

SUMMARY PROPOSAL BUDGET

YEAR 1

ORGANIZATION Columbia University				FOR NSF USE ONLY		
				PROPOSAL NO.	DURATION (months)	
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Pierre Gentine				AWARD NO.	Proposed	Granted
					NSF Funded Person-months	
A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				CAL	ACAD	SUMR
1. Pierre Gentine - PI				0.00	0.00	3.00
2. Ryan Abernathey - co-PI				0.00	0.00	1.00
3. Elias Bareinboim - Associate Professor				0.00	0.00	0.30
4. Robin Bell - Research Professor				0.00	0.00	0.30
5. Vanessa Burbano - Assistant Professor				0.00	0.00	1.50
6. (20) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)				0.00	0.00	19.40
7. (25) TOTAL SENIOR PERSONNEL (1 - 6)				0.00	0.00	25.50
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (7) POST DOCTORAL SCHOLARS				12.00	0.00	0.00
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				0.00	0.00	0.00
3. (7) GRADUATE STUDENTS						
4. (0) UNDERGRADUATE STUDENTS						
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)						
6. (7) OTHER						
TOTAL SALARIES AND WAGES (A + B)						
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)						
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)						
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)						
TPU Nodes				\$	100,000	
TOTAL EQUIPMENT						
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)						
2. INTERNATIONAL						
F. PARTICIPANT SUPPORT COSTS						
1. STIPENDS \$ 50,000						
2. TRAVEL 0						
3. SUBSISTENCE 0						
4. OTHER 95,000						
TOTAL NUMBER OF PARTICIPANTS (21)						
TOTAL PARTICIPANT COSTS						
G. OTHER DIRECT COSTS						
1. MATERIALS AND SUPPLIES						
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION						
3. CONSULTANT SERVICES						
4. COMPUTER SERVICES						
5. SUBAWARDS						
6. OTHER						
TOTAL OTHER DIRECT COSTS						
H. TOTAL DIRECT COSTS (A THROUGH G)						
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)						
MTDC -- Lamont (Rate: 54.0000, Base: 141821) (Cont. on Comments Page)						
TOTAL INDIRECT COSTS (F&A)						
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)						
K. FEE						
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)						
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$		
PI/PI NAME Pierre Gentine				FOR NSF USE ONLY		
ORG. REP. NAME* Jessy George				INDIRECT COST RATE VERIFICATION		
				Date Checked	Date Of Rate Sheet	Initials - ORG

SUMMARY PROPOSAL BUDGET COMMENTS - Year 1

Other Senior Personnel

Name - Title	Cal	Acad	Sumr	Funds Requested	
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Cogburn, Courtney D - co-PI	0.00	0.00	1.00	13733	
Elsaesser, Gregory - Associate Research Scientist	0.00	0.00	0.00	1.00	9849
Fish, Jacob - Professor	0.00	0.00	0.30	7643	
Giometto, Marco - Assistant Professor	0.00	0.00	0.30	3708	
Kaiser, Gail - Professor	0.00	0.00	0.30	6961	
Kim, Martha - Associate Professor	0.00	0.00	0.50	8574	
Kingslake, Jonathan - Assistant Professor	0.00	0.00	1.00	12345	
Kpotufe, Samory - Assistant Professor	0.00	0.00	0.30	6090	
Lall, Upmanu - Professor	0.00	0.00	0.30	7653	
Lipson, Hod - Professor	0.00	0.00	0.30	7299	
McKinley, Galen A - co-PI	0.00	0.00	2.00	38356	
Menge, Duncan - Associate Professor	0.00	0.00	1.00	13501	
Pincus, Robert - Adjunct Senior Research Scientist	0.00	0.00	1.50	18066	
Purdie-Greenaway, Valerie - Associate Professor	0.00	0.00	0.30	5296	
Revkin, Andrew - Director	0.00	0.00	1.00	13750	
Van Lier-Walqui, Marcus - Associate Research Scientist	0.00	0.00	3.00	23523	
Vondrick, Carl - Assistant Professor	0.00	0.00	1.00	22759	
Weng, Ensheng - Associate Research Scientist	0.00	0.00	3.00	21114	
Zheng, Changxi - Associate Professor	0.00	0.00	0.30	4985	
Zheng, Tian - co-PI	0.00	0.00	1.00	22889	

** I- Indirect Costs

MTDC -- Morningside (Rate: 62.0000, Base 2412884)

SUMMARY PROPOSAL BUDGET

YEAR **2**

ORGANIZATION Columbia University				FOR NSF USE ONLY		
				PROPOSAL NO.	DURATION (months)	
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Pierre Gentine				AWARD NO.	Proposed	Granted
					NSF Funded Person-months	
A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				CAL	ACAD	SUMR
1. Pierre Gentine - PI				0.00	0.00	3.00
2. Ryan Abernathey - co-PI				0.00	0.00	1.00
3. Elias Bareinboim - Associate Professor				0.00	0.00	0.30
4. Robin Bell - Research Professor				0.00	0.00	0.30
5. Vanessa Burbano - Assistant Professor				0.00	0.00	1.50
6. (21) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)				0.00	0.00	19.70
7. (26) TOTAL SENIOR PERSONNEL (1 - 6)				0.00	0.00	25.80
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (7) POST DOCTORAL SCHOLARS				12.00	0.00	0.00
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				0.00	0.00	0.00
3. (7) GRADUATE STUDENTS						
4. (8) UNDERGRADUATE STUDENTS						
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)						
6. (7) OTHER						
TOTAL SALARIES AND WAGES (A + B)						
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)						
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)						
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)						
TOTAL EQUIPMENT						
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)						
2. INTERNATIONAL						
F. PARTICIPANT SUPPORT COSTS						
1. STIPENDS \$ 50,000						
2. TRAVEL 0						
3. SUBSISTENCE 0						
4. OTHER 115,000						
TOTAL NUMBER OF PARTICIPANTS (21)						
TOTAL PARTICIPANT COSTS						
G. OTHER DIRECT COSTS						
1. MATERIALS AND SUPPLIES						
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION						
3. CONSULTANT SERVICES						
4. COMPUTER SERVICES						
5. SUBAWARDS						
6. OTHER						
TOTAL OTHER DIRECT COSTS						
H. TOTAL DIRECT COSTS (A THROUGH G)						
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC -- Lamont (Rate: 54.0000, Base: 156353) (Cont. on Comments Page)						
TOTAL INDIRECT COSTS (F&A)						
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)						
K. FEE						
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)						
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$		
PI/PI NAME Pierre Gentine				FOR NSF USE ONLY		
ORG. REP. NAME* Jessy George				INDIRECT COST RATE VERIFICATION		
				Date Checked	Date Of Rate Sheet	Initials - ORG

SUMMARY PROPOSAL BUDGET COMMENTS - Year 2

Other Senior Personnel

Name - Title	Cal	Acad	Sumr	Funds Requested	
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Camargo, Suzana - Research Professor	0.00	0.00	0.30	8016	
Cogburn, Courtney D - co-PI	0.00	0.00	1.00	14145	
Elsaesser, Gregory - Associate Research Scientist	0.00	0.00	1.00	10144	
Fish, Jacob - Professor	0.00	0.00	0.30	7872	
Giometto, Marco - Assistant Professor	0.00	0.00	0.30	3819	
Kaiser, Gail - Professor	0.00	0.00	0.30	7240	
Kim, Martha - Associate Professor	0.00	0.00	0.50	8917	
Kingslake, Jonathan - Assistant Professor	0.00	0.00	1.00	12715	
Kpotufe, Samory - Assistant Professor	0.00	0.00	0.30	6273	
Lall, Upmanu - Professor	0.00	0.00	0.30	7882	
Lipson, Hod - Professor	0.00	0.00	0.30	7518	
McKinley, Galen A - co-PI	0.00	0.00	2.00	39507	
Menge, Duncan - Associate Professor	0.00	0.00	1.00	13906	
Pincus, Robert - Adjunct Senior Research Scient	0.00	0.00	1.50	18608	
Purdie-Greenaway, Valerie - Associate Professor	0.00	0.00	0.30	5455	
Revkin, Andrew - Director	0.00	0.00	1.00	14163	
Van Lier-Walqui, Marcus - Associate Research Scientist	0.00	0.00	3.00	24228	
Vondrick, Carl - Assistant Professor	0.00	0.00	1.00	23669	
Weng, Ensheng - Associate Research Scientist	0.00	0.00	3.00	21747	
Zheng, Changxi - Associate Professor	0.00	0.00	0.30	5184	
Zheng, Tian - co-PI	0.00	0.00	1.00	23576	

** 1- Indirect Costs

MTDC -- Morningside (Rate: 62.0000, Base 2358936)

SUMMARY PROPOSAL BUDGET

YEAR 3

ORGANIZATION Columbia University				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Pierre Gentine				AWARD NO.	Proposed	Granted	
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-months		Funds Requested By proposer	Funds granted by NSF (if different)
		CAL	ACAD	SUMR			
1.	Pierre Gentine - PI	0.00	0.00	3.00	58,024		
2.	Ryan Abernathey - co-PI	0.00	0.00	1.00	17,137		
3.	Elias Bareinboim - Associate Professor	0.00	0.00	0.30	5,324		
4.	Robin Bell - Research Professor	0.00	0.00	0.30	6,634		
5.	Vanessa Burbano - Assistant Professor	0.00	0.00	1.50	17,500		
6.	(21) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	19.70	293,574		
7.	(26) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	25.80	398,193		
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1.	(6) POST DOCTORAL SCHOLARS	12.00	0.00	0.00	381,924		
2.	(0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00	0		
3.	(9) GRADUATE STUDENTS				407,312		
4.	(0) UNDERGRADUATE STUDENTS				0		
5.	(0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				0		
6.	(7) OTHER				561,208		
TOTAL SALARIES AND WAGES (A + B)					1,748,637		
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					378,253		
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					2,126,890		
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT					0		
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)					28,800		
2. INTERNATIONAL					0		
F. PARTICIPANT SUPPORT COSTS							
1.	STIPENDS \$ <u>50,000</u>						
2.	TRAVEL <u>0</u>						
3.	SUBSISTENCE <u>0</u>						
4.	OTHER <u>75,000</u>						
TOTAL NUMBER OF PARTICIPANTS (21)				TOTAL PARTICIPANT COSTS	125,000		
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES					54,436		
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION					38,391		
3. CONSULTANT SERVICES					65,000		
4. COMPUTER SERVICES					0		
5. SUBAWARDS					578,853		
6. OTHER					438,645		
TOTAL OTHER DIRECT COSTS					1,175,325		
H. TOTAL DIRECT COSTS (A THROUGH G)					3,456,015		
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)							
MTDC -- Lamont (Rate: 54.0000, Base: 161043) (Cont. on Comments Page)							
TOTAL INDIRECT COSTS (F&A)					1,543,985		
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)					5,000,000		
K. FEE					0		
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)					5,000,000		
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$			
PI/PD NAME Pierre Gentine				FOR NSF USE ONLY			
ORG. REP. NAME* Jessy George				INDIRECT COST RATE VERIFICATION			
		Date Checked	Date Of Rate Sheet	Initials - ORG			

SUMMARY PROPOSAL BUDGET COMMENTS - Year 3

Other Senior Personnel

Name - Title	Cal	Acad	Sumr	Funds Requested	
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Camargo, Suzana - Research Professor	0.00	0.00	0.30	8256	
Cogburn, Courtney D - co-PI	0.00	0.00	1.00	14570	
Elsaesser, Gregory - Associate Research Scientist	0.00	0.00	1.00	10448	
Fish, Jacob - Professor	0.00	0.00	0.30	8108	
Giometto, Marco - Assistant Professor	0.00	0.00	0.30	3934	
Kaiser, Gail - Professor	0.00	0.00	0.30	7529	
Kim, Martha - Associate Professor	0.00	0.00	0.50	9274	
Kingslake, Jonathan - Assistant Professor	0.00	0.00	1.00	13097	
Kpotufe, Samory - Assistant Professor	0.00	0.00	0.30	6461	
Lall, Upmanu - Professor	0.00	0.00	0.30	8119	
Lipson, Hod - Professor	0.00	0.00	0.30	7744	
McKinley, Galen A - co-PI	0.00	0.00	2.00	40692	
Menge, Duncan - Associate Professor	0.00	0.00	1.00	14324	
Pincus, Robert - Adjunct Senior Research Scient	0.00	0.00	1.50	19166	
Purdie-Greenaway, Valerie - Associate Professor	0.00	0.00	0.30	5619	
Revkin, Andrew - Director	0.00	0.00	1.00	14587	
Van Lier-Walqui, Marcus - Associate Research Scientist	0.00	0.00	3.00	24955	
Vondrick, Carl - Assistant Professor	0.00	0.00	1.00	24616	
Weng, Ensheng - Associate Research Scientist	0.00	0.00	3.00	22400	
Zheng, Changxi - Associate Professor	0.00	0.00	0.30	5392	
Zheng, Tian - co-PI	0.00	0.00	1.00	24283	

** 1- Indirect Costs

MTDC -- Morningside (Rate: 62.0000, Base 2350035)

SUMMARY PROPOSAL BUDGET

YEAR 4

ORGANIZATION Columbia University				FOR NSF USE ONLY		
				PROPOSAL NO.	DURATION (months)	
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Pierre Gentine				AWARD NO.	Proposed	Granted
					NSF Funded Person-months	
A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				CAL	ACAD	SUMR
1. Pierre Gentine - PI				0.00	0.00	3.00
2. Ryan Abernathy - co-PI				0.00	0.00	1.00
3. Elias Bareinboim - Associate Professor				0.00	0.00	0.30
4. Robin Bell - Research Professor				0.00	0.00	0.30
5. Vanessa Burbano - Assistant Professor				0.00	0.00	1.50
6. (19) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)				0.00	0.00	19.10
7. (24) TOTAL SENIOR PERSONNEL (1 - 6)				0.00	0.00	25.20
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (6) POST DOCTORAL SCHOLARS				12.00	0.00	0.00
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				0.00	0.00	0.00
3. (10) GRADUATE STUDENTS						466,146
4. (0) UNDERGRADUATE STUDENTS						0
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)						0
6. (7) OTHER						577,804
TOTAL SALARIES AND WAGES (A + B)						1,831,134
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)						384,926
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)						2,216,060
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)						
TOTAL EQUIPMENT						0
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)						28,800
2. INTERNATIONAL						0
F. PARTICIPANT SUPPORT COSTS						
1. STIPENDS \$ _____				0		
2. TRAVEL _____				0		
3. SUBSISTENCE _____				0		
4. OTHER _____				85,000		
TOTAL NUMBER OF PARTICIPANTS (21)						85,000
TOTAL PARTICIPANT COSTS						85,000
G. OTHER DIRECT COSTS						
1. MATERIALS AND SUPPLIES						10,031
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION						25,000
3. CONSULTANT SERVICES						29,000
4. COMPUTER SERVICES						0
5. SUBAWARDS						594,083
6. OTHER						471,589
TOTAL OTHER DIRECT COSTS						1,129,703
H. TOTAL DIRECT COSTS (A THROUGH G)						3,459,563
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)						
MTDC -- Lamont (Rate: 54.0000, Base: 154972) (Cont. on Comments Page)						
TOTAL INDIRECT COSTS (F&A)						1,540,437
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)						5,000,000
K. FEE						0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)						5,000,000
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$		
PI/PI NAME Pierre Gentine				FOR NSF USE ONLY		
ORG. REP. NAME* Jessy George				INDIRECT COST RATE VERIFICATION		
		Date Checked	Date Of Rate Sheet	Initials - ORG		

SUMMARY PROPOSAL BUDGET COMMENTS - Year 4

Other Senior Personnel

Name - Title	Cal	Acad	Sumr	Funds Requested	
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Cogburn, Courtney D - co-PI	0.00	0.00	1.00	15007	
Elsaesser, Gregory - Associate Research Scientist	0.00	0.00	0.00	1.00	10762
Fish, Jacob - Professor	0.00	0.00	0.30	8351	
Giometto, Marco - Assistant Professor	0.00	0.00	0.30	4052	
Kim, Martha - Associate Professor	0.00	0.00	0.50	9645	
Kingslake, Jonathan - Assistant Professor	0.00	0.00	1.00	13490	
Kpotufe, Samory - Assistant Professor	0.00	0.00	0.30	6655	
Lall, Upmanu - Professor	0.00	0.00	0.30	8363	
Lipson, Hod - Professor	0.00	0.00	0.30	7976	
McKinley, Galen A - co-PI	0.00	0.00	2.00	41913	
Menge, Duncan - Associate Professor	0.00	0.00	1.00	14753	
Pincus, Robert - Adjunct Senior Research Scientist	0.00	0.00	0.00	1.50	19741
Purdie-Greenaway, Valerie - Associate Professor	0.00	0.00	0.30	5788	
Revkin, Andrew - Director	0.00	0.00	1.00	15025	
Van Lier-Walqui, Marcus - Associate Research Scientist	0.00	0.00	0.00	3.00	25704
Vondrick, Carl - Assistant Professor	0.00	0.00	1.00	25600	
Weng, Ensheng - Associate Research Scientist	0.00	0.00	0.00	3.00	23072
Zheng, Changxi - Associate Professor	0.00	0.00	0.30	5608	
Zheng, Tian - co-PI	0.00	0.00	1.00	25011	

** I- Indirect Costs

MTDC -- Morningside (Rate: 62.0000, Base 2349600)

SUMMARY PROPOSAL BUDGET

YEAR 5

ORGANIZATION Columbia University				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Pierre Gentine				AWARD NO.	Proposed	Granted	
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-months		Funds Requested By proposer	Funds granted by NSF (if different)
		CAL	ACAD	SUMR			
1.	Pierre Gentine - PI	0.00	0.00	3.00	61,557		
2.	Ryan Abernathy - co-PI	0.00	0.00	1.00	18,180		
3.	Elias Bareinboim - Associate Professor	0.00	0.00	0.30	5,759		
4.	Vanessa Burbano - Assistant Professor	0.00	0.00	1.50	17,500		
5.	Courtney D Cogburn - co-PI	0.00	0.00	1.00	15,457		
6.	(18) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	18.10	280,061		
7.	(23) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	24.90	398,514		
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1.	(6) POST DOCTORAL SCHOLARS	12.00	0.00	0.00	405,183		
2.	(0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00	0		
3.	(9) GRADUATE STUDENTS				432,117		
4.	(0) UNDERGRADUATE STUDENTS				0		
5.	(0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				0		
6.	(7) OTHER				586,898		
TOTAL SALARIES AND WAGES (A + B)					1,822,712		
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					392,148		
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					2,214,860		
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT					0		
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)					28,800		
2. INTERNATIONAL					0		
F. PARTICIPANT SUPPORT COSTS							
1.	STIPENDS \$ <u>50,000</u>						
2.	TRAVEL <u>0</u>						
3.	SUBSISTENCE <u>0</u>						
4.	OTHER <u>35,000</u>						
TOTAL NUMBER OF PARTICIPANTS (21)				TOTAL PARTICIPANT COSTS	85,000		
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES					12,834		
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION					41,275		
3. CONSULTANT SERVICES					10,000		
4. COMPUTER SERVICES					0		
5. SUBAWARDS					608,822		
6. OTHER					455,688		
TOTAL OTHER DIRECT COSTS					1,128,619		
H. TOTAL DIRECT COSTS (A THROUGH G)					3,457,279		
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)							
MTDC -- Lamont (Rate: 54.0000, Base: 150599) (Cont. on Comments Page)							
TOTAL INDIRECT COSTS (F&A)					1,542,721		
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)					5,000,000		
K. FEE					0		
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)					5,000,000		
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$			
PI/PD NAME Pierre Gentine				FOR NSF USE ONLY			
ORG. REP. NAME* Jessy George				INDIRECT COST RATE VERIFICATION			
		Date Checked	Date Of Rate Sheet	Initials - ORG			

SUMMARY PROPOSAL BUDGET COMMENTS - Year 5

Other Senior Personnel

Name - Title	Cal	Acad	Sumr	Funds Requested	
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Elsaesser, Gregory - Associate Research Scientist	0.00	0.00	0.00	1.00	11085
Fish, Jacob - Professor	0.00	0.00	0.30	8602	
Giometto, Marco - Assistant Professor	0.00	0.00	0.30	4173	
Kim, Martha - Associate Professor	0.00	0.00	0.50	10031	
Kingslake, Jonathan - Assistant Professor	0.00	0.00	1.00	13894	
Kpotufe, Samory - Assistant Professor	0.00	0.00	0.30	6854	
Lall, Upmanu - Professor	0.00	0.00	0.30	8613	
Lipson, Hod - Professor	0.00	0.00	0.30	8215	
McKinley, Galen A - co-PI	0.00	0.00	2.00	43170	
Menge, Duncan - Associate Professor	0.00	0.00	1.00	15196	
Pincus, Robert - Adjunct Senior Research Scient	0.00	0.00	1.50	20334	
Purdie-Greenaway, Valerie - Associate Professor	0.00	0.00	0.30	5961	
Revkin, Andrew - Director	0.00	0.00	1.00	15476	
Van Lier-Walqui, Marcus - Associate Research Scientist	0.00	0.00	3.00	26475	
Vondrick, Carl - Assistant Professor	0.00	0.00	1.00	26624	
Weng, Ensheng - Associate Research Scientist	0.00	0.00	3.00	23764	
Zheng, Changxi - Associate Professor	0.00	0.00	0.30	5832	
Zheng, Tian - co-PI	0.00	0.00	1.00	25762	

** I- Indirect Costs

MTDC -- Morningside (Rate: 62.0000, Base 2357093)

SUMMARY PROPOSAL BUDGET Cumulative

ORGANIZATION Columbia University				FOR NSF USE ONLY		
				PROPOSAL NO.	DURATION (months)	
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Pierre Gentine				AWARD NO.	Proposed	Granted
					NSF Funded Person-months	
A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				CAL	ACAD	SUMR
1. Pierre Gentine - PI				0.00	0.00	15.00
2. Ryan Abernathey - co-PI				0.00	0.00	5.00
3. Elias Bareinboim - Associate Professor				0.00	0.00	1.50
4. Robin Bell - Research Professor				0.00	0.00	1.20
5. Vanessa Burbano - Assistant Professor				0.00	0.00	7.50
6. (21) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)				0.00	0.00	97.00
7. (26) TOTAL SENIOR PERSONNEL (1 - 6)				0.00	0.00	127.20
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (32) POST DOCTORAL SCHOLARS				60.00	0.00	0.00
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				0.00	0.00	0.00
3. (42) GRADUATE STUDENTS						
4. (8) UNDERGRADUATE STUDENTS						
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)						
6. (35) OTHER						
TOTAL SALARIES AND WAGES (A + B)						
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)						
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)						
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)						
\$ 100,000						
TOTAL EQUIPMENT						
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)						
2. INTERNATIONAL						
F. PARTICIPANT SUPPORT COSTS						
1. STIPENDS \$ 200,000						
2. TRAVEL 0						
3. SUBSISTENCE 0						
4. OTHER 405,000						
TOTAL NUMBER OF PARTICIPANTS (105)						
TOTAL PARTICIPANT COSTS						
G. OTHER DIRECT COSTS						
1. MATERIALS AND SUPPLIES						
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION						
3. CONSULTANT SERVICES						
4. COMPUTER SERVICES						
5. SUBAWARDS						
6. OTHER						
TOTAL OTHER DIRECT COSTS						
H. TOTAL DIRECT COSTS (A THROUGH G)						
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)						
TOTAL INDIRECT COSTS (F&A)						
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)						
K. FEE						
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)						
M. COST SHARING PROPOSED LEVEL \$ 0						
AGREED LEVEL IF DIFFERENT \$						
PI/PI NAME Pierre Gentine				FOR NSF USE ONLY		
ORG. REP. NAME* Jessy George				INDIRECT COST RATE VERIFICATION		
				Date Checked	Date Of Rate Sheet	Initials - ORG

C *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

BUDGET JUSTIFICATION

A. SENIOR PERSONNEL

Pierre Gentine, PI: We request 3 summer months of annual salary, with an increase of 3% annually thereafter. Per Dragana Brzakovic on 12/4/2019, it was stated that the PI is required to commit 3 person months. The amount of effort requested would facilitate the PI to supervise three faculty leaders, the Managing Director, chair the Executive Committee, liaise with the NSF and external partners, and overall steer the strategic development of the center across its five years.

Galen McKinley, Co-PI: We request 2 summer months of annual salary, with an increase of 3% annually thereafter. The amount of effort requested would facilitate the Co-PI to serve as the Deputy Director, co-Chairing the Convergence Subcommittee and supervising all research.

Ryan Abernathy, Co-PI: We request 1 summer months of annual salary, with an increase of 3% annually thereafter. The amount of effort requested would facilitate the Co-PI to supervise two cloud engineers and steer the direction of the LEAPangeo cloud computational platform. The Co-PI will also conduct research on ocean transport.

Courtney Cogburn, Co-PI: We request 1 summer months of annual salary, with an increase of 3% annually thereafter. The amount of effort requested would facilitate the Co-PI to govern diversity, equity, and inclusion initiatives, including supervising consultants and postdocs, teaching workshops, and conducting research in team formation.

Tian Zheng, Co-PI: We request 1 summer months of annual salary, with an increase of 3% annually thereafter. The amount of effort requested would facilitate the Co-PI to design and execute educational programming, including designing a certificate program, co-chairing the Convergence Subcommittee, supervising K-12 and parent training programming, and oversee formative and summative evaluation. Zheng will also contribute to spatiotemporal and pattern identification data science research.

Elias Bareinboim: We request 0.3 summer months of annual salary, with an increase of 4% annually thereafter. The amount of effort requested would facilitate the Senior Personnel to work on causal inference and transfer learning.

Robin Bell: We request 0.3 summer months of annual salary, with an increase of 3% in years 2-4. The amount of effort requested would facilitate the Senior Personnel to work on the development of the cryosphere parameterizations and observational products.

Vanessa Burbano: We request 1.5 summer months of annual salary, with an increase of 3% annually thereafter. The amount of effort requested would facilitate the Senior Personnel to conduct research into corporate communications and causal best practices, supervise a postdoc, participate in the Knowledge Transfer Subcommittee, and oversee website and content development.

Suzana Camargo: We request 0.3 summer months of annual salary in year 2, with an increase of 3% in year 3. The amount of effort requested would facilitate the Senior Personnel to work on climate model metrics.

Gregory Elsaesser: We request 1 month of annual salary, with an increase of 3% annually thereafter. The amount of effort requested would facilitate the Senior Personnel to work on the coupling of the model and parameter estimation.

Jacob Fish: We request 0.5 summer months of annual salary, with an increase of 3% annually thereafter. The amount of effort requested would facilitate the Senior Personnel to work on the mathematical definition of the coupling.

Marco Giometto: We request 0.3 summer months of annual salary, with an increase of 3% annually thereafter. The amount of effort requested would facilitate the Senior Personnel to work on the development of a new parametrization of turbulence and on supervising direct numerical simulations and large eddy simulations.

Gail Kaiser: We request 0.3 summer months of annual salary, with an increase of 4% in years 2-3. The amount of effort requested would facilitate the Senior Personnel to work on the machine learning algorithms and their integration in the ESM.

Martha Kim: We request 0.5 summer months of annual salary, with an increase of 4% annually thereafter. The amount of effort requested would facilitate the Senior Personnel to work on algorithm efficiency.

Jonathan Kingslake: We request 1 summer month of annual salary, with an increase of 3% annually thereafter. The amount of effort requested would facilitate the Senior Personnel to work on the development of the cryosphere parameterizations and observational products.

Samory Kpotufe: We request 0.3 summer months of annual salary, with an increase of 3% annually thereafter. The amount of effort requested would facilitate the Senior Personnel to work on the use of transfer learning for the ESM parameterizations.

Upmanu Lall: We request 0.3 summer months of annual salary, with an increase of 3% annually thereafter. The amount of effort requested would facilitate the Senior Personnel to work on uncertainty quantification.

Hod Lipson: We request 0.3 summer months of annual salary, with an increase of 3% annually thereafter. The amount of effort requested would facilitate the Senior Personnel to work on equation discovery applications.

Duncan Menge: We request 1 summer months of annual salary, with an increase of 3% annually thereafter. The amount of effort requested would facilitate the Senior Personnel to work on the photosynthesis and respiration models.

Robert Pincus: We request 1.5 summer months of annual salary, with an increase of 3% annually thereafter. The amount of effort requested would facilitate the Senior Personnel to collaborate on the development of the microphysics parameterization.

Valerie Purdie-Greenaway: We request 0.3 summer months of annual salary, with an increase of 3% annually thereafter. The amount of effort requested would facilitate the Senior Personnel to conduct research into equitable team development and facilitate programming into stereotype threat and anti-racism.

Andrew Revkin: We request 1 summer months of annual salary, with an increase of 3% annually thereafter. The amount of effort requested would facilitate the Senior Personnel to develop and execute a Communicators in Residence program, author new visualization and written communications publications, participate in the Knowledge Transfer Subcommittee.

Marcus Van Lier-Walqui: We request 3 summer months of annual salary, with an increase of 3% annually thereafter. The amount of effort requested would facilitate the Senior Personnel to work on parameterization and high-resolution simulations of microphysics.

Carl Vondrick: We request 1.5 summer months of annual salary, with an increase of 4% annually thereafter. The amount of effort requested would facilitate the Senior Personnel to supervise the machine learning developments across themes and their integration in the ESMs.

Ensheng Weng: We request 3 summer months of annual salary, with an increase of 3% annually thereafter. The amount of effort requested would facilitate the Senior Personnel to develop the new photosynthesis and respiration models.

Changxi Zheng: We request 0.3 summer months of annual salary, with an increase of 4% annually thereafter. The amount of effort requested would facilitate the Senior Personnel to the integration of ML algorithms in the ESMs and the use of physical constraints in ML.

B. OTHER PERSONNEL

Managing Director: We are requesting funds to support 1 Managing Director to financially manage the center, supervise all administrative staff, staff committees and subcommittees, and conduct special projects as assigned by the PI.

Assistant Director: We are requesting funds for 1 Assistant Director to support educational and diversity programming, including administering the flow of trainees to and from NCAR, and the Executives in Residence program.

Program Manager: We are requesting funds for 1 Program Manager to support Knowledge Transfer efforts including website development, partnership stewardship, and social media strategy.

Postdocs: We are requesting funds for 7 postdocs in years 1 and 2 and funds for 6 post docs in years 3-5. The postdocs will conduct research across 11 knowledge-data/ rich-poor projects: Atmospheric Convection, Cloud Microphysics, Meta-Learning, Metrics, Photosynthesis and Respiration, Carbon Flux, Biopump, Coupling, Hydrology & Snow, Management, and Diversity and Inclusion.

GRAs: We are requesting funds for 7 GRA's in year 1; 8 GRA's in year 2; 9 GRA's in year 3, 10 GRA's in year 4 and 9 GRA's in year 5. The GRA's will receive 12-month tuition remission and stipend support, and conduct research across all 24 knowledge-data/ rich-poor projects.

Ethics Instructor: We are requesting funds to support 1 Ethics Instructor to design and execute an annual workshop on research ethics and the responsible conduct of research. All materials developed will be published open-source to the Center's website.

Cloud Engineers: We are requesting funds to support 2 Cloud Engineers to build, maintain, and make broadly accessible the new LEAPangeo cloud computing platform.

Associate Research Scientist: We are requesting funds to support 1 Associate Research Scientist to support cryospheric research under the supervision of Senior Personnel Kingslake and Bell.

C. FRINGE BENEFITS

The fringe benefit rate is 28.2%, charged to faculty salary. GRA stipend is excluded from fringe. These rates are based on the University’s federally negotiated rate agreement, dated 10/18/19.

D. EQUIPMENT

Equipment: \$100,000 is being requested for TPU Nodes. LEAP will build a shared data and computing platform called *LEAPangeo*. This platform will use cloud computing, provided via a partnership with **Google Cloud** and **Microsoft Azure**, and allowing the required combination of high-performance mass storage (e.g., **Google Cloud Storage**, “GCS”) and on-demand computing (e.g., **Google Compute Engine**, “GCE”). Datasets will be extracted from diverse sources, transformed into analysis-ready, cloud-optimized formats, and stored in GCS. All data will be published using open-source licenses and will be publicly available.

E. TRAVEL

Domestic Travel:

Travel costs are computed based on the attendance 20 personnel to attend the following Conferences each year: American Geophysical Union, NEURIPS and the American Meteorological Society. Funds were also requested based on attendance of the Managing Director to go to the National Organization of Research Development Professionals (NORDP). The estimates were calculated as follows:

NORDP		Conference attendance: (20 personnel, 3 conferences)	
Airfare/Transportation	\$400	Airfare	\$32,000
Lodging based on \$200/night (3)	\$600	Lodging based on \$200/night	\$60,000
Per-diem based on \$100/day	\$400	Registration Fee	\$5,000
Other (Taxi, bus, Fees)	\$300	Per-diem based on \$50/day	\$20,000
TOTAL	\$1700	Other (Taxi, bus, Fees)	\$25,300
		TOTAL	\$142,300

F. PARTICIPANT SUPPORT COSTS

- 1. **Stipends:** \$200,000 are being requested for 50 REU Students Stipends
- 4. **Other:** We are requesting \$405,000 for Participant Support Costs (21 participants). This consists of Financial Aid for non STC students, curriculum writing internships; symposiums; hackathon and lecture series.

G. OTHER DIRECT COSTS

- 1. **Supplies:** We are requesting \$136,145 in supplies for the project. These supplies include dedicated laptops for each administrator and leadership faculty, general meetings support and catering.
- 2. **Publication:** \$194,666 is being requested for publication costs.
- 3. **Consultants:** Funds are requested for an Animator, Videographer and Photographer at \$74,000 for the project. We are also requesting funds for a D&I Consultant at \$250,000 to conduct an annual equity assessment, lead annual workshops in anti-racism, and communicate LEAP research and processes to diversity stakeholders.
- 5. **Subcontracts:** Funds are being requested for our subcontractors; NYU, Teachers College, University of California Irvine, and University of Minnesota

6. Other

-Housing: \$133,840 is being requested for housing for LEAP Fellows and postdocs travelling to NCAR in Boulder, CO for semester-long residencies.

-Funds are requested for **Convergence Luncheons**-these will be six events per year for approximately 50 attendees, to host lightning talks on the intersections of geoscience and data science; **Education Internships** consisting of graduate internship stipends for the Design Studio, for approximately 10 interns to develop case studies and curricula; **and Research Seed Funding** to support approximately 20 team per year – teams including faculty and students – in initiating new mini-projects across LEAP’s Knowledge-Data Continuum. This request will total \$904,970 for the project.

-Tuition: Tuition is requested for the GRA’s, which must be charged as a direct cost on all contracts, at \$1,157,557

I. INDIRECT COSTS

Sponsored Projects Administration certifies that the Primary Place of Performance for the proposed research will occur at Mudd Building, Room 842, 500 West 120th Street, New York, NY 10027, an on-campus location, and that the appropriate SEAS F&A rate is 62% and Lamont at 54%.

SUMMARY PROPOSAL BUDGET

YEAR 1

ORGANIZATION New York University				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Laure Zanna				AWARD NO.	Proposed	Granted	
				A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)			
				CAL	ACAD	SUMR	
1. Laure Zanna - Professor				0.00	0.00	0.50	8,257
2.							
3.							
4.							
5.							
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)				0.00	0.00	0.00	0
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)				0.00	0.00	0.50	8,257
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (0) POST DOCTORAL SCHOLARS				0.00	0.00	0.00	0
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				0.00	0.00	0.00	0
3. (1) GRADUATE STUDENTS							55,701
4. (0) UNDERGRADUATE STUDENTS							0
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)							0
6. (0) OTHER							0
TOTAL SALARIES AND WAGES (A + B)							63,958
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)							2,477
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)							66,435
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT							0
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)							0
2. INTERNATIONAL							0
F. PARTICIPANT SUPPORT COSTS							
1. STIPENDS \$ _____ 0							
2. TRAVEL _____ 0							
3. SUBSISTENCE _____ 0							
4. OTHER _____ 0							
TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT COSTS							0
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES							0
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION							0
3. CONSULTANT SERVICES							0
4. COMPUTER SERVICES							0
5. SUBAWARDS							0
6. OTHER							20,609
TOTAL OTHER DIRECT COSTS							20,609
H. TOTAL DIRECT COSTS (A THROUGH G)							87,044
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) modified total direct costs (Rate: 58.5000, Base: 66435)							
TOTAL INDIRECT COSTS (F&A)							38,864
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)							125,908
K. FEE							0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)							125,908
M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL IF DIFFERENT \$							
PI/PI NAME Laure Zanna				FOR NSF USE ONLY			
ORG. REP. NAME* Jessy George				INDIRECT COST RATE VERIFICATION			
		Date Checked	Date Of Rate Sheet	Initials - ORG			

SUMMARY PROPOSAL BUDGET

YEAR 2

ORGANIZATION New York University				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Laure Zanna				AWARD NO.	Proposed	Granted	
A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-months		Funds Requested By proposer	Funds granted by NSF (if different)
				CAL	ACAD	SUMR	
1.	Laure Zanna - Professor			0.00	0.00	0.50	8,463
2.							
3.							
4.							
5.							
6.	(0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)			0.00	0.00	0.00	0
7.	(1) TOTAL SENIOR PERSONNEL (1 - 6)			0.00	0.00	0.50	8,463
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1.	(0) POST DOCTORAL SCHOLARS			0.00	0.00	0.00	0
2.	(0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)			0.00	0.00	0.00	0
3.	(1) GRADUATE STUDENTS						57,093
4.	(0) UNDERGRADUATE STUDENTS						0
5.	(0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)						0
6.	(0) OTHER						0
TOTAL SALARIES AND WAGES (A + B)							65,556
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)							2,539
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)							68,095
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT							0
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)							0
2. INTERNATIONAL							0
F. PARTICIPANT SUPPORT COSTS							
1.	STIPENDS	\$	0				
2.	TRAVEL		0				
3.	SUBSISTENCE		0				
4.	OTHER		0				
TOTAL NUMBER OF PARTICIPANTS (0)				TOTAL PARTICIPANT COSTS			0
G. OTHER DIRECT COSTS							
1.	MATERIALS AND SUPPLIES						0
2.	PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION						0
3.	CONSULTANT SERVICES						0
4.	COMPUTER SERVICES						0
5.	SUBAWARDS						0
6.	OTHER						21,124
TOTAL OTHER DIRECT COSTS							21,124
H. TOTAL DIRECT COSTS (A THROUGH G)							89,219
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) modified total direct costs (Rate: 58.5000, Base: 68095)							
TOTAL INDIRECT COSTS (F&A)							39,836
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)							129,055
K. FEE							0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)							129,055
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$			
PI/PI NAME Laure Zanna				FOR NSF USE ONLY			
ORG. REP. NAME* Jessy George				INDIRECT COST RATE VERIFICATION			
		Date Checked	Date Of Rate Sheet	Initials - ORG			

SUMMARY PROPOSAL BUDGET

YEAR 3

ORGANIZATION New York University				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Laure Zanna				AWARD NO.	Proposed	Granted	
A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-months		Funds Requested By proposer	Funds granted by NSF (if different)
		CAL	ACAD	SUMR			
1.	Laure Zanna - Professor	0.00	0.00	0.50	8,675		
2.							
3.							
4.							
5.							
6.	(0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	0		
7.	(1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.50	8,675		
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1.	(0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00	0		
2.	(0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00	0		
3.	(1) GRADUATE STUDENTS				58,520		
4.	(0) UNDERGRADUATE STUDENTS				0		
5.	(0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				0		
6.	(0) OTHER				0		
TOTAL SALARIES AND WAGES (A + B)					67,195		
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					2,603		
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					69,798		
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT					0		
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)					0		
2. INTERNATIONAL					0		
F. PARTICIPANT SUPPORT COSTS							
1.	STIPENDS \$ _____				0		
2.	TRAVEL _____				0		
3.	SUBSISTENCE _____				0		
4.	OTHER _____				0		
TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT COSTS					0		
G. OTHER DIRECT COSTS							
1.	MATERIALS AND SUPPLIES				0		
2.	PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				0		
3.	CONSULTANT SERVICES				0		
4.	COMPUTER SERVICES				0		
5.	SUBAWARDS				0		
6.	OTHER				21,652		
TOTAL OTHER DIRECT COSTS					21,652		
H. TOTAL DIRECT COSTS (A THROUGH G)					91,450		
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) modified total direct costs (Rate: 58.5000, Base: 69798)							
TOTAL INDIRECT COSTS (F&A)					40,832		
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)					132,282		
K. FEE					0		
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)					132,282		
M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL IF DIFFERENT \$							
PI/PI NAME Laure Zanna				FOR NSF USE ONLY			
ORG. REP. NAME* Jessy George				INDIRECT COST RATE VERIFICATION			
		Date Checked	Date Of Rate Sheet	Initials - ORG			

SUMMARY PROPOSAL BUDGET

YEAR 4

ORGANIZATION New York University				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Laure Zanna				AWARD NO.	Proposed	Granted	
A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-months		Funds Requested By proposer	Funds granted by NSF (if different)
				CAL	ACAD	SUMR	
1. Laure Zanna - Professor				0.00	0.00	0.50	8,892
2.							
3.							
4.							
5.							
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)				0.00	0.00	0.00	0
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)				0.00	0.00	0.50	8,892
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (0) POST DOCTORAL SCHOLARS				0.00	0.00	0.00	0
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				0.00	0.00	0.00	0
3. (1) GRADUATE STUDENTS							59,983
4. (0) UNDERGRADUATE STUDENTS							0
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)							0
6. (0) OTHER							0
TOTAL SALARIES AND WAGES (A + B)							68,875
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)							2,668
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)							71,543
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT							0
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)							0
2. INTERNATIONAL							0
F. PARTICIPANT SUPPORT COSTS							
1. STIPENDS \$ _____ 0							
2. TRAVEL _____ 0							
3. SUBSISTENCE _____ 0							
4. OTHER _____ 0							
TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT COSTS							0
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES							0
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION							0
3. CONSULTANT SERVICES							0
4. COMPUTER SERVICES							0
5. SUBAWARDS							0
6. OTHER							22,194
TOTAL OTHER DIRECT COSTS							22,194
H. TOTAL DIRECT COSTS (A THROUGH G)							93,737
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) modified total direct costs (Rate: 58.5000, Base: 71543)							
TOTAL INDIRECT COSTS (F&A)							41,853
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)							135,590
K. FEE							0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)							135,590
M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL IF DIFFERENT \$							
PI/PI NAME Laure Zanna				FOR NSF USE ONLY			
ORG. REP. NAME* Jessy George				INDIRECT COST RATE VERIFICATION			
		Date Checked	Date Of Rate Sheet	Initials - ORG			

SUMMARY PROPOSAL BUDGET

YEAR 5

ORGANIZATION New York University				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Laure Zanna				AWARD NO.	Proposed	Granted	
				A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)			
				CAL	ACAD	SUMR	
1. Laure Zanna - Professor				0.00	0.00	0.50	9,114
2.							
3.							
4.							
5.							
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)				0.00	0.00	0.00	0
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)				0.00	0.00	0.50	9,114
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (0) POST DOCTORAL SCHOLARS				0.00	0.00	0.00	0
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				0.00	0.00	0.00	0
3. (1) GRADUATE STUDENTS							61,482
4. (0) UNDERGRADUATE STUDENTS							0
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)							0
6. (0) OTHER							0
TOTAL SALARIES AND WAGES (A + B)							70,596
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)							2,734
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)							73,330
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT							0
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)							0
2. INTERNATIONAL							0
F. PARTICIPANT SUPPORT COSTS							
1. STIPENDS \$ _____ 0							
2. TRAVEL _____ 0							
3. SUBSISTENCE _____ 0							
4. OTHER _____ 0							
TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT COSTS							0
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES							0
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION							0
3. CONSULTANT SERVICES							0
4. COMPUTER SERVICES							0
5. SUBAWARDS							0
6. OTHER							22,748
TOTAL OTHER DIRECT COSTS							22,748
H. TOTAL DIRECT COSTS (A THROUGH G)							96,078
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) modified total direct costs (Rate: 58.5000, Base: 73330)							
TOTAL INDIRECT COSTS (F&A)							42,898
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)							138,976
K. FEE							0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)							138,976
M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL IF DIFFERENT \$							
PI/PD NAME Laure Zanna				FOR NSF USE ONLY			
ORG. REP. NAME* Jessy George				INDIRECT COST RATE VERIFICATION			
		Date Checked	Date Of Rate Sheet	Initials - ORG			

SUMMARY PROPOSAL BUDGET Cumulative

ORGANIZATION New York University				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Laure Zanna				AWARD NO.			
				Proposed	Granted		
A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-months		Funds Requested By proposer	Funds granted by NSF (if different)
				CAL	ACAD	SUMR	
1. Laure Zanna - Professor				0.00	0.00	2.50	43,401
2.							
3.							
4.							
5.							
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)				0.00	0.00	0.00	0
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)				0.00	0.00	2.50	43,401
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (0) POST DOCTORAL SCHOLARS				0.00	0.00	0.00	0
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				0.00	0.00	0.00	0
3. (5) GRADUATE STUDENTS							292,779
4. (0) UNDERGRADUATE STUDENTS							0
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)							0
6. (0) OTHER							0
TOTAL SALARIES AND WAGES (A + B)							336,180
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)							13,021
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)							349,201
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT							0
E. TRAVEL							
1. DOMESTIC (INCL. U.S. POSSESSIONS)							0
2. INTERNATIONAL							0
F. PARTICIPANT SUPPORT COSTS							
1. STIPENDS \$ _____				0			
2. TRAVEL _____				0			
3. SUBSISTENCE _____				0			
4. OTHER _____				0			
TOTAL NUMBER OF PARTICIPANTS (0)							
TOTAL PARTICIPANT COSTS							0
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES							0
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION							0
3. CONSULTANT SERVICES							0
4. COMPUTER SERVICES							0
5. SUBAWARDS							0
6. OTHER							108,327
TOTAL OTHER DIRECT COSTS							108,327
H. TOTAL DIRECT COSTS (A THROUGH G)							457,528
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)							
TOTAL INDIRECT COSTS (F&A)							204,283
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)							661,811
K. FEE							0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)							661,811
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$			
PI/PI NAME Laure Zanna				FOR NSF USE ONLY			
ORG. REP. NAME* Jessy George				INDIRECT COST RATE VERIFICATION			
		Date Checked		Date Of Rate Sheet		Initials - ORG	

C *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

BUDGET JUSTIFICATION
New York University

A. SENIOR PERSONNEL

PI: For each of the 5 project years, we request 0.5 months support for PI, Laure Zanna. The amount of effort requested will facilitate the PI to help develop ocean physics parameterizations using machine learning, both deterministic and stochastic. She will also supervise the Graduate Student at NYU and co-supervise those at Columbia within the Ocean Thrust. The PI. 2.5% annual increases are included.

B. OTHER PERSONNEL

GRA: For each of the 5 project years, we request funds to support the stipend of 1 full time Graduate Research Assistant (GRA) during the 9 month academic year as well as 3 summer months per year. The GRA will perform research on ocean mesoscale parameterizations with machine learning under different turbulent regimes and different climates. 2.5% annual increases are included.

C. FRINGE BENEFITS

The fringe benefit rate is 30%, charged to faculty salary. GRA stipend is excluded from fringe

G. OTHER DIRECT COSTS

G.6 OTHER - TUITION

Tuition for the one GRA, which must be charged as a direct cost on all grants, is 37% of the GRA salary each year.

I. INDIRECT COSTS

Per the negotiated indirect cost rate agreement with DHHS dated October 11, 2019, New York University has a predetermined facilities and administrative (F&A) rate of 58.5% modified total direct costs (MTDC). Exclusions are as follows:

- Tuition Remission

Inflators

All expenses are inflated at 2.5% beginning each fiscal year (September 1st)

SUMMARY PROPOSAL BUDGET

YEAR 1

ORGANIZATION Teachers College, Columbia University				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Charles Lang				AWARD NO.	Proposed	Granted	
A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-months		Funds Requested By proposer	Funds granted by NSF (if different)
		CAL	ACAD	SUMR			
1.	Charles Lang - Visiting Assistant Professor	0.00	0.00	2.00	21,971		
2.	Paulo Blikstein - Associate Professor	0.30	0.00	0.00	3,595		
3.	Oren Pizmony-Levy - Associate Professor	1.00	0.00	0.00	9,357		
4.							
5.							
6.	(0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	0		
7.	(3) TOTAL SENIOR PERSONNEL (1 - 6)	1.30	0.00	2.00	34,923		
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1.	(0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00	0		
2.	(0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00	0		
3.	(1) GRADUATE STUDENTS				27,000		
4.	(0) UNDERGRADUATE STUDENTS				0		
5.	(0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				0		
6.	(0) OTHER				0		
TOTAL SALARIES AND WAGES (A + B)					61,923		
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					22,293		
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					84,216		
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT					0		
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)					0		
2. INTERNATIONAL					0		
F. PARTICIPANT SUPPORT COSTS							
1.	STIPENDS \$ 40,000						
2.	TRAVEL 0						
3.	SUBSISTENCE 0						
4.	OTHER 0						
TOTAL NUMBER OF PARTICIPANTS (16)				TOTAL PARTICIPANT COSTS	40,000		
G. OTHER DIRECT COSTS							
1.	MATERIALS AND SUPPLIES				22,316		
2.	PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				0		
3.	CONSULTANT SERVICES				0		
4.	COMPUTER SERVICES				0		
5.	SUBAWARDS				0		
6.	OTHER				0		
TOTAL OTHER DIRECT COSTS					22,316		
H. TOTAL DIRECT COSTS (A THROUGH G)					146,532		
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 42.5000, Base: 106532)							
TOTAL INDIRECT COSTS (F&A)					45,276		
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)					191,808		
K. FEE					0		
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)					191,808		
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$			
PI/PI NAME Charles Lang				FOR NSF USE ONLY			
ORG. REP. NAME* Jessy George				INDIRECT COST RATE VERIFICATION			
		Date Checked	Date Of Rate Sheet	Initials - ORG			

SUMMARY PROPOSAL BUDGET

YEAR **2**

ORGANIZATION Teachers College, Columbia University				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Charles Lang				AWARD NO.	Proposed	Granted	
				A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)			
				CAL	ACAD	SUMR	
1.	Charles Lang - Visiting Assistant Professor			0.00	0.00	2.00	22,631
2.	Paulo Blikstein - Associate Professor			0.30	0.00	0.00	3,703
3.	Oren Pizmony-Levy - Associate Professor			1.00	0.00	0.00	9,638
4.							
5.							
6.	(0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)			0.00	0.00	0.00	0
7.	(3) TOTAL SENIOR PERSONNEL (1 - 6)			1.30	0.00	2.00	35,972
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1.	(0) POST DOCTORAL SCHOLARS			0.00	0.00	0.00	0
2.	(0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)			0.00	0.00	0.00	0
3.	(1) GRADUATE STUDENTS						27,810
4.	(0) UNDERGRADUATE STUDENTS						0
5.	(0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)						0
6.	(0) OTHER						0
TOTAL SALARIES AND WAGES (A + B)							63,782
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)							22,961
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)							86,743
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT							0
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)							0
2. INTERNATIONAL							0
F. PARTICIPANT SUPPORT COSTS							
1.	STIPENDS	\$	40,000				
2.	TRAVEL		0				
3.	SUBSISTENCE		0				
4.	OTHER		0				
TOTAL NUMBER OF PARTICIPANTS (16)				TOTAL PARTICIPANT COSTS			40,000
G. OTHER DIRECT COSTS							
1.	MATERIALS AND SUPPLIES						22,385
2.	PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION						0
3.	CONSULTANT SERVICES						0
4.	COMPUTER SERVICES						0
5.	SUBAWARDS						0
6.	OTHER						0
TOTAL OTHER DIRECT COSTS							22,385
H. TOTAL DIRECT COSTS (A THROUGH G)							149,128
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 42.5000, Base: 109128)							
TOTAL INDIRECT COSTS (F&A)							46,379
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)							195,507
K. FEE							0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)							195,507
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$			
PI/PD NAME Charles Lang				FOR NSF USE ONLY			
ORG. REP. NAME* Jessy George				INDIRECT COST RATE VERIFICATION			
		Date Checked	Date Of Rate Sheet	Initials - ORG			

SUMMARY PROPOSAL BUDGET

YEAR 3

ORGANIZATION Teachers College, Columbia University				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Charles Lang				AWARD NO.	Proposed	Granted	
A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-months		Funds Requested By proposer	Funds granted by NSF (if different)
		CAL	ACAD	SUMR			
1.	Charles Lang - Visiting Assistant Professor	0.00	0.00	2.00	23,309		
2.	Paulo Blikstein - Associate Professor	0.30	0.00	0.00	3,814		
3.	Oren Pizmony-Levy - Associate Professor	1.00	0.00	0.00	9,927		
4.							
5.							
6.	(0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	0		
7.	(3) TOTAL SENIOR PERSONNEL (1 - 6)	1.30	0.00	2.00	37,050		
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1.	(0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00	0		
2.	(0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00	0		
3.	(1) GRADUATE STUDENTS				28,644		
4.	(0) UNDERGRADUATE STUDENTS				0		
5.	(0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				0		
6.	(0) OTHER				0		
TOTAL SALARIES AND WAGES (A + B)					65,694		
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					23,650		
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					89,344		
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT					0		
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)					0		
2. INTERNATIONAL					0		
F. PARTICIPANT SUPPORT COSTS							
1.	STIPENDS \$ <u>40,000</u>						
2.	TRAVEL <u>0</u>						
3.	SUBSISTENCE <u>0</u>						
4.	OTHER <u>0</u>						
TOTAL NUMBER OF PARTICIPANTS (16)				TOTAL PARTICIPANT COSTS	40,000		
G. OTHER DIRECT COSTS							
1.	MATERIALS AND SUPPLIES				22,458		
2.	PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				0		
3.	CONSULTANT SERVICES				0		
4.	COMPUTER SERVICES				0		
5.	SUBAWARDS				0		
6.	OTHER				0		
TOTAL OTHER DIRECT COSTS					22,458		
H. TOTAL DIRECT COSTS (A THROUGH G)					151,802		
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 42.5000, Base: 111802)							
TOTAL INDIRECT COSTS (F&A)					47,516		
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)					199,318		
K. FEE					0		
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)					199,318		
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$			
PI/PI NAME Charles Lang				FOR NSF USE ONLY			
ORG. REP. NAME* Jessy George				INDIRECT COST RATE VERIFICATION			
		Date Checked	Date Of Rate Sheet	Initials - ORG			

SUMMARY PROPOSAL BUDGET

YEAR 4

ORGANIZATION Teachers College, Columbia University				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Charles Lang				AWARD NO.	Proposed	Granted	
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-months		Funds Requested By proposer	Funds granted by NSF (if different)
		CAL	ACAD	SUMR			
1.	Charles Lang - Visiting Assistant Professor	0.00	0.00	2.00	24,009		
2.	Paulo Blikstein - Associate Professor	0.30	0.00	0.00	3,929		
3.	Oren Pizmony-Levy - Associate Professor	1.00	0.00	0.00	10,224		
4.							
5.							
6.	(0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	0		
7.	(3) TOTAL SENIOR PERSONNEL (1 - 6)	1.30	0.00	2.00	38,162		
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1.	(0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00	0		
2.	(0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00	0		
3.	(1) GRADUATE STUDENTS				29,504		
4.	(0) UNDERGRADUATE STUDENTS				0		
5.	(0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				0		
6.	(0) OTHER				0		
TOTAL SALARIES AND WAGES (A + B)					67,666		
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					24,360		
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					92,026		
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT					0		
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)					0		
2. INTERNATIONAL					0		
F. PARTICIPANT SUPPORT COSTS							
1.	STIPENDS \$ <u>40,000</u>						
2.	TRAVEL <u>0</u>						
3.	SUBSISTENCE <u>0</u>						
4.	OTHER <u>0</u>						
TOTAL NUMBER OF PARTICIPANTS (16)				TOTAL PARTICIPANT COSTS	40,000		
G. OTHER DIRECT COSTS							
1.	MATERIALS AND SUPPLIES				22,530		
2.	PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				0		
3.	CONSULTANT SERVICES				0		
4.	COMPUTER SERVICES				0		
5.	SUBAWARDS				0		
6.	OTHER				0		
TOTAL OTHER DIRECT COSTS					22,530		
H. TOTAL DIRECT COSTS (A THROUGH G)					154,556		
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) MTDC (Rate: 42.5000, Base: 114556)							
TOTAL INDIRECT COSTS (F&A)					48,686		
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)					203,242		
K. FEE					0		
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)					203,242		
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$			
PI/PD NAME Charles Lang				FOR NSF USE ONLY			
ORG. REP. NAME* Jessy George				INDIRECT COST RATE VERIFICATION			
		Date Checked	Date Of Rate Sheet	Initials - ORG			

SUMMARY PROPOSAL BUDGET

YEAR 5

ORGANIZATION Teachers College, Columbia University				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Charles Lang				AWARD NO.	Proposed	Granted	
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-months		Funds Requested By proposer	Funds granted by NSF (if different)
				CAL	ACAD	SUMR	
1. Charles Lang - Visiting Assistant Professor				0.00	0.00	2.00	24,729
2. Paulo Blikstein - Associate Professor				0.30	0.00	0.00	4,047
3. Oren Pizmony-Levy - Associate Professor				1.00	0.00	0.00	10,531
4.							
5.							
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)				0.00	0.00	0.00	0
7. (3) TOTAL SENIOR PERSONNEL (1 - 6)				1.30	0.00	2.00	39,307
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (0) POST DOCTORAL SCHOLARS				0.00	0.00	0.00	0
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				0.00	0.00	0.00	0
3. (1) GRADUATE STUDENTS							30,389
4. (0) UNDERGRADUATE STUDENTS							0
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)							0
6. (0) OTHER							0
TOTAL SALARIES AND WAGES (A + B)							69,696
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)							25,090
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)							94,786
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT							0
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)							0
2. INTERNATIONAL							0
F. PARTICIPANT SUPPORT COSTS							
1. STIPENDS \$ 40,000							
2. TRAVEL 0							
3. SUBSISTENCE 0							
4. OTHER 0							
TOTAL NUMBER OF PARTICIPANTS (16)				TOTAL PARTICIPANT COSTS			40,000
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES							22,606
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION							0
3. CONSULTANT SERVICES							0
4. COMPUTER SERVICES							0
5. SUBAWARDS							0
6. OTHER							0
TOTAL OTHER DIRECT COSTS							22,606
H. TOTAL DIRECT COSTS (A THROUGH G)							157,392
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)							
MTDC (Rate: 42.5000, Base: 117392)							
TOTAL INDIRECT COSTS (F&A)							49,892
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)							207,284
K. FEE							0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)							207,284
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$			
PI/PD NAME Charles Lang				FOR NSF USE ONLY			
ORG. REP. NAME* Jessy George				INDIRECT COST RATE VERIFICATION			
				Date Checked	Date Of Rate Sheet	Initials - ORG	

SUMMARY PROPOSAL BUDGET Cumulative

ORGANIZATION Teachers College, Columbia University				FOR NSF USE ONLY		
				PROPOSAL NO.	DURATION (months)	
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Charles Lang				AWARD NO.	Proposed	Granted
					NSF Funded Person-months	
A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				CAL	ACAD	SUMR
1. Charles Lang - Visiting Assistant Professor				0.00	0.00	10.00
2. Paulo Blikstein - Associate Professor				1.50	0.00	0.00
3. Oren Pizmony-Levy - Associate Professor				5.00	0.00	0.00
4.						
5.						
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)				0.00	0.00	0.00
7. (3) TOTAL SENIOR PERSONNEL (1 - 6)				6.50	0.00	10.00
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL SCHOLARS				0.00	0.00	0.00
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				0.00	0.00	0.00
3. (5) GRADUATE STUDENTS						
4. (0) UNDERGRADUATE STUDENTS						
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)						
6. (0) OTHER						
TOTAL SALARIES AND WAGES (A + B)						
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)						
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)						
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)						
TOTAL EQUIPMENT						
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)						
2. INTERNATIONAL						
F. PARTICIPANT SUPPORT COSTS						
1. STIPENDS \$ 200,000						
2. TRAVEL 0						
3. SUBSISTENCE 0						
4. OTHER 0						
TOTAL NUMBER OF PARTICIPANTS (80) TOTAL PARTICIPANT COSTS						
G. OTHER DIRECT COSTS						
1. MATERIALS AND SUPPLIES						
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION						
3. CONSULTANT SERVICES						
4. COMPUTER SERVICES						
5. SUBAWARDS						
6. OTHER						
TOTAL OTHER DIRECT COSTS						
H. TOTAL DIRECT COSTS (A THROUGH G)						
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)						
TOTAL INDIRECT COSTS (F&A)						
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)						
K. FEE						
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)						
M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL IF DIFFERENT \$						
PI/PI NAME Charles Lang				FOR NSF USE ONLY		
ORG. REP. NAME* Jessy George				INDIRECT COST RATE VERIFICATION		
				Date Checked	Date Of Rate Sheet	Initials - ORG

C *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

Teachers College, Columbia University

**Science and Technology Centers (STCs)
Center for Learning the Earth with Artificial Intelligence and Physics**

Lab to School Program for K-12 teachers

Budget Narrative

A. Senior Personnel

Oren Pizmony-Levy (Project PI): \$49,677

The project requests 1.0 month/per year (CAL) effort for the Principal Investigator, Oren Pizmony-Levy. Oren will assume primary responsibility for overseeing grant activities and will lead the development and administration of K-12 teacher training and parents conference.

Charles Lang (Co-PI): \$116,649

The project requests 2.0 months/per year (SMR) effort for the Evaluation Expert, Charles Lang. Charles will lead the evaluation of all educational activities, including programs at the undergraduate and graduate levels.

Paulo Blikstein: \$19,089

The project requests 0.3 month/per year (CAL) effort for the Design Expert, Paulo Blikstein, for a total salary cost of \$19,089 (plus \$8,113 fringe at our current 42.5% rate). Paulo will support the PI in designing and implementing training programs for teachers and parents.

B. Other Personnel

Graduate Research Assistant (GRA): \$143,347

The project requires three semesters (at \$9,000/semester) GRA for curriculum development, data collection (interviews, observations, and surveys), data management and analysis.

C. Fringe Benefits \$118,354

Fringe is calculated at the College's current federally negotiated DHHS rate of 36% for all employees.

F. Participant Support \$200,000

We include \$2,500 stipend for each teacher ($n=16*5=80$) to encourage participation in the research project.

G. Other Direct Costs

A. Materials & Supplies \$112,295

We request funds for supplies and printing costs, which include four digital recorders for interviews, batteries, paper for photocopies and printouts.

H. Indirect Costs \$237,749

Indirect costs is calculated at the College's federally negotiated DHHS rate of 42.5% MTDC.

SUMMARY PROPOSAL BUDGET

YEAR 1

ORGANIZATION University of California-Irvine				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Michael Pritchard				AWARD NO.	Proposed	Granted	
A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-months		Funds Requested By proposer	Funds granted by NSF (if different)
		CAL	ACAD	SUMR			
1.	Michael Pritchard - Associate Professor	0.00	0.00	0.50	6,949		
2.							
3.							
4.							
5.							
6.	(0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	0		
7.	(1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.50	6,949		
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1.	(1) POST DOCTORAL SCHOLARS	12.00	0.00	0.00	60,000		
2.	(0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00	0		
3.	(0) GRADUATE STUDENTS				0		
4.	(0) UNDERGRADUATE STUDENTS				0		
5.	(0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				0		
6.	(0) OTHER				0		
TOTAL SALARIES AND WAGES (A + B)					66,949		
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					15,402		
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					82,351		
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT					0		
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)					0		
2. INTERNATIONAL					0		
F. PARTICIPANT SUPPORT COSTS							
1.	STIPENDS \$ _____				0		
2.	TRAVEL _____				0		
3.	SUBSISTENCE _____				0		
4.	OTHER _____				0		
TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT COSTS					0		
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES					0		
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION					0		
3. CONSULTANT SERVICES					0		
4. COMPUTER SERVICES					0		
5. SUBAWARDS					0		
6. OTHER					0		
TOTAL OTHER DIRECT COSTS					0		
H. TOTAL DIRECT COSTS (A THROUGH G)					82,351		
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) modified total direct costs (Rate: 57.0000, Base: 82351)							
TOTAL INDIRECT COSTS (F&A)					46,940		
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)					129,291		
K. FEE					0		
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)					129,291		
M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL IF DIFFERENT \$							
PI/PI NAME Michael Pritchard				FOR NSF USE ONLY			
ORG. REP. NAME* Jessy George				INDIRECT COST RATE VERIFICATION			
		Date Checked	Date Of Rate Sheet	Initials - ORG			

SUMMARY PROPOSAL BUDGET

YEAR **2**

ORGANIZATION University of California-Irvine				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Michael Pritchard				AWARD NO.	Proposed	Granted	
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-months		Funds Requested By proposer	Funds granted by NSF (if different)
	CAL	ACAD	SUMR				
1. Michael Pritchard - Associate Professor	0.00	0.00	0.50		7,088		
2.							
3.							
4.							
5.							
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0		
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.50		7,088		
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (1) POST DOCTORAL SCHOLARS	12.00	0.00	0.00		61,200		
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00		0		
3. (0) GRADUATE STUDENTS					0		
4. (0) UNDERGRADUATE STUDENTS					0		
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0		
6. (0) OTHER					0		
TOTAL SALARIES AND WAGES (A + B)					68,288		
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					16,160		
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					84,448		
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT					0		
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)					0		
2. INTERNATIONAL					0		
F. PARTICIPANT SUPPORT COSTS							
1. STIPENDS \$ _____					0		
2. TRAVEL _____					0		
3. SUBSISTENCE _____					0		
4. OTHER _____					0		
TOTAL NUMBER OF PARTICIPANTS (0)				TOTAL PARTICIPANT COSTS	0		
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES					0		
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION					0		
3. CONSULTANT SERVICES					0		
4. COMPUTER SERVICES					0		
5. SUBAWARDS					0		
6. OTHER					0		
TOTAL OTHER DIRECT COSTS					0		
H. TOTAL DIRECT COSTS (A THROUGH G)					84,448		
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) modified total direct costs (Rate: 57.0000, Base: 84448)							
TOTAL INDIRECT COSTS (F&A)					48,135		
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)					132,583		
K. FEE					0		
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)					132,583		
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$			
PI/PD NAME Michael Pritchard				FOR NSF USE ONLY			
ORG. REP. NAME* Jessy George				INDIRECT COST RATE VERIFICATION			
		Date Checked	Date Of Rate Sheet	Initials - ORG			

SUMMARY PROPOSAL BUDGET

YEAR 3

ORGANIZATION University of California-Irvine				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Michael Pritchard				AWARD NO.	Proposed	Granted	
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-months		Funds Requested By proposer	Funds granted by NSF (if different)
		CAL	ACAD	SUMR			
1.	Michael Pritchard - Associate Professor	0.00	0.00	0.50	7,229		
2.							
3.							
4.							
5.							
6.	(0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	0		
7.	(1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.50	7,229		
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1.	(1) POST DOCTORAL SCHOLARS	12.00	0.00	0.00	62,424		
2.	(0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00	0		
3.	(0) GRADUATE STUDENTS				0		
4.	(0) UNDERGRADUATE STUDENTS				0		
5.	(0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				0		
6.	(0) OTHER				0		
TOTAL SALARIES AND WAGES (A + B)					69,653		
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					17,004		
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					86,657		
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT					0		
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)					0		
2. INTERNATIONAL					0		
F. PARTICIPANT SUPPORT COSTS							
1.	STIPENDS \$ _____	0					
2.	TRAVEL _____	0					
3.	SUBSISTENCE _____	0					
4.	OTHER _____	0					
TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT COSTS					0		
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES					0		
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION					0		
3. CONSULTANT SERVICES					0		
4. COMPUTER SERVICES					0		
5. SUBAWARDS					0		
6. OTHER					0		
TOTAL OTHER DIRECT COSTS					0		
H. TOTAL DIRECT COSTS (A THROUGH G)					86,657		
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) modified total direct costs (Rate: 57.0000, Base: 86658)							
TOTAL INDIRECT COSTS (F&A)					49,395		
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)					136,052		
K. FEE					0		
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)					136,052		
M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL IF DIFFERENT \$							
PI/PD NAME Michael Pritchard				FOR NSF USE ONLY			
ORG. REP. NAME* Jessy George				INDIRECT COST RATE VERIFICATION			
		Date Checked	Date Of Rate Sheet	Initials - ORG			

SUMMARY PROPOSAL BUDGET

YEAR 4

ORGANIZATION University of California-Irvine				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Michael Pritchard				AWARD NO.	Proposed	Granted	
				A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)			
				CAL	ACAD	SUMR	
1. Michael Pritchard - Associate Professor				0.00	0.00	0.50	7,735
2.							
3.							
4.							
5.							
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)				0.00	0.00	0.00	0
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)				0.00	0.00	0.50	7,735
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (1) POST DOCTORAL SCHOLARS				12.00	0.00	0.00	63,672
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				0.00	0.00	0.00	0
3. (0) GRADUATE STUDENTS							0
4. (0) UNDERGRADUATE STUDENTS							0
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)							0
6. (0) OTHER							0
TOTAL SALARIES AND WAGES (A + B)							71,407
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)							17,915
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)							89,322
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT							0
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)							0
2. INTERNATIONAL							0
F. PARTICIPANT SUPPORT COSTS							
1. STIPENDS \$ _____				0			
2. TRAVEL _____				0			
3. SUBSISTENCE _____				0			
4. OTHER _____				0			
TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT COSTS							0
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES							0
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION							0
3. CONSULTANT SERVICES							0
4. COMPUTER SERVICES							0
5. SUBAWARDS							0
6. OTHER							0
TOTAL OTHER DIRECT COSTS							0
H. TOTAL DIRECT COSTS (A THROUGH G)							89,322
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) modified total direct costs (Rate: 57.0000, Base: 89322)							
TOTAL INDIRECT COSTS (F&A)							50,914
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)							140,236
K. FEE							0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)							140,236
M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL IF DIFFERENT \$							
PI/PI NAME Michael Pritchard				FOR NSF USE ONLY			
ORG. REP. NAME* Jessy George				INDIRECT COST RATE VERIFICATION			
		Date Checked	Date Of Rate Sheet	Initials - ORG			

SUMMARY PROPOSAL BUDGET

YEAR 5

ORGANIZATION University of California-Irvine				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Michael Pritchard				AWARD NO.	Proposed	Granted	
A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-months		Funds Requested By proposer	Funds granted by NSF (if different)
				CAL	ACAD	SUMR	
1. Michael Pritchard - Associate Professor				0.00	0.00	0.50	7,890
2.							
3.							
4.							
5.							
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)				0.00	0.00	0.00	0
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)				0.00	0.00	0.50	7,890
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (1) POST DOCTORAL SCHOLARS				12.00	0.00	0.00	64,946
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				0.00	0.00	0.00	0
3. (0) GRADUATE STUDENTS							0
4. (0) UNDERGRADUATE STUDENTS							0
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)							0
6. (0) OTHER							0
TOTAL SALARIES AND WAGES (A + B)							72,836
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)							18,622
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)							91,458
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT							0
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)							0
2. INTERNATIONAL							0
F. PARTICIPANT SUPPORT COSTS							
1. STIPENDS \$ _____							0
2. TRAVEL _____							0
3. SUBSISTENCE _____							0
4. OTHER _____							0
TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT COSTS							0
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES							0
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION							0
3. CONSULTANT SERVICES							0
4. COMPUTER SERVICES							0
5. SUBAWARDS							0
6. OTHER							0
TOTAL OTHER DIRECT COSTS							0
H. TOTAL DIRECT COSTS (A THROUGH G)							91,458
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) modified total direct costs (Rate: 57.0000, Base: 91458)							
TOTAL INDIRECT COSTS (F&A)							52,131
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)							143,589
K. FEE							0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)							143,589
M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL IF DIFFERENT \$							
PI/PI NAME Michael Pritchard				FOR NSF USE ONLY			
ORG. REP. NAME* Jessy George				INDIRECT COST RATE VERIFICATION			
		Date Checked	Date Of Rate Sheet	Initials - ORG			

SUMMARY PROPOSAL BUDGET Cumulative

ORGANIZATION University of California-Irvine				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Michael Pritchard				AWARD NO.	Proposed	Granted	
				A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)			
				CAL	ACAD	SUMR	
1. Michael Pritchard - Associate Professor				0.00	0.00	2.50	36,891
2.							
3.							
4.							
5.							
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)				0.00	0.00	0.00	0
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)				0.00	0.00	2.50	36,891
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (5) POST DOCTORAL SCHOLARS				60.00	0.00	0.00	312,242
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				0.00	0.00	0.00	0
3. (0) GRADUATE STUDENTS							0
4. (0) UNDERGRADUATE STUDENTS							0
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)							0
6. (0) OTHER							0
TOTAL SALARIES AND WAGES (A + B)							349,133
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)							85,103
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)							434,236
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT							0
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)							0
2. INTERNATIONAL							0
F. PARTICIPANT SUPPORT COSTS							
1. STIPENDS \$ _____ 0							
2. TRAVEL _____ 0							
3. SUBSISTENCE _____ 0							
4. OTHER _____ 0							
TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT COSTS							0
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES							0
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION							0
3. CONSULTANT SERVICES							0
4. COMPUTER SERVICES							0
5. SUBAWARDS							0
6. OTHER							0
TOTAL OTHER DIRECT COSTS							0
H. TOTAL DIRECT COSTS (A THROUGH G)							434,236
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)							
TOTAL INDIRECT COSTS (F&A)							247,515
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)							681,751
K. FEE							0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)							681,751
M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL IF DIFFERENT \$							
PI/PI NAME Michael Pritchard				FOR NSF USE ONLY			
ORG. REP. NAME* Jessy George				INDIRECT COST RATE VERIFICATION			
		Date Checked	Date Of Rate Sheet	Initials - ORG			

C *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

BUDGET JUSTIFICATION
UNIVERSITY OF CALIFORNIA, IRVINE

A. SENIOR PERSONNEL

PI: For each of the 5 project years, we request 0.5 months support for PI Michael Pritchard. The amount of effort requested will facilitate the PI to oversee the research effort, including co-drafting manuscripts and presentations, and advising on analysis of results. A 2% cost of living increase was applied to each period of this proposal as well as a 5% merit increase, where applicable.

B. OTHER PERSONNEL

PI: For each of the 5 project years, we request funds to support the salary of 1 full time Postdoctoral researcher. The postdoc will conduct convection-permitting climate simulations and experiment with machine learning algorithms to emulate the resulting physics including stochasticity. The work will be in coordination with collaborators at Columbia and NCAR involved in complementary emulation of turbulence and microphysics. The salaries and wages were estimated using UCI's academic and staff salary scales. A 2% cost of living increase was applied to each period.

C. FRINGE BENEFITS

The fringe benefit rate is for PI Pritchard @ 10.1% year 1, 10.4% year2, 10.7% year 3, 11% year4, 11.3% year 5, and postdoc @ 24.5% year1, 25.2% year2, 2.26% year3, 26.8% year 4, 27.3% year5. Composite fringe benefits were estimated using the composite benefit rates agreed and calculated per the University of California, Irvine policy.

I. INDIRECT COSTS

Facilities and Administrative costs were estimated in accordance with UCI's approved indirect cost rate agreement. Based on the nature of the work proposed the following rates were used at 57%. UCI's indirect cost rate agreement was approved by DHHS, the Federal Cognizant Audit Agency for UCI on 5/29/19.

SUMMARY PROPOSAL BUDGET

YEAR 1

ORGANIZATION University of Minnesota-Twin Cities				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Vipin Kumar				AWARD NO.	Proposed	Granted	
				A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)			
				CAL	ACAD	SUMR	
1. Vipin Kumar - Regents Professor				0.00	0.00	0.50	14,537
2.							
3.							
4.							
5.							
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)				0.00	0.00	0.00	0
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)				0.00	0.00	0.50	14,537
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (0) POST DOCTORAL SCHOLARS				0.00	0.00	0.00	0
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				0.00	0.00	0.00	0
3. (1) GRADUATE STUDENTS							29,151
4. (0) UNDERGRADUATE STUDENTS							0
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)							0
6. (0) OTHER							0
TOTAL SALARIES AND WAGES (A + B)							43,688
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)							9,926
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)							53,614
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT							0
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)							0
2. INTERNATIONAL							0
F. PARTICIPANT SUPPORT COSTS							
1. STIPENDS \$ _____ 0							
2. TRAVEL _____ 0							
3. SUBSISTENCE _____ 0							
4. OTHER _____ 0							
TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT COSTS							0
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES							0
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION							0
3. CONSULTANT SERVICES							0
4. COMPUTER SERVICES							0
5. SUBAWARDS							0
6. OTHER							19,169
TOTAL OTHER DIRECT COSTS							19,169
H. TOTAL DIRECT COSTS (A THROUGH G)							72,783
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) modified total direct costs (Rate: 54.9160, Base: 56794)							
TOTAL INDIRECT COSTS (F&A)							31,189
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)							103,972
K. FEE							0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)							103,972
M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL IF DIFFERENT \$							
PI/PI NAME Vipin Kumar				FOR NSF USE ONLY			
ORG. REP. NAME* Jessy George				INDIRECT COST RATE VERIFICATION			
		Date Checked	Date Of Rate Sheet	Initials - ORG			

SUMMARY PROPOSAL BUDGET

YEAR 2

ORGANIZATION University of Minnesota-Twin Cities				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Vipin Kumar				AWARD NO.	Proposed	Granted	
A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-months		Funds Requested By proposer	Funds granted by NSF (if different)
	CAL	ACAD	SUMR				
1. Vipin Kumar - Regents Professor	0.00	0.00	0.50		15,119		
2.							
3.							
4.							
5.							
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0		
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.50		15,119		
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0		
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00		0		
3. (1) GRADUATE STUDENTS					30,318		
4. (0) UNDERGRADUATE STUDENTS					0		
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0		
6. (0) OTHER					0		
TOTAL SALARIES AND WAGES (A + B)					45,437		
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					10,322		
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					55,759		
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT					0		
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)					0		
2. INTERNATIONAL					0		
F. PARTICIPANT SUPPORT COSTS							
1. STIPENDS \$ _____					0		
2. TRAVEL _____					0		
3. SUBSISTENCE _____					0		
4. OTHER _____					0		
TOTAL NUMBER OF PARTICIPANTS (0)				TOTAL PARTICIPANT COSTS	0		
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES					0		
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION					0		
3. CONSULTANT SERVICES					0		
4. COMPUTER SERVICES					0		
5. SUBAWARDS					0		
6. OTHER					19,296		
TOTAL OTHER DIRECT COSTS					19,296		
H. TOTAL DIRECT COSTS (A THROUGH G)					75,055		
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) modified total direct costs (Rate: 55.0000, Base: 59065)							
TOTAL INDIRECT COSTS (F&A)					32,486		
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)					107,541		
K. FEE					0		
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)					107,541		
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$			
PI/PI NAME Vipin Kumar				FOR NSF USE ONLY			
ORG. REP. NAME* Jessy George				INDIRECT COST RATE VERIFICATION			
		Date Checked	Date Of Rate Sheet	Initials - ORG			

SUMMARY PROPOSAL BUDGET

YEAR 3

ORGANIZATION University of Minnesota-Twin Cities				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Vipin Kumar				AWARD NO.	Proposed	Granted	
				A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)			
				CAL	ACAD	SUMR	
1. Vipin Kumar - Regents Professor				0.00	0.00	0.50	15,724
2.							
3.							
4.							
5.							
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)				0.00	0.00	0.00	0
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)				0.00	0.00	0.50	15,724
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (0) POST DOCTORAL SCHOLARS				0.00	0.00	0.00	0
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				0.00	0.00	0.00	0
3. (1) GRADUATE STUDENTS							31,530
4. (0) UNDERGRADUATE STUDENTS							0
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)							0
6. (0) OTHER							0
TOTAL SALARIES AND WAGES (A + B)							47,254
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)							10,735
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)							57,989
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT							0
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)							0
2. INTERNATIONAL							0
F. PARTICIPANT SUPPORT COSTS							
1. STIPENDS \$ _____ 0							
2. TRAVEL _____ 0							
3. SUBSISTENCE _____ 0							
4. OTHER _____ 0							
TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT COSTS							0
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES							0
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION							0
3. CONSULTANT SERVICES							0
4. COMPUTER SERVICES							0
5. SUBAWARDS							0
6. OTHER							19,428
TOTAL OTHER DIRECT COSTS							19,428
H. TOTAL DIRECT COSTS (A THROUGH G)							77,417
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) modified total direct costs (Rate: 55.0000, Base: 61426)							
TOTAL INDIRECT COSTS (F&A)							33,784
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)							111,201
K. FEE							0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)							111,201
M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL IF DIFFERENT \$							
PI/PI NAME Vipin Kumar				FOR NSF USE ONLY			
ORG. REP. NAME* Jessy George				INDIRECT COST RATE VERIFICATION			
				Date Checked	Date Of Rate Sheet	Initials - ORG	

SUMMARY PROPOSAL BUDGET

YEAR 4

ORGANIZATION University of Minnesota-Twin Cities				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Vipin Kumar				AWARD NO.	Proposed	Granted	
A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-months		Funds Requested By proposer	Funds granted by NSF (if different)
	CAL	ACAD	SUMR				
1. Vipin Kumar - Regents Professor	0.00	0.00	0.50		16,353		
2.							
3.							
4.							
5.							
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0		
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.50		16,353		
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (0) POST DOCTORAL SCHOLARS	0.00	0.00	0.00		0		
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00		0		
3. (1) GRADUATE STUDENTS					32,792		
4. (0) UNDERGRADUATE STUDENTS					0		
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0		
6. (0) OTHER					0		
TOTAL SALARIES AND WAGES (A + B)					49,145		
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					11,166		
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					60,311		
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT					0		
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)					0		
2. INTERNATIONAL					0		
F. PARTICIPANT SUPPORT COSTS							
1. STIPENDS \$ _____					0		
2. TRAVEL _____					0		
3. SUBSISTENCE _____					0		
4. OTHER _____					0		
TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT COSTS					0		
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES					0		
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION					0		
3. CONSULTANT SERVICES					0		
4. COMPUTER SERVICES					0		
5. SUBAWARDS					0		
6. OTHER					19,566		
TOTAL OTHER DIRECT COSTS					19,566		
H. TOTAL DIRECT COSTS (A THROUGH G)					79,877		
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) modified total direct costs (Rate: 55.0000, Base: 63887)							
TOTAL INDIRECT COSTS (F&A)					35,138		
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)					115,015		
K. FEE					0		
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)					115,015		
M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL IF DIFFERENT \$							
PI/PI NAME Vipin Kumar				FOR NSF USE ONLY			
ORG. REP. NAME* Jessy George				INDIRECT COST RATE VERIFICATION			
		Date Checked	Date Of Rate Sheet	Initials - ORG			

SUMMARY PROPOSAL BUDGET

YEAR 5

ORGANIZATION University of Minnesota-Twin Cities				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Vipin Kumar				AWARD NO.	Proposed	Granted	
				A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)			
				CAL	ACAD	SUMR	
1. Vipin Kumar - Regents Professor				0.00	0.00	0.50	17,007
2.							
3.							
4.							
5.							
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)				0.00	0.00	0.00	0
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)				0.00	0.00	0.50	17,007
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (0) POST DOCTORAL SCHOLARS				0.00	0.00	0.00	0
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				0.00	0.00	0.00	0
3. (1) GRADUATE STUDENTS							34,103
4. (0) UNDERGRADUATE STUDENTS							0
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)							0
6. (0) OTHER							0
TOTAL SALARIES AND WAGES (A + B)							51,110
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)							11,613
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)							62,723
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT							0
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)							0
2. INTERNATIONAL							0
F. PARTICIPANT SUPPORT COSTS							
1. STIPENDS \$ _____ 0							
2. TRAVEL _____ 0							
3. SUBSISTENCE _____ 0							
4. OTHER _____ 0							
TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT COSTS							0
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES							0
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION							0
3. CONSULTANT SERVICES							0
4. COMPUTER SERVICES							0
5. SUBAWARDS							0
6. OTHER							19,709
TOTAL OTHER DIRECT COSTS							19,709
H. TOTAL DIRECT COSTS (A THROUGH G)							82,432
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) modified total direct costs (Rate: 55.0000, Base: 66439)							
TOTAL INDIRECT COSTS (F&A)							36,541
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)							118,973
K. FEE							0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)							118,973
M. COST SHARING PROPOSED LEVEL \$ 0 AGREED LEVEL IF DIFFERENT \$							
PI/PI NAME Vipin Kumar				FOR NSF USE ONLY			
ORG. REP. NAME* Jessy George				INDIRECT COST RATE VERIFICATION			
		Date Checked	Date Of Rate Sheet	Initials - ORG			

SUMMARY PROPOSAL BUDGET Cumulative

ORGANIZATION University of Minnesota-Twin Cities				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Vipin Kumar				AWARD NO.			
				Proposed	Granted		
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-months		Funds Requested By proposer	Funds granted by NSF (if different)
				CAL	ACAD	SUMR	
1. Vipin Kumar - Regents Professor				0.00	0.00	2.50	78,740
2.							
3.							
4.							
5.							
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)				0.00	0.00	0.00	0
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)				0.00	0.00	2.50	78,740
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (0) POST DOCTORAL SCHOLARS				0.00	0.00	0.00	0
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				0.00	0.00	0.00	0
3. (5) GRADUATE STUDENTS							157,894
4. (0) UNDERGRADUATE STUDENTS							0
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)							0
6. (0) OTHER							0
TOTAL SALARIES AND WAGES (A + B)							236,634
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)							53,762
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)							290,396
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT							0
E. TRAVEL							
1. DOMESTIC (INCL. U.S. POSSESSIONS)							0
2. INTERNATIONAL							0
F. PARTICIPANT SUPPORT COSTS							
1. STIPENDS \$ _____ 0							
2. TRAVEL _____ 0							
3. SUBSISTENCE _____ 0							
4. OTHER _____ 0							
TOTAL NUMBER OF PARTICIPANTS (0)				TOTAL PARTICIPANT COSTS			0
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES							0
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION							0
3. CONSULTANT SERVICES							0
4. COMPUTER SERVICES							0
5. SUBAWARDS							0
6. OTHER							97,168
TOTAL OTHER DIRECT COSTS							97,168
H. TOTAL DIRECT COSTS (A THROUGH G)							387,564
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)							
TOTAL INDIRECT COSTS (F&A)							169,138
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)							556,702
K. FEE							0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)							556,702
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$			
PI/PD NAME Vipin Kumar				FOR NSF USE ONLY			
ORG. REP. NAME* Jessy George				INDIRECT COST RATE VERIFICATION			
		Date Checked		Date Of Rate Sheet		Initials - ORG	

C *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

**University of Minnesota
Budget Justification**

- A. Senior Personnel.** Vipin Kumar, Principal Investigator (PI), will supervise the proposed research and teaching activities at the University of Minnesota. We are requesting 0.50 summer-month salary support for each 5 project years. Annual 9-month salary: \$251,616. Salary is adjusted for 4% annual increase per year. The University's fiscal year is from July 1st to June 30th.
- B. Other Personnel.** To be named one graduate research assistant (GRA) from the Department Computer Science and Engineering salary support is requested for 50% 9 academic-months and 50% 3 summer-months for each 5 project years to carry out the research tasks under the supervision of the PI. The student will also be involved in research dissemination and outreach, as well as education. GRA Hourly Rate: \$26.00. Salary is adjusted for 4% annual increase per year. The University's fiscal year is from July 1st to June 30th.
- C. Fringe Benefits.** Fringe benefits are calculated at 36% for the PI. GRA fringe rates are calculated at 16.1%, which includes health benefits. Tuition is calculated as \$20.50/hr for each proposed academic hour the graduate students will work on the project (with no tuition costs in the summer). Tuition for the GRA, which must be charged as a direct cost on all grants is \$ 15,990 in each 5 project years.
- D. Equipment.** None.
- E. Travel.** None.
- F. Participant Support Costs.** None.
- G. Other Direct Costs.**
- G.1. Materials and Supplies.** None.
- G.2. Publication/Documentation/Dissemination.** None.
- G.3. Consultant Services.** None.
- G.4. Computer Services.**
- G.4.1. Network and Computer Services.** Networking and computer charges are expenses charged to sponsored and non sponsored accounts to support the portion of networking and computer infrastructure used by sponsored and non sponsored research projects. In a formula found to be Uniform Guidance compliant by the Office of Treasury Accounting and Internal/External Sales and Sponsored Projects Administration, research specific computing is separated from general-purpose computing. The networking and computer support charge is based on FTEs and special projects that can be attributed to research-only projects. Total charges budgeted is \$17,218.
- G.5. Subawards.** None.
- G.6. Other.** None.
- H. Total Direct Costs - \$387,563**
- I. U of MN Indirect Costs** are calculated at 54% of modified total direct costs (MTDC) up to fiscal year 2021 and 55% of modified total direct costs in fiscal year 2022 and after, with equipment and GRA tuition exempt from F&A. Total Indirect Costs - \$169,139.

	Direct Costs		GRA Tuition		MTDC
Period 1:	\$72,783	-	\$15,990	=	\$56,793
Period 2:	\$75,055	-	\$15,990	=	\$59,065
Period 3:	\$77,417	-	\$15,990	=	\$61,427
Period 4:	\$79,877	-	\$15,990	=	\$63,887
Period 4:	\$82,431	-	\$15,990	=	\$66,441

Modified Total Direct Costs (MTDC) to apply Indirect Cost Rate = \$307,613

\$4,733 x 54% UMN MTDC Rate (Before Fiscal Year 22) = \$2,555 Indirect Costs

\$302,880 x 55% UMN MTDC Rate (After Fiscal Year 22) = \$166,584 Indirect Costs

Total Indirect Costs - \$169,139

J. Total Direct and Indirect Costs - \$556,702

K. Fees. None.

L. Amount of this Request - \$556,702