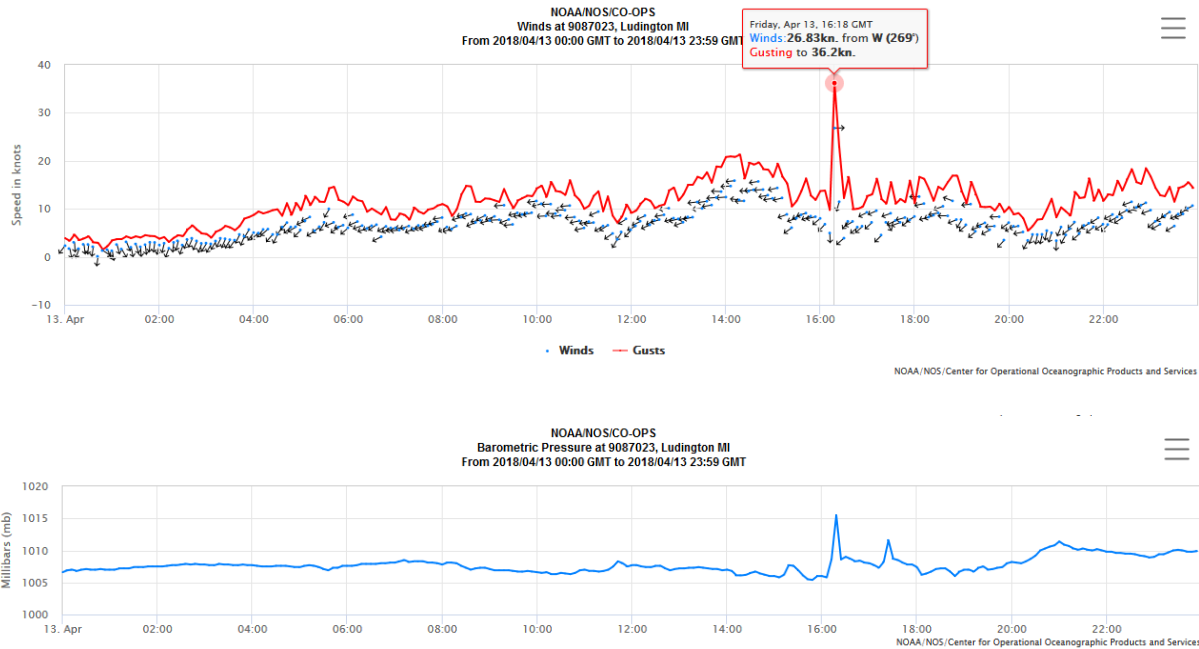


Figure 1. Time series plot of wind speed (upper; *knots*) and sea level pressure (lower; *mb*) for Ludington, Michigan, on 13 April 2018. Images taken from:

<https://tidesandcurrents.noaa.gov/met.html?bdate=20180413&edate=20180413&units=standard&timezone=GMT&id=9087023&interval=6>

## 2. Objectives

The objectives of this study are:

- a. to conduct a thorough case study of the event in question;
- b. to confirm the existence and mechanics of inertial gravity waves, especially with the Great Lakes portion of the event, and;

- c. to test the downdraft convective inhibition (DCIN) as a means of segregating locations where winds met severe criterion from areas where winds did not.

To accomplish the stated objectives, the usual suite of observed data will be examined. In particular, one-minute pressure data from appropriate ASOS stations will be acquired and examined to assess gravity wave existence/dynamics. Additionally, hourly initial fields will be acquired for the 13-km native grid of the Rapid Refresh (RAP) from the National Center for Environmental Information (NCEI) National Operational Model Archive and Distribution System (NOMADS) server. Using the RAP output, additional plan-view, cross section, time height, and skew-T analyses will be brought to bear to assess the event. Scripts exist at the University of Missouri (MU) already for the calculation and evaluation of DCAPE, DCIN, and their ratio.

### 3. Specific Tasks to be Completed

We have identified several tasks to be completed with this study. First, a detailed synoptic and mesoscale analysis will be completed on this event. Secondly, time series will be created from surface pressure observations in order to establish the existence, and infer the nature of, suspected inertial gravity waves. Third, fields of DCAPE, DCIN, and their ratio will be created for the period encompassing the strong and damaging winds. Finally, the results will be created as tools for forecasters as well as educational seminars for both NWS and MU staff and students, respectively.

Details follow:

- **Task A:** Data acquisition and formatting. (Performed at NWS and MU).
- **Task B:** Detailed case study of 13 April 2018 cyclone. (NWS and MU).

- **Task C:** Transfer the results of Task B into useful guidelines, forecast fields, and/or analyses for the operational forecast environment in the form of AWIPS procedures and GEMPAK scripts. These fields, along with some type of nomogram, table, or chart would successfully meet one of the main goals of COMET projects --- direct use in forecast/warning operations. (NWS and MU).
- **Task D:** Development of instructional materials for the classroom and/or COMET distance-based learning environment. It's very easy now to take PowerPoint or other materials and turn them into web-based modules or teletraining. It seems a natural outcome would be to create a toolbox of material that could be used in the classroom or via distance-based learning. (Performed by MU).

#### **4. Time Table**

Task A can be completed within the first month of the project start. We anticipate Task B to take the ensuing 2-3 months as investigators at both the University and the NWS examine the case thoroughly. Tasks C and D will begin at a Skype meeting of the principal investigators and the graduate student beginning around month 6.

#### **5. Description of Principal Investigators**

Patrick S. Market is an associate professor of meteorology at the University of Missouri-Columbia. His research focuses on the synoptic- and mesoscale aspects of heavy precipitation systems, as well as the dynamics of jet streaks and how their motion and structure are altered by diabatic heating. His abbreviated curriculum vita is appended to this proposal.

Dr. Greg Mann is the Science and Operations Officer at the National Weather Service (NWS) Weather Forecast Office (WFO) in Pontiac/Detroit, MI. His research work pertaining to Great Lakes mesoscale processes including convective wind storms and their influence on Great Lakes responses (e.g., meteotsunamis) will provide great insight for the proposed effort. He also has extensive knowledge regarding design and application of numerical weather prediction experiments in Great Lakes applications.

## References

- Anderson, E. J., A. J. Bechle, C. H. Wu, D. J. Schwab, G. E. Mann, and K. A. Lombardy: Reconstruction of a meteotsunami in Lake Erie on 27 May 2012: Roles of atmospheric conditions o hydrodynamic response in enclosed basins. *J. Geophys. Res.*, **120**, 8020-8038.
- Coleman, T.A. and K.R. Knupp, 2011: A review of three significant wake lows over Alabama and Georgia. *Wea. Forecasting*, **26**, 766–773
- Gaffin, D. M., S. S. Parker, and P. D. Kirkwood, 2003: An unexpectedly heavy and complex snowfall event across the southern Appalachian region. *Wea. Forecasting*, **18**, 224–235.
- Grempler, K., P. S. Market, C. B. Henson, and S. Ritter, 2018: Using the downdraft convective inhibition (DCIN) to evaluate severe weather threats from elevated convection. *29<sup>th</sup> Conference on Weather Analysis and Forecasting*, Denver, CO, Amer. Meteor. Soc., 06 June 2018, 8A.6.
- Hartung, D. C., J. A. Otkin, J. E. Martin, and D. Turner, 2010: The life cycle of an undular bore and its interaction with a shallow, intense cold front. *Mon. Wea. Rev.*, **138**, 886–908.
- Koch, S.E. and C. O'Handley, 1997: Operational forecasting and detection of mesoscale gravity waves. *Wea. Forecasting*, **12**, 253-281.
- Kuchera, E.L. and M.D. Parker, 2006: Severe convective wind environments. *Wea. Forecasting*, **21**, 595–612. <https://doi.org/10.1175/WAF931.1>
- Market, P.S., S. M. Rochette, J. Shewchuk, R. Difani, J.S. Kastman, C. B. Henson, N.I. Fox, 2017: Evaluating elevated convection with the downdraft convective inhibition. *Atmospheric Science Letters*. doi:: 10.1002/asl.727

## **Budget and Justification**

Funds are requested (Table I) chiefly for one semester of support of a graduate research assistant (salary) at the University of Missouri (UM), who will be employed at 0.25 FTE. The student's effort includes four months of salary, tuition remission, and a portion of the flat-rate medical insurance for graduate students commensurate with the 4 months 0.25 FTE. A student has been identified already for this work who is experienced with GEMPAK, the NAWIPS suite, cave/AWIPS, and various methods of online data retrieval.

In addition, monies are requested by the University of Missouri to support conference travel, preferably a national AMS or NWA Annual gathering, where this work can be presented to a significant portion of the operational community. Any remaining funds will be used to make additional presentations at state or regional conferences. The supplies budget included in this request is for external memory/storage for project data.

We note that the University of Missouri investigator has waived any salary request. Finally, one of the Linux workstations in the University of Missouri Atmospheric Science Program's WAV Lab will be dedicated to the proposed work, constituting a donation of facilities to the project.

Indirect costs are calculated at the University's federally negotiated indirect cost rate of 55% modified total direct costs for on-campus research activities.

No funds are requested by the National Weather Service Office to support research and conference travel and Dr. Mann's contribution will be in-kind.



Table I. Proposed Project Budget

	COMET Funds (UM)	NWS Contributions (FY)
<b>University Senior Personnel</b>		
1. Patrick S. Market (UM)	NA	NA
2.	NA	NA
<b>Other University Personnel</b>		
1. Graduate Research Assistant (GRA)	\$4,553	NA
2. GRA Tuition	\$1,474	NA
3. Fringe benefit	\$688	
<b>Total Salaries + Fringe Benefits</b>	<b>\$6,715</b>	<b>\$0</b>
<b>NWS Personnel</b>		
1. Greg Mann, Science & Operations Officer	NA	<b>8 hours / month</b>
<b>Travel</b>		
1. Research Trips	\$0	\$0
2. Conference Trips	\$2,750	<b>\$0</b>
3. Other	\$0	\$0
<b>Total Travel</b>	<b>\$2,750</b>	<b>\$0</b>
<b>Other Direct Costs</b>		
1. Materials & Supplies	\$200	NA
2. Publication Costs	\$0	NA
3. Other Data	\$0	NA
4. NWS Computers & Related Hardware	\$0	NA
<b>Total Other Direct Costs</b>	<b>\$200</b>	<b>\$0</b>
<b>Indirect Costs</b>		
1. Indirect Cost Rate	55%	NA
2. Applied to all items but tuition.		NA
<b>Total Indirect Costs</b>	<b>\$4,505</b>	<b>\$0</b>
<b>Total Costs (Direct + Indirect)</b>	<b>\$14,170</b>	<b>\$0</b>

## NWS Checklist for Submitting a COMET Outreach Proposal

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		12/8/2018
2. Did NWS office consult Scientific Services Division (SSD) staff?	X		12/10/2018
3. Was Statement of Work and budget formulated as a team effort between university and NWS staffs?	X		
4. Was proposal submitted to SSD for review?	X		1/15/2019
5. Did SSD forward copies of proposals dealing with WSR-88D data to Radar Operations Center (ROC), Applications Branch Chief for review?	N/A		
6. Did SSD forward copies of proposals dealing with hydrometeorology to the Senior Scientist of OHD for review?	N/A		
7. Did SSD review the data request for project to ensure its scope and criticality for proposal?	X		2/6/2019
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?	X		
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?		X	
12. Have the following people signed off on the proposal cover sheet: - MIC/HIC? - SSD Chief? - Regional Director?	X		3/4/2019
13. Is a letter of endorsement signed by regional director attached?	X		

## NWS Checklist for Submitting a COMET Outreach Proposal

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.			



UNIVERSITY OF MISSOURI - COLUMBIA  
OFFICE OF RESEARCH AND  
OFFICE OF SPONSORED PROGRAMS ADMINISTRATION  
GRANT ADMINISTRATIVE INFORMATION

**APPLICANT NAME AND ADDRESS:**

The Curators of the University of Missouri  
The University of Missouri  
Office of Sponsored Programs Administration  
115 Business Loop 70W  
Mizzou North, Room 501  
Columbia, MO 65211-0001  
(573) 882-7560  
grantsdc@missouri.edu

**OVERNIGHT MAILING ADDRESS:**

Office of Sponsored Programs Administration  
115 Business Loop 70West  
Mizzou North, Room 501  
Columbia, MO 65203

**MAKE AWARDS/CHECKS PAYABLE TO:**

The Curators of the University of Missouri

**CHECKS MAILED TO:**

University of Missouri AR  
PO Box 807012  
Kansas City, MO 64180-7012

**ORGANIZATION TYPE:**

Public Institution of Higher Education and a Public  
Corporation under the laws of the State of Missouri (sec.  
172.00 RSMo.)

**COGNIZANT AUDIT AGENCY:**

U.S. Department of Health and Human Services  
Office of the Secretary, Div. of Cost Allocation  
Room 1130 Main Tower Building  
Dallas, TX 75202  
ATTN: Branch Manager, Colleges and  
Universities

**ADMINISTRATIVE CONTRACTING OFFICE:**

Office of Naval Research, Chicago Branch  
230 South Dearborn, Room 380  
Chicago, IL 60604-1595

**U.S. CONGRESSIONAL DISTRICT:**

Fourth (4th) Congressional District

**COUNTY:**

Boone County, Missouri

**TAX EXEMPT STATUS:**

Exempt by virtue of being an organization as described  
in Section 115 of the Internal Revenue Code of 1954; the  
University is an instrumentality of the State of Missouri

**EMPLOYER ID NUMBER:**

43-6003859

**MISSOURI STATE VENDOR NUMBER:**

436003859D7

**DUNS NUMBER:**

153890272 Columbia Campus  
006326904 UM System (US Department of ED)

**AUTHORIZED SIGNATURES:**

**1<sup>st</sup> Primary:**

Karen M. Geren, Pre-Award Manager  
Office of Sponsored Programs Administration  
University of Missouri

**2<sup>nd</sup> Primary:**

Craig David, Director  
Office of Sponsored Programs Administration  
University of Missouri

**Alternative Authorized Signers:**

Michelle L. Leaton, Assistant Pre-Award Manager.  
Jamie Szabo, Associate Director  
Brenda Leuenberger, Senior Compliance Manager  
Melissa Old, Compliance Manager  
Cameron Purves, Compliance Manager  
Office of Sponsored Programs Administration  
University of Missouri

**Financial Officer:**

Jamie Szabo, Associate Director  
Office of Sponsored Programs Administration  
University of Missouri

**Business Contact:**

Craig David, Director  
University of Missouri  
Office of Sponsored Programs Administration  
115 Business Loop 70West  
Mizzou North, Room 501  
Columbia, MO 65211-0001  
(573) 882-7560  
grantsdc@missouri.edu

COLLEGES AND UNIVERSITIES RATE AGREEMENT

EIN: 1436003859

DATE:03/19/2018

ORGANIZATION:

FILING REF.: The preceding agreement was dated 04/11/2017

University of Missouri System  
118 University Hall  
Columbia, MO 65211-3020

The rates approved in this agreement are for use on grants, contracts and other agreements with the Federal Government, subject to the conditions in Section III.

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**SECTION I: INDIRECT COST RATES**

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RATE TYPES:      FIXED                  FINAL                  PROV. (PROVISIONAL)      PRED. (PREDETERMINED)

EFFECTIVE PERIOD

<u>TYPE</u>	<u>FROM</u>	<u>TO</u>	<u>RATE (%)</u>	<u>LOCATION</u>	<u>APPLICABLE TO</u>
PRED.	07/01/2016	06/30/2020	55.00	On Campus	Organized Research
PRED.	07/01/2016	06/30/2020	45.00	On Campus	Instruction
PRED.	07/01/2016	06/30/2020	33.00	On Campus	Other Sponsored Activities
PRED.	07/01/2016	06/30/2020	26.00	Off Campus	All Programs
PROV.	07/01/2020	Until Amended			Use same rates and conditions as those cited for fiscal year ending June 30, 2020.

\*BASE

ORGANIZATION: University of Missouri System

AGREEMENT DATE: 3/19/2018

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Modified total direct costs, consisting of all direct salaries and wages, applicable fringe benefits, materials and supplies, services, travel and up to the first \$25,000 of each subaward (regardless of the period of performance of the subawards under the award). Modified total direct costs shall exclude equipment, capital expenditures, charges for patient care, rental costs, tuition remission, scholarships and fellowships, participant support costs and the portion of each subaward in excess of \$25,000. Other items may only be excluded when necessary to avoid a serious inequity in the distribution of indirect costs, and with the approval of the cognizant agency for indirect costs.

ORGANIZATION: University of Missouri System

AGREEMENT DATE: 3/19/2018

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**SECTION I: FRINGE BENEFIT RATES\*\***

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<u>TYPE</u>	<u>FROM</u>	<u>TO</u>	<u>RATE (%)</u>	<u>LOCATION</u>	<u>APPLICABLE TO</u>
FIXED	7/1/2017	6/30/2018	22.00	All	(1)
FIXED	7/1/2017	6/30/2018	27.40	All	(2)
FIXED	7/1/2018	6/30/2019	23.50	All	(1)
FIXED	7/1/2018	6/30/2019	28.20	All	(2)
PROV.	7/1/2019	Until amended			Use same rates and conditions as those cited for fiscal year ending June 30, 2019.

\*\* DESCRIPTION OF FRINGE BENEFITS RATE BASE:

Salaries and wages.

- (1) Med School Employees - Columbia
- (2) All Employees Except Medical School Employees - Columbia

ORGANIZATION: University of Missouri System

AGREEMENT DATE: 3/19/2018

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**SECTION II: SPECIAL REMARKS**

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TREATMENT OF FRINGE BENEFITS:

The fringe benefits are charged using the rate(s) listed in the Fringe Benefits Section of this agreement. FICA is specifically identified to each employee and is charged individually as direct costs. The fringe benefits included in the rate(s) are listed in the Special Remarks Section of this agreement.

TREATMENT OF PAID ABSENCES

Vacation, holiday, sick leave pay and other paid absences are included in salaries and wages and are claimed on grants, contracts and other agreements as part of the normal cost for salaries and wages. Separate claims are not made for the cost of these paid absences.

OFF-SITE DEFINITION: For all activities performed in facilities not owned by the organization and to which rent is directly allocated to the project(s), the off-site rate will apply. Actual costs will be apportioned between on-site and off-site components. Each portion will bear the appropriate rate.

FRINGE BENEFITS:

Disability Insurance	Dental Insurance	Worker's Compensation
Retirement	Life Insurance	Tuition Remission
Unemployment Insurance	Wellness Program	Health Insurance

Equipment Definition -

Equipment means an article of nonexpendable, tangible personal property having a useful life of more than one year and an acquisition cost of \$5,000 or more per unit.

The next fringe benefit rate proposal, based on actual costs for the fiscal year ending 06/30/2018, is due in our office by 12/31/2018. The next facilities and administrative cost rate proposal, based on actual costs for the fiscal year ending 06/30/2019, is due in our office by 12/31/2019.

Effective 7/1/2016, the Facilities & Administrative rates shown on page 1 of this rate agreement apply to the four (4) University of Missouri campuses listed below:

- University of Missouri - Columbia (1436003859B4)
- University of Missouri - Kansas City (EIN 1436003859A1)
- University of Missouri - St. Louis (EIN 1436003859B1)
- Missouri University of Science & Technology (EIN 1436003859A3)



ORGANIZATION: University of Missouri System

AGREEMENT DATE: 3/19/2018

**SECTION III: GENERAL**

**A. LIMITATIONS:**

The rates in this Agreement are subject to any statutory or administrative limitations and apply to a given grant, contract or other agreement only to the extent that funds are available. Acceptance of the rates is subject to the following conditions: (1) Only costs incurred by the organization were included in its facilities and administrative cost pools as finally accepted; such costs are legal obligations of the organization and are allowable under the governing cost principles; (2) The same costs that have been treated as facilities and administrative costs are not claimed as direct costs; (3) Similar types of costs have been accorded consistent accounting treatment; and (4) The information provided by the organization which was used to establish the rates is not later found to be materially incomplete or inaccurate by the Federal Government. In such situations the rate(s) would be subject to renegotiation at the discretion of the Federal Government.

**B. ACCOUNTING CHANGES:**

This Agreement is based on the accounting system purported by the organization to be in effect during the Agreement period. Changes to the method of accounting for costs which affect the amount of reimbursement resulting from the use of this Agreement require prior approval of the authorized representative of the cognizant agency. Such changes include, but are not limited to, changes in the charging of a particular type of cost from facilities and administrative to direct. Failure to obtain approval may result in cost disallowances.

**C. FIXED RATES:**

If a fixed rate is in this Agreement, it is based on an estimate of the costs for the period covered by the rate. When the actual costs for this period are determined, an adjustment will be made to a rate of a future year(s) to compensate for the difference between the costs used to establish the fixed rate and actual costs.

**D. USE BY OTHER FEDERAL AGENCIES:**

The rates in this Agreement were approved in accordance with the authority in Title 2 of the Code of Federal Regulations, Part 200 (2 CFR 200), and should be applied to grants, contracts and other agreements covered by 2 CFR 200, subject to any limitations in A above. The organization may provide copies of the Agreement to other Federal Agencies to give them early notification of the Agreement.

**E. OTHER:**

If any Federal contract, grant or other agreement is reimbursing facilities and administrative costs by a means other than the approved rate(s) in this Agreement, the organization should (1) credit such costs to the affected programs, and (2) apply the approved rate(s) to the appropriate base to identify the proper amount of facilities and administrative costs allocable to these programs.

BY THE INSTITUTION:

University of Missouri System

(INSTITUTION)

(SIGNATURE)

Ryan Rapp

(NAME)

Vice President for Finance & CFO

(TITLE)

March 23, 2018

(DATE)

ON BEHALF OF THE FEDERAL GOVERNMENT:

DEPARTMENT OF HEALTH AND HUMAN SERVICES

(AGENCY)

(SIGNATURE)

Arif Karim

(NAME)

Director, Cost Allocation Services

(TITLE)

3/19/2018

(DATE) 7085

HHS REPRESENTATIVE:

Theodore Foster

Telephone:

(214) 767-3261