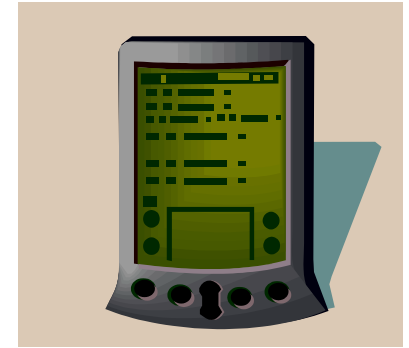


# **Placing Palm Pilot Handheld Technology in the Hands of Introductory-Level Geoscience Students During Field Experiences**



**Laura Guertin, Earth Science**

**Penn State University Delaware County**



# Abstract

Many geoscience students do not receive the opportunity to use technological tools during field experiences until they enroll in upper-division courses in their departments or attend field camp.

Introductory-level geoscience courses are typically “show and tell” with demonstrations of pieces of equipment in the field. However, handheld technology, such as Palm Pilot computers, can be successfully integrated with introductory-level field experiences as a data collection tool and handheld reference guide.

Palm Pilots offer each student the opportunity to become actively involved in the field experience. Forms can be created and tailored to a specific outdoor exercise and placed on the Palms for students to collect data. Instructors can create eBooks with instructional materials and reference guides for the students to correspond with the project objective. Instructional videos can be created and placed on the Palms for students to demonstrate field techniques and procedures. With the prices dropping and discounts for bulk purchases available, Palm Pilots are now accessible to departments.



# **Abstract (cont.)**

**For two years the Penn State Delaware County campus has integrated handheld technology in the field experiences corresponding to introductory-level geoscience courses. For example, the introductory oceanography students use the handhelds to collect data on changes in beach profile elevations at the shore. The physical geology students use the handhelds for a tombstone weathering investigation and rock identification project. All of these projects have eBooks and instructional videos that describe the project and act as reference material, such as the rock identification eBook and video on how to begin measuring a beach profile.**

**Students respond very positively to using the handheld technology. In addition to giving students a valuable introduction to see how technology can be used in the field, the experience gives non-science majors a chance to see an application of an everyday technological tool in a nontraditional setting. End-of-semester course evaluations are filled with student suggestions of additional field experiences and more Palm Pilot use.**

# PSU Delaware County campus

- ~1,500 students, commuter campus
- Primarily freshmen and sophomores
- First 2 years of science programming





# Geology at Penn State DelCo

- Intro-level, gen-ed, non-science students
  - no TA's, no majors, one instructor
- **Overarching course goals**
  - **Course Goal:** experience with scientific method, working with data sets
  - **Course Goal:** using technology



# Why use handheld technology?

- Streamlines fieldwork, makes data collection more efficient
- Why use with intro-level courses?
  - Gives nonscience majors a more authentic field experience
  - Lets nonscience majors see a new application of technology

# Tombstone Weathering Project

## ■ OLD METHOD

- ☐ Form hypotheses
- ☐ Collect data with pen-and-paper method
- ☐ Enter in MS Excel worksheet
- ☐ Instructor merges files
- ☐ Data sorted for graphing and interpretation





# Tombstone Weathering Project

## ■ NEW METHOD

- Form hypotheses
- Collect data on Palm Pilot (eBook for reference)
- On hotsync, all data compiled online, exported to MS Excel
- Data sorted for graphing and interpretation







# How to Set Up the Palms for Data Collection in the Field

- Develop data-collection form in Dreamweaver
- Connect to MS Access database
- Place online, load on Palm through AvantGo (web-clipping program)

Cemetery Investigation - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Media

Address http://

Location

Section

Row

Position

Date of Birth

Month

Day

Year

Date of Death

Month

Day

Year

Age (if present on tombstone)

years,  months

Gender

Rock Type

Weathering Rate

Tombstone Style

Tombstone Height (x.x cm)

In shade?

Along...

Epitaph

Submit

Reset

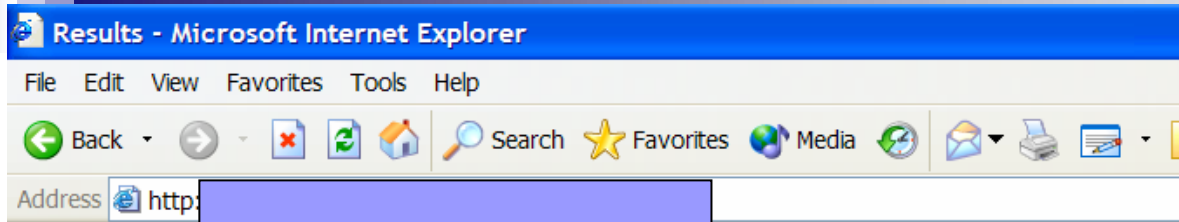
Other 1

Other 2

Other 3

# Data collection form on Palm Pilot

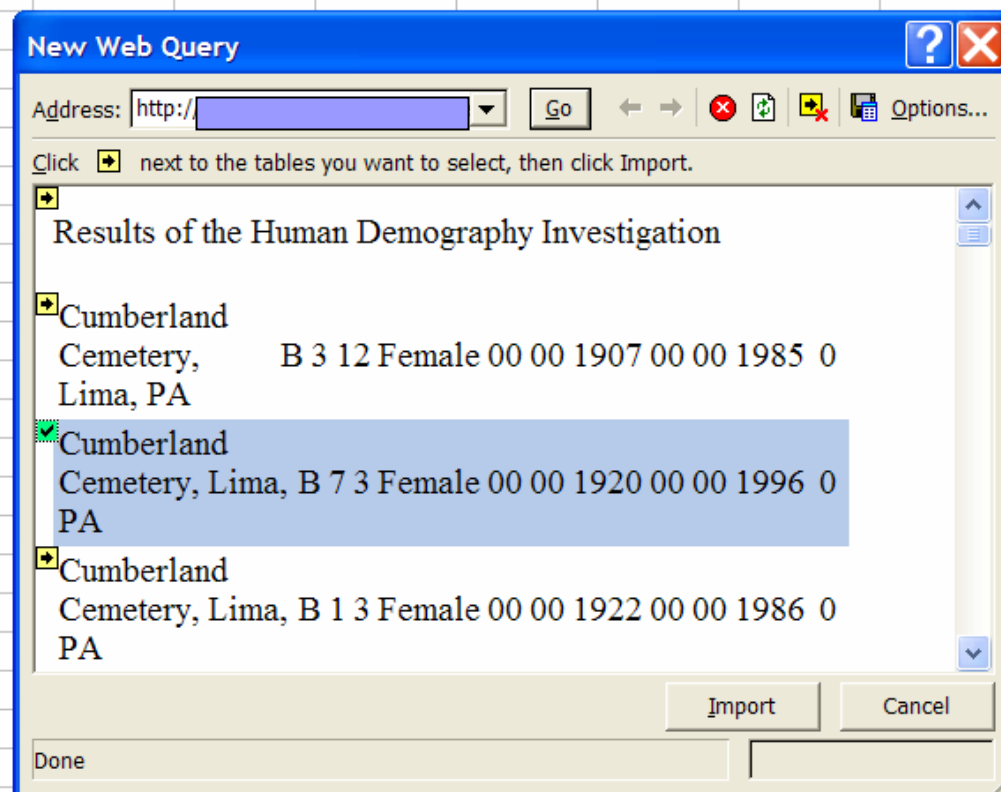
Location	Sec	Row	Pos	DOB-M	DOB-D	DOB-Y	DOD-M	DOD-D	DOD-Y	Age (Y)	Age (M)	Gender	Rock	Rate	Style	Height	Shade	Along	I
CC_Lima A	02	04		March	27	1877	Feb	14	1904	--		female	marble	04	elevated block	8.5/18	no	major road	
CC_Lima A	02	17		not present	not present	1865	not present	not present	1962	--		female	metal plate	02	elevated block	4/28	yes	major road	
CC_Lima A	13	15		--	--	1836	--	--	1907	71	--	male	granite	01	pulpit stone (cash register)	29	--	--	
CC_Lima A	02	09		not present	not present	1842	not present	not present	1915	--		female	granite	01	pulpit stone (cash register)	36/19.5	no	major road	
CC_Lima A	02	22		not present	not present		July	20	1946	--		male	granite	01	rounded slab	23/26	no	major road	
CC_Lima A	02	15		not present	not present	1862	not present	not present	1917	--		male	granite	02	pulpit stone (cash register)	32.5/28.5	yes	major road	
CC_Lima A	13	09		--	--	1782	--	--	1872	90	--	female	marble	04	elevated block	14.5	--	--	
CC_Lima A	02	06		cannot read	cannot read		cannot read	cannot read		--		unsure	marble	05	tablet (milano)	14/14	no	major road	
CC_Lima A	02	19		not present	not present	1901	not present	not present	1990	--		female	granite	01	elevated block	4.5/30.5	yes	major road	
CC_Lima A	13	18		April	19	1910	May	14	1911	--		male	marble	02	tablet (milano)	22.5	--	--	
CC_Lima A	02	11		cannot read	cannot read		cannot read	cannot read		--		unsure	marble	05	rounded slab	16/20	no	major road	
CC_Lima A	02	24		Feb	20	1834	July	30	1919	--		male	granite	02	elevated block	13.5/22	no	major road	
CC_Lima A	02	03		Aug	25	1840	Jan	13	1905	--		male	marble	04	elevated block	6/18	no	major road	
CC_Lima A	02	16		not present	not present	1863	not present	not present	1917	--		male	granite	02	pulpit stone (cash register)	31/28.5	yes	major road	
CC_Lima A	13	12		Oct	--	1808	May	06	1873	66	08	male	marble	04	tablet (milano)	42	--	--	
CC_Lima A	02	08		not present	not present	1842	not present	not present	1923	--		male	granite	01	pulpit stone (cash register)	36/19.5	no	major road	
CC_Lima A	02	21		not present	not present		not present	not present		--		female	granite	01	rounded slab	23/26	no	major road	
CC_Lima A	03	12		July	19	1832	Aug	03	1904	--		male	granite	04	pulpit stone (cash register)	34	no	major road	
CC_Lima A	12	10		--	--	1889	--	--	1912	--		female	granite	02	obelisk	81	--	--	
CC_Lima A	03	15		Jan	cannot read	no read	Nov	cannot read	1884	--		male	granite	04	rounded slab	15.5	no	major road	
CC_Lima A	12	10		--	--	1911	--	--	1989	--		male	granite	02	obelisk	81	no	--	
CC_Lima A	03	13		--	--	1840	--	--	1873	--		female	granite	02	rounded slab	39	no	major road	
CC_Lima A	12	10		--	--	1860	--	--	1933	--		female	granite	02	obelisk	81	--	--	



## Results of the Human Demography Investigation

Cumberland Ceme  
Cumberland Ceme  
Cumberland Ceme  
Cumberland Ceme  
Cumberland Ceme  
Cumberland Ceme  
Cumberland Ceme  
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Cumberland Ceme  
Cumberland Ceme  
Cumberland Ceme  
Cumberland Ceme  
Cumberland Ceme  
Cumberland Ceme  
Cumberland Ceme  
Cumberland Ceme  
Cumberland Cemetery, Lima, PA

- Back
- Forward
- Save Background As...
- Set as Background
- Copy Background
- Set as Desktop Item...
- Select All
- Paste
- Create Shortcut
- Add to Favorites...
- View Source
- Encoding
- Print
- Refresh
- Export to Microsoft Excel
- Properties

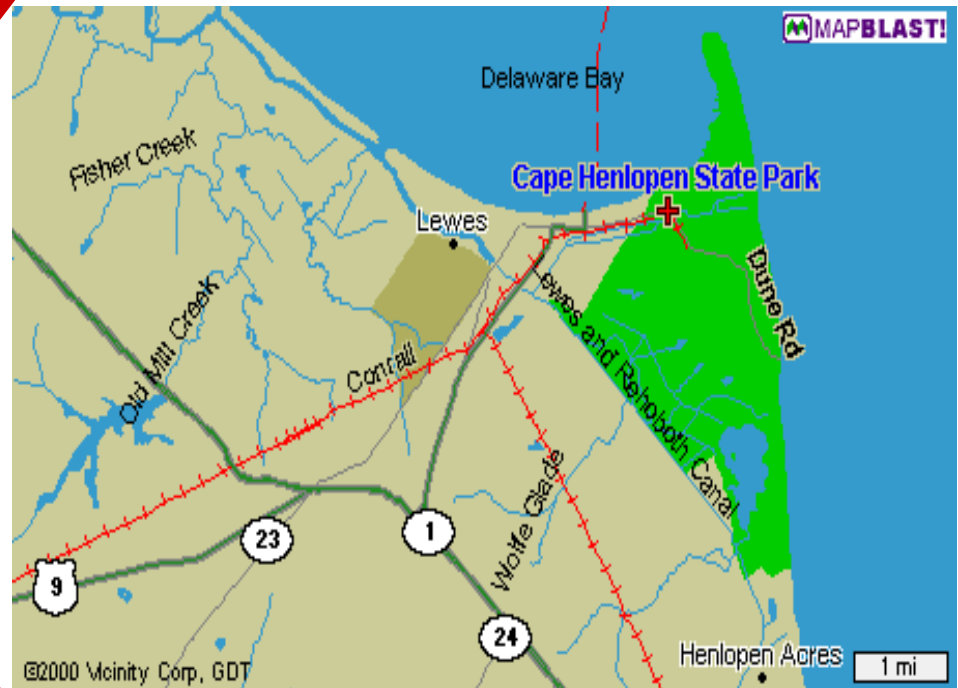
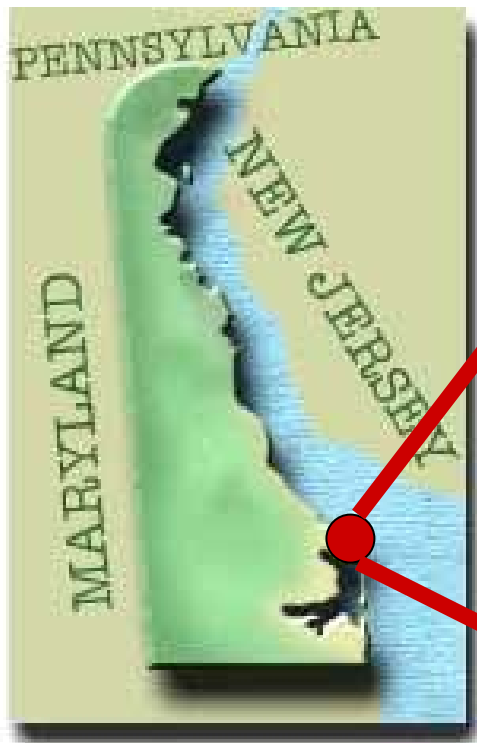




	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	Location	Sec	Row	Pos	DOB-M	DOB-D	DOB-Y	DOD-M	DOD-D	DOD-Y	Age(Y)	Age(M)	Gender	Rock	Rate	Style	Height	Shade	Along
2	CC_Lima	A	2	4	March	27	1877	Feb	14	1904	--	--	female	marble	4	elevated block	8.5/18	no	major road
3	CC_Lima	A	2	17	not present	not present	1865	not present	not present	1962	--	--	female	metal plate	2	elevated block	28-Apr	yes	major road
4	CC_Lima	A	13	15	--	--	1836	--	--	1907	71	--	male	granite	1	pulpit stone (cash register)	29	--	--
5	CC_Lima	A	2	9	not present	not present	1842	not present	not present	1915	--	--	female	granite	1	pulpit stone (cash register)	36/19.5	no	major road
6	CC_Lima	A	2	22	not present	not present		July	20	1946	--	--	male	granite	1	rounded slab	23/26	no	major road
7	CC_Lima	A	2	15	not present	not present	1862	not present	not present	1917	--	--	male	granite	2	pulpit stone (cash register)	32.5/28.5	yes	major road
8	CC_Lima	A	13	9	--	--	1782	--	--	1872	90	--	female	marble	4	elevated block	14.5	--	--
9	CC_Lima	A	2	6	cannot read	cannot read		cannot read	cannot read		--	--	unsure	marble	5	tablet (milano)	14/14	no	major road
10	CC_Lima	A	2	19	not present	not present	1901	not present	not present	1990	--	--	female	granite	1	elevated block	4.5/30.5	yes	major road
11	CC_Lima	A	13	18	April	19	1910	May	14	1911	--	--	male	marble	2	tablet (milano)	22.5	--	--
12	CC_Lima	A	2	11	cannot read	cannot read		cannot read	cannot read		--	--	unsure	marble	5	rounded slab	16/20	no	major road
13	CC_Lima	A	2	24	Feb	20	1834	July	30	1919	--	--	male	granite	2	elevated block	13.5/22	no	major road
14	CC_Lima	A	2	3	Aug	25	1840	Jan	13	1905	--	--	male	marble	4	elevated block	18-Jun	no	major road
15	CC_Lima	A	2	16	not present	not present	1863	not present	not present	1917	--	--	male	granite	2	pulpit stone (cash register)	31/28.5	yes	major road
16	CC_Lima	A	13	12	Oct	--	1808	May	6	1873	66	8	male	marble	4	tablet (milano)	42	--	--
17	CC_Lima	A	2	8	not present	not present	1842	not present	not present	1923	--	--	male	granite	1	pulpit stone (cash register)	36/19.5	no	major road
18	CC_Lima	A	2	21	not present	not present		not present	not present		--	--	female	granite	1	rounded slab	23/26	no	major road
19	CC_Lima	A	3	12	July	19	1832	Aug	3	1904	--	--	male	granite	4	pulpit stone (cash register)	34	no	major road
20	CC_Lima	A	12	10	--	--	1889	--	--	1912	--	--	female	granite	2	obelisk	81	--	--
21	CC_Lima	A	3	15	Jan	cannot read	no read	Nov	cannot read	1884	--	--	male	granite	4	rounded slab	15.5	no	major road
22	CC_Lima	A	12	10	--	--	1911	--	--	1989	--	--	male	granite	2	obelisk	81	no	--
23	CC_Lima	A	3	13	--	--	1840	--	--	1873	--	--	female	granite	2	rounded slab	39	no	major road
24	CC_Lima	A	12	10	--	--	1860	--	--	1933	--	--	female	granite	2	obelisk	81	--	--
25	CC_Lima	A	3	11	--	--	1832	--	--	1917	--	--	unsure	granite	2	rounded slab	44	no	major road
26	CC_Lima	A	3	17	cannot read	cannot read		cannot read	cannot read		--	--	male	marble	5	rounded slab	14.5	no	major road
27	CC_Lima	A	3	14	--	--	1798	--	--	1871	--	--	male	granite	2	rounded slab	39	no	major road
28	CC_Lima	A	3	11	--	--	1836	--	--	1885	--	--	female	granite	2	rounded slab	44	no	major road
29	CC_Lima	A	12	10	--	--	1885	--	--	1953	--	--	male	granite	2	obelisk	81	no	--
30	CC_Lima	A	3	15	March	28	1874	Sept	18	1908	--	--	male	granite	3	rounded slab	16.5	no	major road
31	CC_Lima	A	12	10	--	--	1894	--	--	1895	--	--	female	granite	2	obelisk	81	--	--
32	CC_Lima	A	3	11	--	--	1868	--	--	1929	--	--	female	granite	2	rounded slab	44	no	major road
33	CC_Lima	A	12	10	--	--	1885	--	--	1982	--	--	female	granite	2	obelisk	81	no	--
34	CC_Lima	A	3	13	--	--	1869	--	--	1927	--	--	unsure	granite	2	rounded slab	39	no	major road
35	CC_Lima	A	12	10	--	--	1858	--	--	1952	--	--	male	granite	2	obelisk	81	--	--
36	CC_Lima	A	3	16	Aug	19	1845	Nov	7	1893	--	--	unsure	granite	4	rounded slab	15	no	major road
37	CC_Lima	A	12	11	--	--	1844	--	--	1915	--	--	male	marble	3	other	7	no	--
38	CC_Lima	A	3	13	July	9	1838	June	30	1916	--	--	female	granite	4	pulpit stone (cash register)	34.5	no	major road
39	CC_Lima	A	12	10	--	--	1885	--	--	1973	--	--	female	granite	2	obelisk	81	no	--
40	CC_Lima	A	3	14	June	30	1823	April	3	1921	--	--	female	granite	3	rounded slab	12.5	no	major road
41	CC_Lima	A	12	10	--	--	1893	--	--	1892	--	--	female	granite	2	obelisk	81	--	--
42	CC_Lima	A	3	11	--	--	1882	--	--	1926	--	--	male	granite	2	rounded slab	44	no	major road
43	CC_Lima	A	12	10	--	--	1887	--	--	1926	--	--	male	granite	2	obelisk	81	no	--

# Cape Henlopen Project

- Spatial and temporal variations in beach profile elevations



# Old and New Field Methods

- **OLD:** Pen-and-paper, manually enter in Excel during lab period
- **NEW:** practice field technique indoors using handheld technology





# Using Palms in the Field



## Beach Profiling

**Latitude**

**Longitude**

**Location**

**Measurement Number**

**Interval**

**Elevation Change**

**Notes (if any)**

# Profile Data on Web Page, in Excel

## Henlopen data

38	00	75	00		0	0	0							
38	00	75	00		0	0	0							
38	00	75	00		0	0	0							
38	47	39	75	5	19		G	0	3	3.5				
38	47	39.42	75	5	19.60				F	1	3	0		
38	47	6.76	75	5	12.33		D	1	3	0				
38	00	75	00				B	1	3	0				
38	47	38.16	75	5	19.44		E	1	3	3				
38	47	5.7	75	5	12.27		C	1	3	0				
	47													
38	00	-	75	5	20.14		H	1	3	3				
	41.07													
38	00	75	00				G	1	3	2				
38	47	3.82	75	5	11.92		A	1	3	0				
	47													
38	00	-	75	5	12.05		D	10	3	5.5				
	6.85													
38	47	38.26	75	5	18.85		E	10	3	2.3				
38	47	40	75	5	19		G	10	3	3				
38	47	39.33	75	5	19.36		F	10	3	3				

	A	B	C	D	E	F	G	H	I	J	K	L
7	38	47		39	75	5	19		G	0	3	3.5
8												
9	38	47		39.42	75	5	19.6		F	1	3	0
10												
11	38	47		6.76	75	5	12.33		D	1	3	0
12												
13	38	0			75	0			B	1	3	0
14												
15	38	47		38.16	75	5	19.44		E	1	3	3
16												
17	38	47		5.7	75	5	12.27		C	1	3	0
18												
19	38	0	47-41.07		75	5	20.14		H	1	3	3
20												
21	38	0			75	0			G	1	3	2
22												
23	38	47		3.82	75	5	11.92		A	1	3	0
24												
25	38	0	47-6.85		75	5	12.05		D	10	3	5.5
26												
27	38	47		38.26	75	5	18.85		E	10	3	2.3
28												
29	38	47		40	75	5	19		G	10	3	3
30												
31	38	47		39.33	75	5	19.36		F	10	3	3

# Students Work With Data

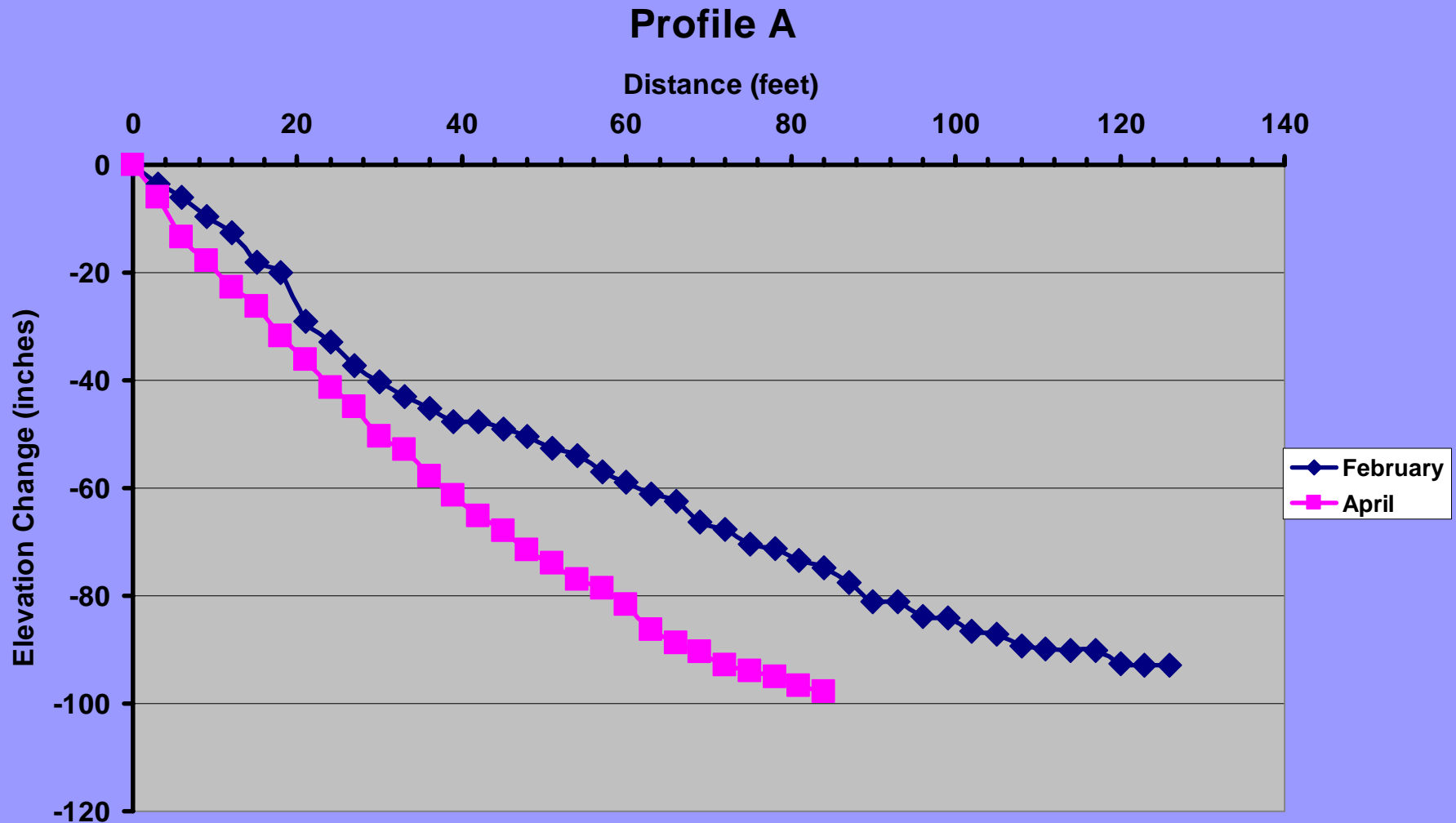


Figure x. Beach profile comparison at location A, Cape Henlopen State Park.



# Benefits of Using Palm Pilots

## ■ Minimizes data errors

- ☐ “I can’t read my writing,” entry in Excel
- ☐ Can have Palm entry errors

## ■ Fewer materials to “juggle” in the field

- ☐ One Palm Pilot (with eBooks, data entry forms)
- ☐ Versus paper form, rock ID book, assignment instruction sheet



# Benefits of Using Palm Pilots

## ■ Data compiled and available immediately

- ☐ No waiting for late data
- ☐ All students can access at all time
  - “I lost my data! I can’t find my Excel sheet!”

## ■ Less work for the faculty member

- ☐ No merging of multiple files
- ☐ No excessive photocopying
- ☐ Students can’t “forget” what they need in the field

# Benefits of Using Palm Pilots

- Students brag about the novelty of using Palms
- Can create instructional videos for students when instructor is not accessible



# Palms work in all weather!





# Drawbacks of Using Palms

- Keeping the batteries charged
- How students treat the Palms – train and be firm on Day 1!



# Student Feedback

- Palms are “cool”
  - ☐ I went out and bought one for myself
  - ☐ Using a Palm is not “rocket science”
- I appreciate not having to type in all that data
- I hope we use Palms for more projects/classes





# **Summary -- field projects with Palm Pilots**

- **Emerging technological tools (handheld computers) can be integrated with introductory-level geoscience field exercises**
  - ☐ Improve efficiency
  - ☐ Improve accuracy
  - ☐ Improve student attitude