

GRAVESTONE PROJECT

AN EARTHTREK CITIZEN SCIENCE PROJECT

YEAR ONE REPORT AUGUST 2010



Pascal Hetu recording data in Woronora Cemetery, Sydney, Australia

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Introduction

We would like to thank all the EarthTrekks who have been collecting data for the Gravestone Project over the last 14 months. At the end of this report is a list of the names of people who have contributed. A special thanks goes to the following EarthTrekks who have collected data from more than 20 graveyards:

mitucats - 124
lobokoa - 23
Monkeybusiness - 22

We hope that people who have already collected data will be willing to continue to be involved in the project and even solicit the help of friends and neighbors to allow us to obtain as much data as possible.

Background

The Gravestone Project started on 1 July 2009 as one of the first projects of the new EarthTrek program. It is led by Dr Deirdre Dragovich from the University of Sydney and Gary Lewis from the Geological Society of America. The project will last for another two years.

The aim of the project is to collect gravestone weathering rates from around the globe and use the data to map the rates and see if conclusions can be drawn about changes to those rates over time.

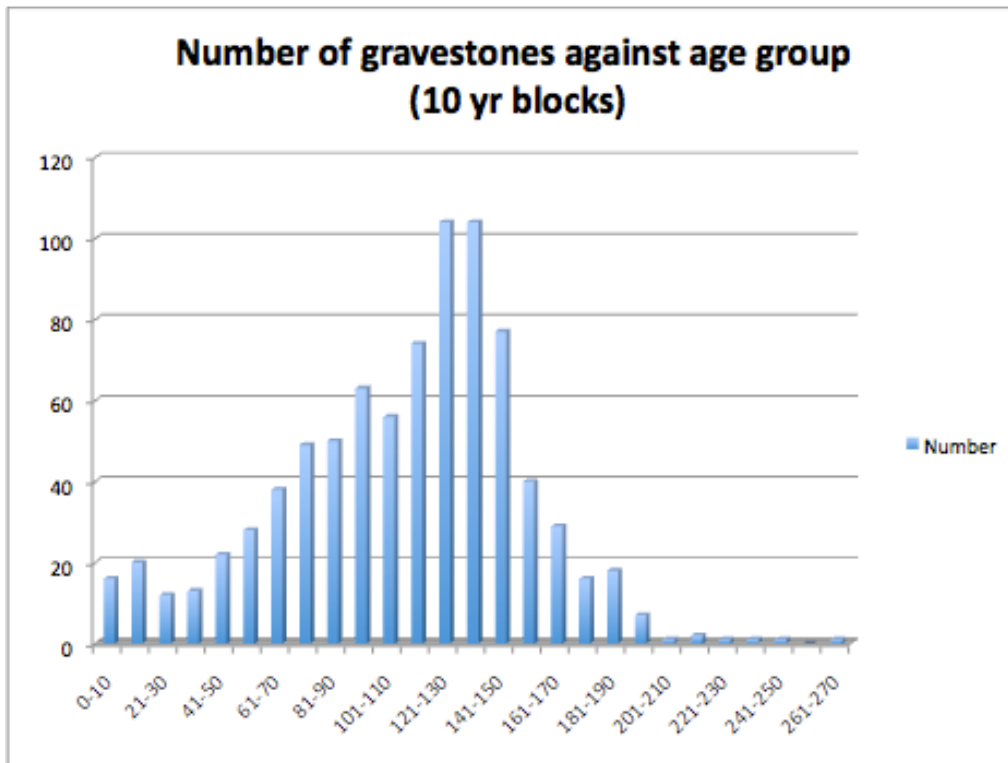
Data Summary and comments

The figures below are based on the data collected and logged into the system as of 31 August 2010.

- 🌐 Number of graveyards visited: 519
- 🌐 Number of gravestones measured and logged: 937
- 🌐 Number in the Northern Hemisphere: 711 (84%)
- 🌐 Number in the Southern Hemisphere: 132 (16%)
- 🌐 Number of gravestones for which data are valid: 843 (90%)

This is an amazing number of gravestones measured with a high rate of validity. While the data has not all been checked, validity in this case is based on the completion of fields so that the age/rate determination can be made. Basically blank or zero fields makes it difficult to calculate rates on a first pass and so they were removed. We also removed some records in which it appeared that a mistake in logging took place, such as a measurement missing an obvious figure.

- 🌐 Oldest valid gravestone measured (year): 1748
- 🌐 Youngest valid gravestone measured (year): 2009



We do hope that we can increase the number of records in the 160 and older range (i.e. earlier than 1850), but this is also a reflection of the number of collectors in North America. As more EarthTrekks collect data in Europe we should see a greater number of records in the older brackets.

- 🕒 Percent measured using thickness method: 92%
- 🕒 Percent measured using lead letter method: 8%

Again, this is due to the number of records collected in North America where the lead letter method for creating the inscription in gravestones was not common.

- 🕒 Facing Direction - North : 6%
- 🕒 Facing Direction - North-East: 6%
- 🕒 Facing Direction - East: 38%
- 🕒 Facing Direction - South-East: 4%
- 🕒 Facing Direction - South: 7%
- 🕒 Facing Direction - South-West: 3%
- 🕒 Facing Direction - West: 31%
- 🕒 Facing Direction - North-West: 4%

Tradition seems to place gravestones facing East or West. Local site conditions seem to be a secondary consideration.

- Average rate - 2.48mm each 100 years

On first pass of the data, the average rate that the measures gravestones are weathering is at a rate of 2.48mm every 100 years. This data may be skewed due to some individual records having very high rates, but these were left in the data until the measurements can be checked and verified.

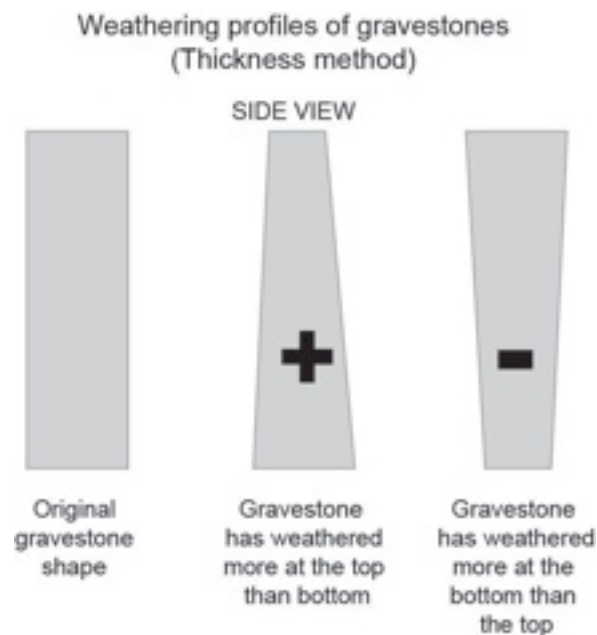
There seems to be no trend in the rate over time seen from the global data as local weather patterns greatly influence the change. What will be more telling once we have a larger dataset will be to look at changes in rate in the one area over time.

- Percent with positive weathering profiles: 73%
- Percent with negative weathering profile: 27%

Positive and negative weathering profile relate to the way the stone is weathering relative to the bottom measurements. A positive weathering profile means that the top of the stone is weathering faster than the bottom of the stone. A negative weather profile means that the bottom of the stone is weathering away faster than the top of the stone.

A negative profile, for example, may be because the bottom of the stone stays wetter after a rain and therefore the stone has a greater chance to react with the water at its base before it is completely dry. It could also be that the bottom of the stone is wetter due to dew or capillary action of water from the base of the stone. Another factor could be human intervention - the eroding of the base of the stone by gardeners using power tools to cut the grass growing around the stones, or the constant watering of lawns keeping the bases wet. We also notice that gravestones that do not have a pedestal and are in contact with the soil can often have a notch at their base which may be due to the stone being kept wet from soil moisture.

One question that would be worth pursuing in another study would be the involvement of organic acids from lawns/vegetation at the base of stones.



A positive profile may be due to the fact that the top of the stone is not as protected as the base to the elements and so gets a greater chance of reacting with rain that hits it. During gentle rain the top of the stone may stay wet, with water evaporating as it runs down the stone - which may be a factor in dry climates. The top of the stone in these climates may also have dry pollutants deposited on them and when a small amount of moisture is present they become active. The issue for these stones maybe that the there is an uneven distribution of the chemicals that weather the stone rather than the effect of differences in moisture.

It certainly would be worth further study to see the geographical spread of positive and negative weathering profiles.

Emerging issues

Three issues have emerged from the data and talking to EarthTrekks so far.

Pedestals

A major issue in some locations is that marble gravestones are placed on pedestals and that people have become confused about the location to take measurements, as there have been no notes in the protocols on how to proceed.



Gravestone on pedestal



Gravestone with NO pedestal

We are working on a change to the protocols and database which will allow measurements to be taken on these gravestones. However it will continue to be our preference to have people collect data on non-pedestal marble gravestones.

Multiple people visiting the same graveyards

Our data becomes more accurate with the more gravestones that are measured. While we want to have a good geographical spread of the data, having multiple people measure gravestones in the same graveyard does help us smooth our any human errors in the records. Therefore do not get too concerned if you find that a graveyard you have visited has already been logged. Please log your data as usual.

Accuracy of measurements

Accuracy is always an issue with any scientific data collection. We ask people to follow the protocols very closely and make sure that you check your measurements carefully. Also, we

ask that you check and double check your figures as you log the data online as it is so easy to make a mistake that would make your hard work invalid.

Next stage

The next stage in this project is to work on collecting data that fills in the geographical areas in which no data has been collected. Once the data pool starts to become larger we can work on the analysis of the data at a more regional level and look for trends in the data. At the end of the day the greater the number of gravestones that are recorded then the better the analysis that can be performed.

Awards and participants

The following EarthTrekks have contributed to this project:

2 lost docs, andy too, AnnyJones, antoinepetit, arby gee, Arf2-D2, BarbershopDru, Beaconhills College, Beagle4Fun, bgma79, Boghaunter Academy, bsirius, cacheman, CartDaddy, chrisXXL, CKayaks, cordesfamily, dahunt, daynoir, DerFlieger, Dr.MORO, drgoby, earth Browser, Earth Trekker, eartheric, edgewise, emmaseaman, eng78ine, Erin Stoesz, Fire Engineer, foxgallagher, garyledbetter, geoaware, geoken, GeoKs, geosoul, gpmike, Huntleigh2, Jacques Laramie DAR, jayarezee, JerseyGirl, Jim Phillips, John Williamson, Julia Dream, KABJET, Konnarock Kid, Lair, lhordern, lobokoa, lsumonica, mankiewicz, massextinct, McAdies, mcgillz, MickEMT, Minna, mitucats, monjorgan, Monkeybusiness23, mr. bloodhound, mugglesdontscareme, northbound, oldfatguy, orphan's dad, ozark4, Pierre Duquette, PSUDE_DrG, rangercaptain1, rbtrekker, rjm1, roadwanderer, seppie, SpaceHiker19, Sparky Girl, stdkj, stripey the bear, stro, thengel, Thoto, threeofme, TooWheelin, tronador, waltzcar, wayward wanderer, worriedman, wvtrainmann, zephyr

EarthTrek has reward all 87 with a Gravestone Medal icon in their profiles; 47 of these have been rewarded with a Gravestone Medal Icon - Level 3; 22 of these have been rewarded with a Gravestone Medal Icon - Level 5 and 13 of these have been rewarded with a Gravestone Medal Icon - Level 10.

Project Contact Information

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