

		Year 1	Year 2	Year 3	Year 4	Year 5	COMBINED TOTALS
		6/1/09-5/31/10	6/1/10-5/31/11	6/1/11-5/31/12	6/1/12-5/31/13	6/1/13-5/31/14	
A. SENIOR PERSONNEL							
A. Desai PI		5.56%	11.11%	11.11%	11.11%	11.11%	
71593 1 month		\$3,977.39	\$8,272.97	\$8,603.89	\$8,948.04	\$9,305.96	\$39,108.25
B. Other Personnel							
TBN Assoc. Researcher		33%	25%	25%	25%	25%	
59331 3 month		\$19,579.23	\$15,426.06	\$16,043.10	\$16,684.83	\$17,352.22	\$85,085.44
TBN Research Assistant		0%	50%	50%	50%	50%	
40368 6 month		\$0.00	\$20,991.36	\$21,831.01	\$22,704.25	\$23,612.43	\$89,139.05
** 4% yearly increase in salaries		100.00%	104.00%	108.16%	112.49%	116.99%	
TOTAL SALARY		\$23,556.62	\$44,690.39	\$46,478.00	\$48,337.12	\$50,270.61	\$213,332.75
C. Fringe Benefits							
Academic		38.50%	39.50%	40.50%	41.50%	42.50%	
PI		\$1,531.29	\$3,267.82	\$3,484.57	\$3,713.44	\$3,955.04	\$15,952.16
Assoc Researcher		\$7,538.00	\$6,093.29	\$6,497.46	\$6,924.20	\$7,374.69	\$34,427.65
Grad Assist		27.50%	28.50%	29.50%	30.50%	31.50%	
Res Asst		\$0.00	\$5,982.54	\$6,440.15	\$6,924.80	\$7,437.91	\$26,785.40
TOTAL FRINGE		\$9,069.30	\$15,343.65	\$16,422.18	\$17,562.44	\$18,767.64	\$77,165.21
TOTAL SALARIES & FRINGE BENEFITS		\$32,625.92	\$60,034.04	\$62,900.18	\$65,899.56	\$69,038.25	\$290,497.96
D. EQUIPMENT							
Piccarro Environsense 3000f		\$65,000.00	\$0.00	\$0.00	\$0.00	\$0.00	\$65,000.00
TOTAL EQUIP		\$65,000.00	\$0.00	\$0.00	\$0.00	\$0.00	\$65,000.00
E. TRAVEL							
Conference Travel		\$2,200.00	\$2,200.00	\$2,200.00	\$2,200.00	\$2,200.00	\$11,000.00
Fieldwork travel		\$3,500.00	\$1,000.00	\$1,000.00	\$1,000.00	\$1,000.00	\$7,500.00
Outreach travel		\$2,000.00	\$0.00	\$0.00	\$0.00	\$0.00	\$2,000.00
TOTAL TRAVEL		\$7,700.00	\$3,200.00	\$3,200.00	\$3,200.00	\$3,200.00	\$20,500.00
F. PARTICIPANT COSTS							
Participant travel and expenses		\$0.00	\$10,000.00	\$10,000.00	\$10,000.00	\$10,000.00	\$40,000.00
REU stipend		\$0.00	\$4,500.00	\$4,500.00	\$4,500.00	\$4,500.00	\$18,000.00
REU travel		\$0.00	\$500.00	\$500.00	\$500.00	\$500.00	\$2,000.00
RET stipend		\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
RET travel		\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
TOTAL PARTICIPANT		\$0.00	\$15,000.00	\$15,000.00	\$15,000.00	\$15,000.00	\$60,000.00
G. OTHER DIRECT COSTS							
cal gases, pump							
diaphragms, parts		\$4,000.00	\$3,000.00	\$5,500.00	\$3,000.00	\$3,000.00	\$18,500.00
Publication		\$0.00	\$1,000.00	\$1,000.00	\$1,000.00	\$1,000.00	\$4,000.00
USFS Contract		\$5,000.00	\$5,000.00	\$5,000.00	\$5,000.00	\$5,000.00	\$25,000.00
Tuition Remission		\$0.00	\$8,000.00	\$8,000.00	\$8,000.00	\$8,000.00	\$32,000.00
\$4,000/semester							
TOTAL OTHER COSTS		\$9,000.00	\$17,000.00	\$19,500.00	\$17,000.00	\$17,000.00	\$79,500.00
H. TOTAL DIRECT COSTS		\$114,325.92	\$95,234.04	\$100,600.18	\$101,099.56	\$104,238.25	\$515,497.96
I. INDIRECT COSTS							
Indirect Base 1 (Adjusted Direct)		\$49,325.92	\$72,234.04	\$77,600.18	\$78,099.56	\$81,238.25	\$358,497.96
Indirect Base 2 (REU/RET stipends)		\$0.00	\$4,500.00	\$4,500.00	\$4,500.00	\$4,500.00	\$18,000.00
Rate 1 48.5%		\$23,923.07	\$35,033.51	\$37,636.09	\$37,878.29	\$39,400.55	\$173,871.51
Rate 2 25.0%		\$0.00	\$1,125.00	\$1,125.00	\$1,125.00	\$1,125.00	\$4,500.00
TOTAL INDIRECT		\$23,923.07	\$36,158.51	\$38,761.09	\$39,003.29	\$40,525.55	\$178,371.51
Base 1 (All costs minus tuition remission, equipment, and participant costs)							
Base 2 REU and RET participant stipend							
TOTAL COSTS		\$138,248.99	\$131,392.55	\$139,361.27	\$140,102.85	\$144,763.80	\$693,869.47

Budget Justification

Budget Narrative

Cost Justification

Funding is requested for 5 years from 6/1/2009 to 5/31/2014. Justification of the costs are provided below. F & A rate is 48.5%. Tuition, permanent equipment over \$5,000, and participant costs are excluded from the F&A cost base. REU and RET participant stipends have a 25% administrative allowance. All salaries are projected to increment 4% annually. All fringe rates are projected to increment 1% annually.

A. Senior Personnel

1. *Ankur Desai* is an assistant professor in Atmospheric & Oceanic Sciences at the University of Wisconsin – Madison and faculty affiliate of the Center for Climatic Research, Nelson Institute for Environmental Studies, University of Wisconsin-Madison. He will be responsible for overall project management, installation of field equipment, and analysis of data. Desai will supervise a graduate student and technician. Desai holds a 9-mo teaching position and this proposal requests total of 4.5-months of salary, budgeted as 0.5-month summer salary in year 1 to support project setup and 1-month summer salary annually thereafter to support summer field research and the outreach and education activities.

B. Other Personnel

1. *Post-doctoral scholars* – none

2. *Other professionals* – We seek support for an associate researcher who will serve as the main field technician on the project. He or she will be responsible for purchase, installation, calibration, maintenance and removal of the CH₄ flux and trace gas sensor system as well as routine maintenance of the WLEF tall tower. Four months of support is requested in year 1 due to the increased work commitment for field deployment, and three months of support is requested in the following years.

3. *Graduate* – Four years of 12-mo 50% graduate research assistantship will support a graduate student in her Ph.D. research in climate and biogeochemistry beginning in the second year of the project. She will work on both the research and education components of this proposal. Tuition remission is budgeted in section G6.

4. *Undergraduates* – none

5. *Secretarial* – none

6. *Other* – none

C. Fringe Benefits

Fringe rate for Ankur Desai (A1) and the associate researcher (B2) is 38.5%. Fringe rate for graduate research assistants (B3) is 27.5%.

D. Permanent Equipment

1. A fast response methane sensor will be purchased for \$65,000 and installed at the WLEF tall tower, to complement the existing CH₄ trace gas system. The EnviroSense 3000f sensor is newly developed by Picarro, Inc. This instrument is a high-uptime, self-calibrating, cavity-ring down based spectroscopic analyzer of CO₂ and CH₄ with a 10 Hz response time. Cost of the system includes a dry scroll vacuum pump and monitor. Using the existing tall tower infrastructure (tubing, data lines, sonic anemometer, etc...) for the rest of the flux instrumentation provides significant costs savings. Desai lab startup funds have been used to purchase a Los Gatos, Inc.

CO₂/CH₄ analyzer for trace gas profile observations at WLEF, which are also central to this proposal.

E. Travel

1. Domestic travel is budgeted for conferences (\$11,000), fieldwork (\$7,500), and outreach planning (\$2,000) for a total of \$20,500.

Field travel is budgeted at \$3,500 for seven 4-day trips in year 1 and \$1,000 for two 4-day trips in years 2-5 by the technician and an assistant (e.g., the graduate research assistant or the PI). Low cost lodging is provided at Kemp NRS, which also provides group kitchen, wet lab, truck rental, shipping/receiving and wireless internet facilities for free. Thus, significant travel cost savings are provided by staying at Kemp.

Meeting travel costs of \$2,200/yr are budgeted for presentation of research results at 1-2 national meetings such as fall AGU by the PI or the graduate student.

Education and outreach travel has been budgeted at \$2,000 in year 1 (\$1,300 for UW employees and \$700 for outreach partners) to conduct three meetings with the College of Menominee Nation, WiscAMP, and Kemp NRS to plan the summer course and talks to be run in years 2-5.

Field Travel:

Purpose: Research Technician and PI or Graduate Assistant travel to field sites

Number of People: 2

Departure/Arrival cities: Madison, WI to Woodruff, WI

Nights/Days: 4

Lodging: $(\$12/\text{night} * 4) * 2 = \96

Meals: $(\$19/\text{day} * 4 \text{ days}) * 2 = \152

Incidentals = \$52

Vehicle Rental (UW Fleet): \$200

Scientific Meeting:

Purpose: PI or Graduate Student to attend the American Geophysical Union (AGU) Meeting

Number of People: 1 (PI or Graduate Student)

Departure/Arrival cities: Madison, WI to San Francisco, CA

Nights/Days: 5

Lodging: $\$150 + 20\% \text{ tax}/\text{night} * 5 = \900

Meals: $\$40/\text{day} * 5 \text{ days} = \200

Airfare: \$600

Ground Transportation: \$50

Conference Registration Fee and Abstract: \$450

Education and Outreach Travel:

Purpose: PI and Graduate Student to coordinate summer course with College of Menominee, WiscAMP, and Kemp NRS. Meeting to be held at CMN or Kemp NRS.

Number of People: 2

Nights/Days: two 5-day trips

Lodging: $(\$12/\text{night} * 2 \text{ people}) * 5 \text{ nights} = \120

Meals: $(\$19/\text{day} * 2) * 5 \text{ days} = \190

Incidentals = \$60

Vehicle Rental (UW Fleet): \$280

Purpose: Staff from College of Menominee / Kemp NRS to meet with PI at UW-Madison

Number of People: 1

Nights/Days: 3 nights

Lodging: (\$70/night)*3 nights= \$210

Meals: (\$34/day)* 3 days = \$102

Incidentals = \$38

Vehicle Rental: \$200

Meeting Space Rental: \$150

2. *Foreign travel* – none

F. Participant Support Costs

Participants include summer outreach workshops (80) and a research experience for undergraduates (4). To conduct the summer course, we have budgeted funding to cover expenses of 20 participants at \$10,000/yr in years 2-5, for a total of \$40,000. This funding will be used to defray participants lodging, meal, and transportation expenses. Additionally, four years of REU funding are requested for support an undergraduate research internship in years 2-5.

1. *Stipends (REU)* – To engage undergraduate research in atmospheric biogeosciences, one 10-week REU internship will be offered in years 2-5. We have budgeted \$4,500 in each year for stipend (total \$18,000). An undergraduate student will be recruited who is interested in gaining research experience in carbon cycle biogeochemistry and land-atmosphere interaction.

The internship will be based primarily at UW-Madison with support for travel to field sites to conduct independent research projects in conjunction with the ongoing activities outlined in this proposal. At the beginning of the internship (weeks 1-2), the student will gain exposure to the project and research ideas central to regional biogeochemistry. He or she will also gain experience in the processing of eddy covariance flux data that is central to this proposal. From this initial experience, the student in consultation with Dr. Desai, the graduate student, and associate researcher, will develop a small field or model based research proposal (week 3) that attempts to better understand the dynamics and mechanisms of methane and CO₂ uptake and emission in forests and wetlands. This project would likely involve use of extra lab equipment or computing equipment available in Desai or collaborator labs. Examples of projects include short-term eddy covariance measurements in nearby wetlands with the Desai lab portable flux tower system, acquisition and analysis of satellite remote sensing data (e.g., MODIS Albedo) to investigate potential for remote sensing of wetland emissions, land cover ground truthing project to improve land covers used in the project footprint model, or regional atmospheric mesoscale model output visualization to analyze tall tower influence functions. Project setup and implementation (week 3-8) will be followed by analysis (weeks 8-9) and writing/presentation of a report to be presented to the lab (week 10). Additionally, should the student choose, he or she may attend lectures and demonstrations being held in conjunction with the outreach summer course.

2. *Travel* – Participant travel costs are budgeted at \$11,280. A total of \$2,000 (\$500/yr) is budgeted for travel expenses to the field site for the REU (see travel breakdown on previous page). Travel costs of \$9,280 are budgeted at \$2,320 (\$116/pp) in years 2-5 to cover summer course expenses to visit field sites and transport from CMN to Kemp NRS.

3. *Subsistence* expenses total to \$21,120 and are budgeted as \$5,280/yr in years 2 to 5 for summer course group meals (\$264/pp = 33 meals over 12 days at \$8/meal in the Kemp NRS group kitchen).

4. *Other* – Additional (other, item F4) expenses of \$9,600 is budgeted as \$2,400/yr in years 2-5 to defray lodging costs at Kemp NRS (\$12/pp/night for 10 days) for the summer course.

G. Other Direct Costs

1. *Materials and Supplies* – Field supplies are budgeted at \$18,500. Each year \$3,000 is requested to support ongoing operation costs of the flux tower, including but not limited to, tower climbs by OK Tower Company (\$1,000/yr) air sampling filters (\$500/yr), pump

diaphragms and parts (\$500/yr), secondary gas standards (\$500/yr), data storage media, replacement parts, recalibration/repair costs, tubing, valves, fittings, and water table/micromet station batteries (remaining \$500/yr). Additionally, \$1,000 is requested in year 1 to support an additional installation tower climb (\$500) and installation of a second sampling line (\$500). In year 3, \$2,500 is requested to replace the internal pump elements and filters of the Picarro analyzer, which have a 24-month lifespan.

2. *Publication* – Total of \$4,000 in publications costs are budgeted at \$1,000/yr in years 2-5 when significant manuscript submissions are expected.

3. *Consultant Services* – An Academic Sole Source Agreement will be made by UW to purchase a field site maintenance agreement from the U.S.D.A. U.S. Forest Service Northern Research Station in Rhinelander, WI. The station has long provided data collection, instrument maintenance, and gas cylinder delivery services to our research sites across the region, which are all located within one hour of the station. The benefit of this agreement is that it maintains high uptime at our research sites and minimizes travel and salary support costs for the technician at UW-Madison. These visits are critical to providing the high data quality required in the research proposed here.

This proposal requests \$25,000 (\$5,000/yr) to continue this contract for support of this proposal.

Services included in the contract are:

Biweekly (26/yr) data collection and instrument routine maintenance visits to the WLEF tall tower and nearby stations at 26.30/hr for 3 hrs/trip = $79.17 + 120 \text{ miles RT} * 0.28/\text{mi} = \2932.02

Quarterly (4x/yr) pick up, delivery and installation of N₂, CO₂, and CH₄ gas cylinders at 26.30/hr for 8 hrs/trip = $211.12 + 120 \text{ miles RT} * 0.28/\text{mi} = \978.88

On demand repair with on site telephone consultation (5x/year) at 26.30/hr for 4 hrs/trip = $105.56 + 120 \text{ miles RT} * 0.28/\text{mi} = \695.80

Administrative costs (indirect) 8% = \$368.53

4. *Computer Services* – none

5. *Subawards* – none

6. *Other (Tuition remission)* – A total of \$32,000 (line item G6) is budgeted for eight semesters of tuition remission at \$4,000/semester.