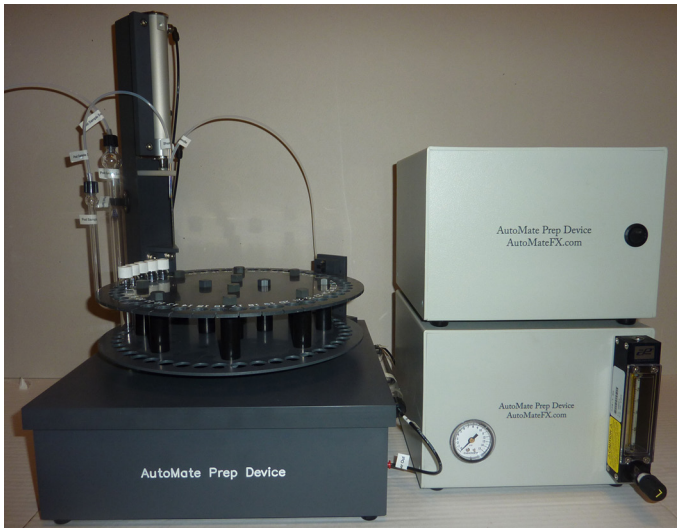
The *AutoMate Prep Device*



An automatic acidification system for determination of:

- **Percent $CaCO_3$ in solid samples (marine and lake sediments, soils, etc.)**
- **Total Dissolved Inorganic Carbon (DIC) in waters samples**
- **Total headspace CO_2 in incubations**

Are you ready to quit sitting in front of a manual preparation CO_2 coulometer?
Are you ready to quit paying workers to sit for hours running samples manually?
Are you ready for a reliable, easy to use automated preparation system?
Are you ready for reliable and quick $CaCO_3$ and total DIC determinations?

If so, you are ready for an AutoMate Prep Device!

- Fast, fully automatic analysis with high precision and accuracy
- Low, consistent blanks
- Low downtime between samples
- Small dead volume
- Robust instrument with low maintenance costs
- Easy to use and maintain
- Compatible with several acids
- Wet portions of instrument isolated from electronic portions of instrument.
- Designed with safety interlocks for low gas pressure, missing vials, loose septa, etc.
- Front-end instrument for use with various analyzers:
  UIC, Inc. CO_2 coulometers (5011 and 5012 native; 5014 and 5015 emulators)
  .

www.automatefx.com

For more information on the AutoMate contact:
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User references on request

The AutoMate Prep Device is controlled by completely customized, simple LabVIEW™ software. Software is customized for each analyzer and to user's specifications. Sample ID and weight can be entered directly, pasted, or imported. Resultant data is automatically saved for export. The AutoMate software was designed to be run on notebook PC's with a small footprint in order to save precious lab counter space.

The AutoMate Prep Device uses Exetainer (Labco, Ltd.) glass vials with screw caps with septa as sample analysis chamber. Solid samples can be weighed directly into the vials reducing potential sample cross contamination and errors. Once weighed out and capped, samples can easily be stored prior to future analysis. The AutoMate requires few consumables: CO_2 free carrier gas, septa top vials, acid, and de-ionized water.

AutoMate Prep Device Specifications for use with UIC, Inc. CO_2 coulometers by AutoMate FX, Inc.

Compatible with UIC CO2 coulometers (5011 and 5012 native; 5014 and 5015 with emulator firmware available from UIC)

Carousel specs:

45 position carousel, holds 12ml septa top vials (Labco Inc. Exetainers)

Space requirements:

~3 feet x ~2 feet (~0.9m x ~0.6m)

Electrical requirements:

Input: 88 to 264 V AC, Maximum power consumption 66 W

Gas requirements:

Compressed nitrogen gas (Ultra high purity N_2 preferred, high purity N_2 acceptable)

Environmental conditions:

Ambient temperatures (5-45° C), Non-condensing atmosphere

Language:

English software and manual

Communication:

AutoMate Prep Device to PC - RS232
AutoMate Prep Device to UIC CO2 coulometer - RS232

Control software:

LabVIEW executable, Sample table allows input by paste or manual data entry

Warranty Period:

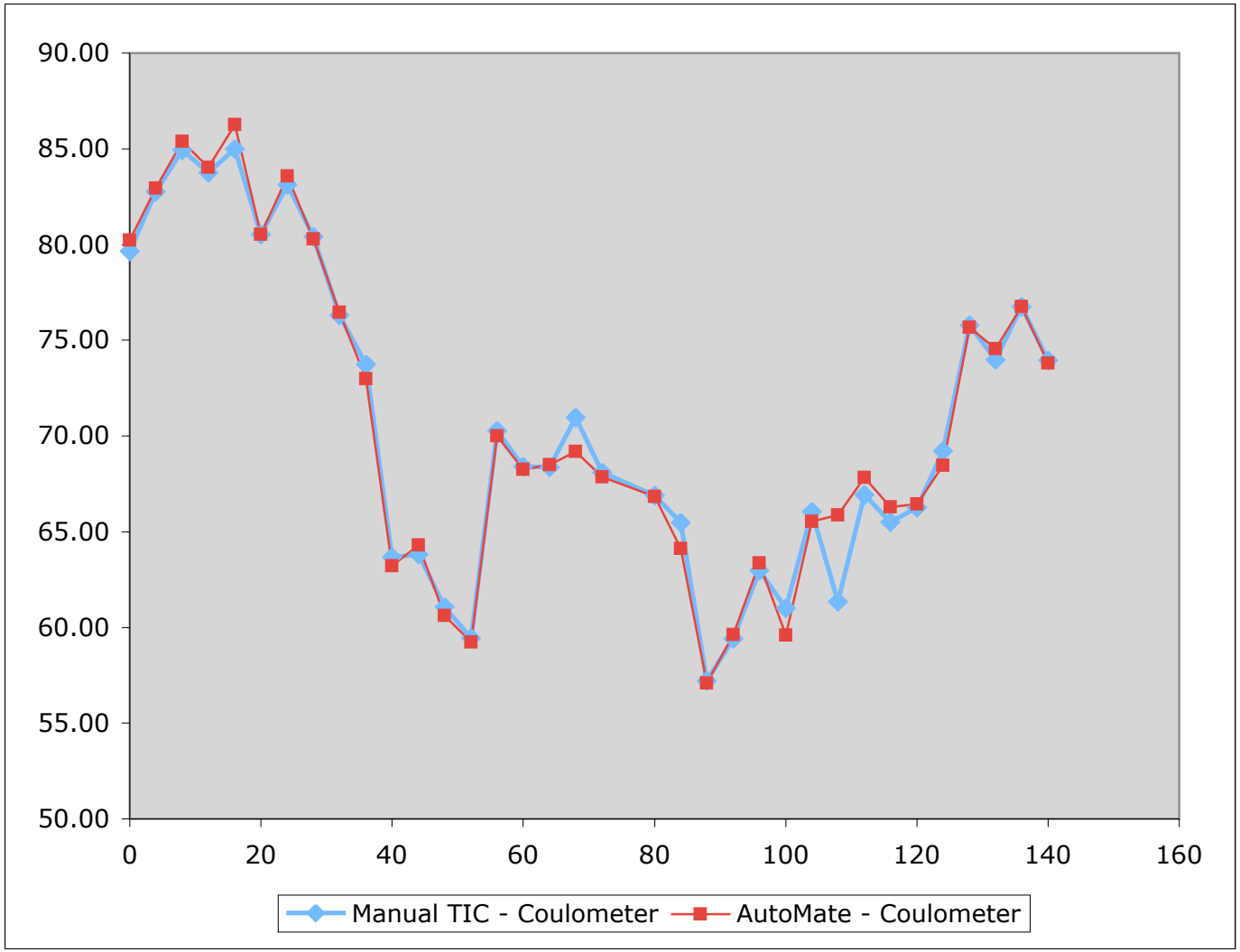
12 months

Tech support:

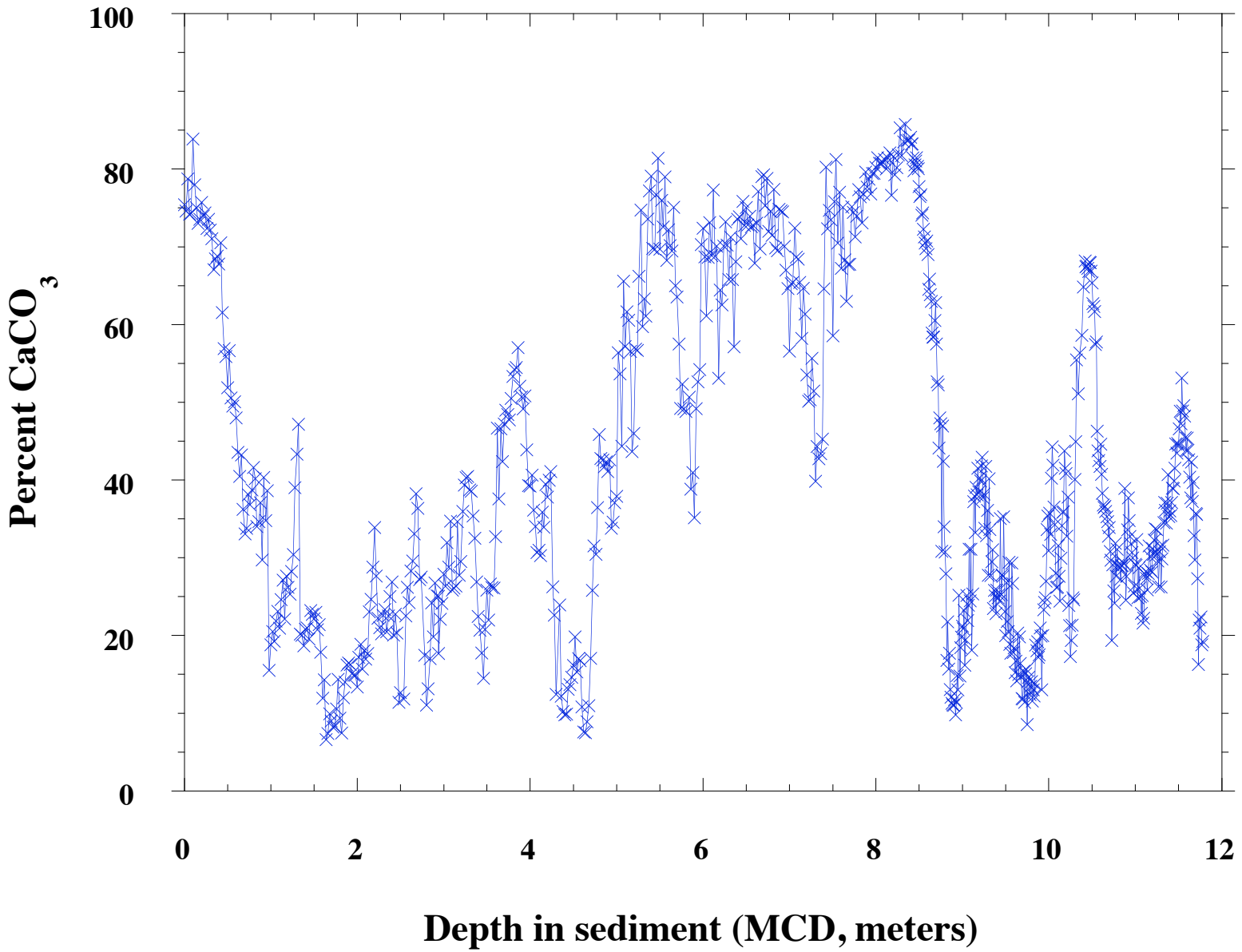
By e-mail or telephone

Depth	% CaCO3 Manual TIC at Lamont	% CaCO3 AutoMate at Lamont
0	79.65	80.24
4	82.77	82.93
8	84.92	85.38
12	83.75	84.02
16	85.00	86.26
20	80.54	80.52
24	83.11	83.56
28	80.39	80.28
32	76.29	76.45
36	73.74	72.99
40	63.66	63.2
44	63.83	64.29
48	61.08	60.63
52	59.43	59.24
56	70.26	69.99
60	68.40	68.25
64	68.37	68.49
68	70.97	69.2
72	68.10	67.85
80	66.90	66.82
84	65.47	64.13
88	57.21	57.09
92	59.42	59.61
96	62.97	63.36
100	61.00	59.58
104	66.04	65.55
108	61.34	65.86
112	66.93	67.82
116	65.51	66.29
120	66.27	66.43
124	69.20	68.45
128	75.80	75.66
132	73.98	74.56
136	76.77	76.77
140	73.94	73.8

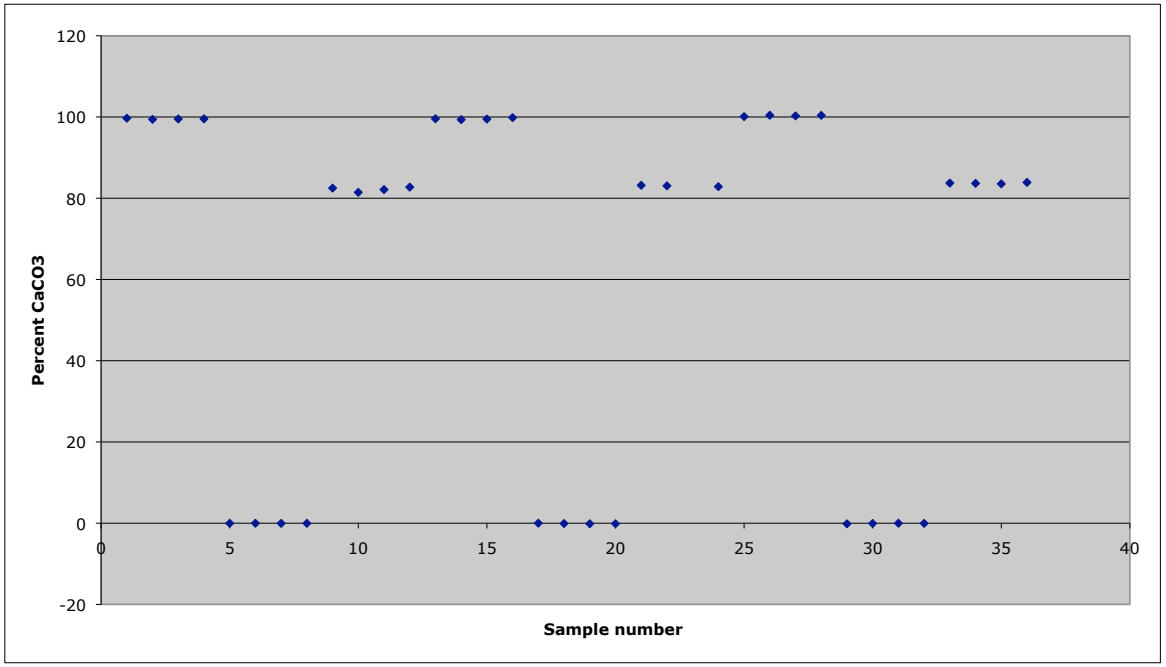
Example marine sediment core



Data courtesy of Peter deMenocal, Lamont


ODP Site 1308 (North Atlantic)
Measured at the University of Florida with an
AutoMate carbonate prep device coupled with a UIC 5011 coulometer
Percent CaCO3
100
80
60
40
20
0
0
2
4
6
8
10
12
Depth in sediment (MCD, meters)

Position	material	Uncorrected %CaCO3
1	CaCO3 std 100%	99.7
2	CaCO3 std 100%	99.42
3	CaCO3 std 100%	99.52
4	CaCO3 std 100%	99.55
5	Silica sand	-0.02
6	Silica sand	-0.01
7	Silica sand	-0.04
8	Silica sand	-0.03
9	MgCO3	82.49
10	MgCO3	81.45
11	MgCO3	82.13
12	MgCO3	82.74
13	CaCO3 std 100%	99.56
14	CaCO3 std 100%	99.36
15	CaCO3 std 100%	99.49
16	CaCO3 std 100%	99.84
17	Silica sand	0.01
18	Silica sand	-0.08
19	Silica sand	-0.13
20	Silica sand	-0.13
21	MgCO3	83.18
22	MgCO3	83.05
24	MgCO3	82.85
25	CaCO3 std 100%	100.1
26	CaCO3 std 100%	100.42
27	CaCO3 std 100%	100.27
28	CaCO3 std 100%	100.4
29	Silica sand	-0.15
30	Silica sand	-0.06
31	Silica sand	-0.01
32	Silica sand	-0.04
33	MgCO3	83.73
34	MgCO3	83.66
35	MgCO3	83.54
36	MgCO3	83.9



AutoMate interfaced with 5011 coulometer

Run 1-30-08
Results are blank corrected but no other corrections have been applied

MgCO3 was used as another material
Due to the different formula weight of MgCO3 versus CaCO3 the final percent is not meaningful.
Consistency is the important thing.

ID	Sample wt (mg) Input	total micrograms C Measured	total micrograms C Measured blank corrected	Calc %CaC03 Calculated	Calc %C Calculated	Data 0 min	Data 1 min	Data 2 min	Data 3 min	Data 4 min	Data 5 min	Data 6 min	Data 7 min	Data 8 min
Blank	0	2.7	0	--	--	0.2	1.5	2.1	2.5	2.7				
Standard	11.3	1356.9	1354.2	99.87	11.98	0.3	349.2	916.9	1155.4	1261.1	1317.7	1344.1	1353.7	1356.9
Standard	11.8	1417.4	1414.7	99.91	11.99	0.2	423.8	1037.1	1255.1	1347.1	1392.2	1410.1	1415.4	1417.4
Standard	14.2	1692.9	1690.2	99.19	11.9	0.4	609.6	1266.3	1501.2	1605.9	1658.5	1682.1	1689.9	1692.9
Standard	10.6	1269.8	1267.1	99.61	11.95	0.4	289.8	850.2	1078	1180.9	1234.4	1258.7	1266.9	1269.8
Standard	10.4	1248.4	1245.7	99.82	11.98	0.5	291.8	822.7	1044.9	1149.6	1207.2	1234.6	1244.8	1248.4
Standard	11.1	1330.3	1327.6	99.67	11.96	0.8	322.2	908.2	1136.3	1237.7	1292.7	1318.3	1326.9	1330.3
Standard	11.2	1343.6	1340.9	99.77	11.97	0.3	346.5	929.2	1155.4	1257.3	1310.1	1333.8	1341.2	1343.6
Standard	13.4	1617.1	1614.4	100.4	12.05	0.3	491.2	1138.3	1391.2	1507.2	1571.4	1602.3	1613.6	1617.1
Standard	13.8	1646.3	1643.6	99.25	11.91	0.2	544.5	1212.7	1441.2	1551.1	1608.6	1634.8	1643.5	1646.3
Standard	11.3	1363.2	1360.5	100.33	12.04	0.4	355.4	944.3	1172.1	1275	1329.7	1353.6	1361	1363.2
Standard	10.3	1237.2	1234.5	99.88	11.99	0	628.2	1042	1164.4	1216.1	1233.6	1237.2		
Standard	9.3	1115.1	1112.4	99.68	11.96	0	548.7	951.9	1059	1101.2	1113	1115.1		

Average
99.78

Precision (1 std dev)
0.357

Results were blank corrected but no other corrections were applied