



Supplement of

Capturing temporal heterogeneity in soil nitrous oxide fluxes with a robust and low-cost automated chamber apparatus

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Table S1: Table with the list of primary parts needed to construct the autochambers and control system described in the main manuscript.

Part Name	Purpose	Supplier	Company Location	Part #	Total Cost (for 9 chambers)	Chamber	Instrument Shed	Notes
2.54 cm x 7.62 cm (1" x 3" nominal) HDPE bar	Chamber base (Fig3a)	McMaster-Carr Supply Company	Elmhurst, IL, USA	8671K63	254	x		
Custom Aluminum L-Brackets	Mount lid to frame (Fig3b)	W. W. Grainger Inc.	Lake Forest, IL, USA	2EYW8	52	x		Subsequent machining required
Spherical Rod Ends	Attach lid pivot point to frame (Fig3b)	McMaster-Carr Supply Company	Elmhurst, IL, USA	60645K13	61	x		
0.64 cm threaded rod	Pivot point/structure for lid (Fig3c)	McMaster-Carr Supply Company	Elmhurst, IL, USA	98804A112	89	x		
0.95 cm stainless tubing	Lid structure (Fig3, 1-5)	W. W. Grainger Inc.	Lake Forest, IL, USA	3ADE9	209	x		
Aluminum angle brackets (lid)	Fig3, red circles	W. W. Grainger Inc.	Lake Forest, IL, USA	2EYN4	7	x		
1.27 cm stainless tubing	Provide additional rigidity around the threaded rod	W. W. Grainger Inc.	Lake Forest, IL, USA	4VMR6	50	x		
5.98x2.04 cm HDPE bar	Connect piston and threaded rod (Fig3d, yellow circle)	McMaster-Carr Supply Company	Elmhurst, IL, USA	8671K38	253	x		
Cylinder Rod Piston	Move lid up/down	Clippard Instrument Laboratory Inc	Cincinnati, OH, USA	UDR-17-6	333	x		
Feet to connect piston to base	Move lid up/down	Clippard Instrument Laboratory Inc	Cincinnati, OH, USA	CB-1795	32	x		
Piston Spherical Rod End	Move lid up/down	Clippard Instrument Laboratory Inc	Cincinnati, OH, USA	RE-1785	76	x		

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1.27 cm HDPE Sheet (lid)	Chamber lid (under red circles, Fig3)	McMaster-Carr Supply Company W. W. Grainger Inc.	Elmhurst, IL, USA	8619K477	246	x		
Custom Inlet Tube Barstock	Control inlet flow; Fig2a		Lake Forest, IL, USA	2EYK7	77	x		Subsequent machining required
10.16 cm dia. PVC tube	Protective cover for inlet tube	Local Hardware Supply			17	x		
0.64 cm HDPE Sheet (cap)	Protective cover for inlet tube	McMaster-Carr Supply Company	Elmhurst, IL, USA	8619K467	80	x		
1 cm spacers	Elevate protective cover for inlet above the main chamber lid to enable gas movement	McMaster-Carr Supply Company	Elmhurst, IL, USA	92510A624	36	x		
2.54 cm D-Shaped Rubber Seal	Seal lid to collar in soil	McMaster-Carr Supply Company	Elmhurst, IL, USA	1129A987	225	x		
Slotted Steel Construction Strut	Provide additional mass at front of lid to ensure tight seal of lid on collar	Local Hardware Supply			117	x		
6.4 mm (1/4" nominal) OD polyethylene tubing	Chamber outlet gas sampler (mounted inside chamber lid); perforate at regular intervals	Cole-Parmer Instrument Company	Vernon Hills, IL, USA	EW-06490-15	72	x		
Stainless Eyebolt	Suspend perforated chamber outlet manifold sampling tube below the lid	W. W. Grainger Inc.	Lake Forest, IL, USA	5ZE79	27	x		
0.64 cm brass tube union fitting	Connect 1/4" nominal gas tubing lengths	Swagelok Company	Solon, OH, USA	B-400-6	270	x		
0.64 cm bulkhead union	Connect gas transport tubing outside the chamber to perforated sampling tubing inside the chamber	Swagelok Company	Solon, OH, USA	B-400-61	63	x		
0.64 cm union tee	Connect gas transport tubing outside the chamber to perforated sampling tubing inside the chamber	Swagelok Company	Solon, OH, USA	B-400-3	90	x		
30.48 cm PVC collars	Collar for inserting into the soil	Local Hardware Supply			100	x		

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Pall 1 µm filters (.32 cm MNPT)	Prevent water / debris from entering gas sampling tubes	VWR International	Radnor, PA, USA	16003-654	828	x	x	
0.32 FNPT x 0.64 tube fitting	Connect filters to tubing	Swagelok Company	Solon, OH, USA	B-200-7-4	200	x		
1.27 cm steel rebar	Secure chamber base to soil	Local Hardware Supply			36	x		
2.54 cm x 6.35 cm U-bolt	Secure chamber base to soil	W. W. Grainger Inc.	Lake Forest, IL, USA	1RCK8	27	x		
0.64 cm LDPE plastic tubing	Connect chamber inlet and outlet to the gas measurement apparatus	United States Plastic Corp.	Lima, OH, USA	58097	708	x		
Assorted screws and nuts/bolts for chamber assembly	Assemble chamber frame and mount lid to frame	Local Hardware Supply			100	x		
Clippard Needle Valves	Control rate of chamber opening/closure	Clippard Instrument Laboratory Inc	Cincinnati, OH, USA	JFC-2A	342	x		
1/8 NPT to 1/4 tube	Connect tubing to cylinder piston for pneumatic chamber operation	Swagelok Company	Solon, OH, USA	B-400-1-2	110	x	x	
Gast 12 VDC oil-less compressor	Pressurize air for chamber opening/closure (pneumatic)	Cole-Parmer Instrument Company	Vernon Hills, IL, USA	UX-07055-60	882		x	
Condor MDR3 compressor switch	Turn on/shut off compressor at desired pressure	W. W. Grainger Inc.	Lake Forest, IL, USA	3FWN3	158		x	
0.635 cm x 15.24 m flexible copper tubing	Allow air to cool and moisture to condense follow compression	W. W. Grainger Inc.	Lake Forest, IL, USA	3P669	34		x	
Speedaire compressed air filter	Filter compressed air and remove water	W. W. Grainger Inc.	Lake Forest, IL, USA	4ZL49	103		x	
Manifold for four-channel valves	Control pneumatic opening/closing of chambers	Clippard Instrument Laboratory Inc	Cincinnati, OH, USA	MMM-41-06	89		x	

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Four-channel, two-way valves	Control pneumatic opening/closing of chambers	Clippard Instrument Laboratory Inc	Cincinnati, OH, USA	MME-41PEEC-W012	87		x	
Plate for extra four-channel ports	Control pneumatic opening/closing of chambers	Clippard Instrument Laboratory Inc	Cincinnati, OH, USA	MMM-41-B	20		x	
12 V, 16 channel relay controller	Control valves for gas sampling and chamber operation	Campbell Scientific	Logan, UT, USA	SDM-CD16AC	816		x	
Manifold for Solenoid Valves	Control gas sample flow	Clippard Instrument Laboratory Inc	Cincinnati, OH, USA	15781-4	121		x	
Solenoid Valves	Control gas sample flow	Clippard Instrument Laboratory Inc	Cincinnati, OH, USA	DV-2M-12-L	406		x	
Plugs for extra manifold ports	Control gas sample flow	Clippard Instrument Laboratory Inc	Cincinnati, OH, USA	0035-2-PKG	7		x	
Aalborg Mass flow controllers	Control gas sample flow	Aalborg Instruments and Controls	Aalborg, Denmark	GFCS-010201	2685		x	
Diaphram Gas Pumps	Sample inlet/outlet gas	KNF Neuberger Incorporated	Freiburg im Breisgau, Germany	KNF UNMP830	400		x	
9-pin cable for MFC communication	Connect MFC to datalogger	Aalborg Instruments and Controls	Aalborg, Denmark	CBL-D5	90		x	
Vent Needle Valves	Control rates of overflow upstream of pumps	Clippard Instrument Laboratory Inc	Cincinnati, OH, USA	GNV-4KI	90		x	
Trojan 6V Deep Cycle Battery	Power the sampling/analysis system	Local Industrial		J305E-AC 6V	4000		x	

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Solar Panels	Power the sampling/analysis system	Battery Service Kyocera Solar Incorporated	Scottsdale, AZ, USA	KU265-6MCA	1110		x	
Charge Controller	Control the charge from the solar panels	Morningstar Corporation	Newton, PA, USA	TS-MPPT-60	600		x	
DC/AC Converter	Convert DC battery voltage to AC for N2O analyzer operation	Samlex Solar	Vancouver, BC, Canada	PST 600-24	220		x	
Drossbach Corrugated Loom Tubing	Protect gas tubing from animal damage	W. W. Grainger Inc.	Lake Forest, IL, USA	25D260	832	x		
LI-COR 830 CO2/H2O Vapor Analyzer	Measure CO2 and H2O	LI-COR Biosciences	Lincoln, NE, USA	LI-850	4400		x	
Teledyne 320U N2O Analyzer	Measure N2O	Teledyne Technologies	Thousand Oaks, CA, USA	T320u	16000		x	
Datalogger	Measurement and control system	Campbell Scientific	Logan, UT, USA	CR3000	3042		x	
Total:					41379			