

Dunedin temperature analysis technical notes

Site 5→6, 1997

Comparison with all stations that were considered:

```
annualTempDiff = CalculateAnnualTempChangeRef(stnDunedinMusselburgh, CANDIDATE_AFTER=stnDunedinMusselburghEws,
[stnInvercargillAero,stnQueenstown,stnPalmerstonEstimate,stnTimaru2Estimate,stnWinchmoreEWS,stnAshburtonCouncil
Estimate,stnWellingtonKelburn], 1997, 10, -1, INCLUDE_YEAR_CHANGE=0)
```

***** SUMMARY *****

Station	Agent	# Yrs	Shift	Mean	Sig.	Corr.	Shift	Maximum	Sig.	Corr.	Shift	Minimum	Sig.	Corr.
Year of site change														
Candidate station before site change														
Candidate station after site change														
Candidate		10/10	0.295		0.1709		0.457	0.0808			0.119	0.5352		
Reference Stations:														
Invercargill Aero	5814	10/10	-0.160		0.0738	0.864	0.048	0.7567	0.631		-0.381	0.0044	0.877	
Queenstown	5446	10/10	-0.212		0.0521	0.841	-0.307	0.0891	0.701		-0.134	0.1667	0.882	
Palmerston	5323	10/10	0.045		0.5442	0.887	0.127	0.1493	0.913		-0.057	0.6313	0.745	
Timaru 2	5095	10/10	-0.001		0.9878	0.816	0.088	0.4367	0.772		-0.100	0.4490	0.725	
Winchmore Ews	4764	10/10	-0.087		0.4458	0.696	-0.097	0.4895	0.730		-0.083	0.4636	0.755	
Ashburton Council	4778	10/10	-0.177		0.0643	0.822	0.044	0.7146	0.799		-0.420	0.0005	0.755	
wellington,Kelburn	3385	10/ 7	-0.090		0.3971	0.801	-0.047	0.7037	0.812		-0.151	0.3069	0.465	
Mean (Ref. Stations)			-0.098				-0.020				-0.190			

Queenstown was rejected because: it is geographically dissimilar to Dunedin, being in a mountain valley; its correlation is not especially high (though higher than Timaru 2 and Ashburton); the multi-decade trend is much higher than at Dunedin.

Winchmore was rejected because of low correlation.

Wellington, Kelburn was rejected because correlation was low and only 7 years available after the change.

The final comparison command is

```
annualTempDiff = CalculateAnnualTempChangeRef(stnDunedinMusselburgh, CANDIDATE_AFTER=stnDunedinMusselburghEws,
[stnInvercargillAero,stnPalmerstonEstimate,stnTimaru2Estimate,stnAshburtonCouncilEstimate], 1997, 10, -1,
INCLUDE_YEAR_CHANGE=0)
```

***** SUMMARY *****

```

Year of site change      : 1997
Candidate station before site change : Dunedin,Musselburgh ( 5402, I50951)
Candidate station after site change  : Dunedin, Musselburgh Ews (15752, I50954)

```

Station	Agent	# Yrs	Shift	Mean Sig.	Corr.	Shift	Maximum Sig.	Corr.	Shift	Minimum Sig.	Corr.
Candidate		10/10	0.295	0.1709		0.457	0.0808		0.119	0.5352	
Reference Stations:											
Invercargill Aero	5814	10/10	-0.160	0.0738	0.864	0.048	0.7567	0.631	-0.381	0.0044	0.877
Palmerston	5323	10/10	0.045	0.5442	0.887	0.127	0.1493	0.913	-0.057	0.6313	0.745
Timaru 2	5095	10/10	-0.001	0.9878	0.816	0.088	0.4367	0.772	-0.100	0.4490	0.725
Ashburton Council	4778	10/10	-0.177	0.0643	0.822	0.044	0.7146	0.799	-0.420	0.0005	0.755
Mean (Ref. Stations)			-0.073			0.077			-0.240		

Site 4→5, 1960

Stations considered were Invercargill Aero, Gore, Alexandra, Waimate, Adair and Wellington Kelburn. Gore had an unspecified site change in August 1965. Alexandra had a site change ("new site 400 yds S of previous site")in September 1963.

Command is

```

annualTempDiff = CalculateAnnualTempChangeRef(stnDunedinMusselburghEstimate,
[stnInvercargillAeroEstimate,stnwaimate,stnAdair,stnWellingtonKelburn], 1960, 10, -1, INCLUDE_YEAR_CHANGE=0)

```

Summary output is

```

***** SUMMARY *****
Year of site change      : 1960
Candidate station before site change : Dunedin,Musselburgh ( 5402, I50951)
Candidate station after site change  : Dunedin,Musselburgh ( 5402, I50951)

```

Station	Agent	# Yrs	Shift	Mean Sig.	Corr.	Shift	Maximum Sig.	Corr.	Shift	Minimum Sig.	Corr.
Candidate		10/10	-0.112	0.4573		-0.404	0.0338		0.181	0.2105	
Reference Stations:											
Invercargill Aero	5814	10/10	-0.056	0.4795	0.905	-0.199	0.1181	0.860	0.078	0.4546	0.716
waimate	5102	10/10	-0.072	0.3121	0.902	-0.143	0.2289	0.733	-0.006	0.9494	0.864
Adair	5088	10/10	-0.057	0.5286	0.854	-0.285	0.0670	0.670	0.173	0.0285	0.919
wellington,Kelburn	3385	10/10	-0.089	0.4140	0.829	-0.453	0.0099	0.646	0.276	0.0061	0.870
Mean (Ref. Stations)			-0.068			-0.270			0.130		

Site 3→4, 1947

As discussed in the comments in bDunedin.pro and in the report, the 2→3 and 3→4 site changes are a pair, bracketing the relatively brief occupation of the cool site 3 (Beta St). I considered a comprehensive list of 11 potential reference sites bracketing *both* changes. Of these, five were rejected at the first cut:

- Naseby Forest 1 (5257): forest station subject to tree-growth effects; high altitude
- Fairlie (4991): high altitude (306 m); in the region of inland Canterbury where the correlation is weak; large variability in temperature difference in the early 1930s
- Appleby (4239): distant, but possibly should have made the short list
- Ashburton Council (4778): trends upwards after 1947 compared with Musselburgh, leading to an implausibly small offset at 1947
- Hamilton Ruakura (2101): distant, low correlation

Another 3 made the short-list 6 and are mentioned in the report

- Queenstown (5446): high altitude (329 m) & climatically dissimilar
- Christchurch Gardens (4858)
- Blenheim (4331)

And 3 are shown in the report and used to calculate the adjustment

- East Gore (5759)
- Alexandra (5576)
- Wellington Kelburn (3385)

Comparison with all stations:

```
comp_all =
[stnEastGoreEstimate, stnQueenstownEstimate, stnAlexandraEstimate, stnNasebyForest1Estimate, stnFairlieEstimate, stn
AshburtonCouncilEstimate, stnBlenheim, stnApplebyEstimate, stnChristchurchGardens, stnWellingtonKelburn, stnHamilton
RuakuraEstimate]
```

```
annualTempDiff = CalculateAnnualTempChangeRef(stnDunedinBetaStEstimate,
CANDIDATE_AFTER=stnDunedinMusselburghEstimate, comp_all, 1947, [6,10], -1, INCLUDE_YEAR_CHANGE=0)
```

Summary output is

```
***** SUMMARY *****
Year of site change           : 1947
```

Candidate station before site change :		Dunedin,Beta St		(5379, I50856)		Candidate station after site change :		Dunedin,Musselburgh		(5402, I50951)	
Station	Agent	# Yrs	Shift	Mean	Sig.	Corr.	Shift	Maximum	Sig.	Corr.	Minimum
Candidate		6/10	1.320	0.0000			1.594	0.0000			1.039
Reference Stations:											
East Gore	5759	6/10	0.657	0.0001	0.853	1.013	0.0000	0.828	0.291	0.0234	0.597
Queenstown	5446	6/ 9	0.659	0.0002	0.776	0.762	0.0003	0.652	0.556	0.0007	0.561
Alexandra	5576	6/10	0.632	0.0001	0.854	0.522	0.0000	0.855	0.739	0.0007	0.527
Naseby Forest 1	5257	6/10	1.184	0.0000	0.871	1.272	0.0000	0.845	1.093	0.0000	0.658
Fairlie	4991	6/10	0.794	0.0002	0.821	0.654	0.0130	0.736	0.923	0.0000	0.732
Ashburton Council	4778	6/10	0.401	0.0004	0.804	0.278	0.1019	0.751	0.523	0.0009	0.805
Blenheim	4331	6/10	0.687	0.0000	0.788	1.375	0.0000	0.669	-0.019	0.8258	0.720
Appleby	4239	6/10	0.867	0.0001	0.821	1.072	0.0002	0.783	0.655	0.0000	0.573
Christchurch Garden	4858	6/10	0.665	0.0000	0.729	0.589	0.0102	0.761	0.738	0.0000	0.725
Wellington,Kelburn	3385	6/10	0.885	0.0000	0.843	1.255	0.0000	0.637	0.491	0.0000	0.850
Hamilton, Ruakura	2101	6/10	1.152	0.0003	0.678	1.131	0.0000	0.608	1.151	0.0026	0.544
Mean (Ref. Stations)			0.780			0.902			0.649		

The short-list 6 (mentioned in the report):

```
comp_6 =
[stnEastGoreEstimate, stnAlexandraEstimate, stnQueenstownEstimate, stnChristchurchGardens, stnBlenheim, stnWellingtonKelburn]
```

```
annualTempDiff = CalculateAnnualTempChangeRef(stnDunedinBetaStEstimate,
CANDIDATE_AFTER=stnDunedinMusselburghEstimate, comp_6, 1947, [6,10], -1, INCLUDE_YEAR_CHANGE=0)
```

Summary output is

```
;***** SUMMARY *****
```

Year of site change :		1947		Candidate station before site change :		Dunedin,Beta St		(5379, I50856)		Candidate station after site change :		Dunedin,Musselburgh		(5402, I50951)	
Station	Agent	# Yrs	Shift	Mean	Sig.	Corr.	Shift	Maximum	Sig.	Corr.	Minimum				
Candidate		6/10	1.320	0.0000			1.594	0.0000			1.039				
Reference Stations:															
East Gore	5759	6/10	0.657	0.0001	0.853	1.013	0.0000	0.828	0.291	0.0234	0.597				
Alexandra	5576	6/10	0.632	0.0001	0.854	0.522	0.0000	0.855	0.739	0.0007	0.527				
Queenstown	5446	6/ 9	0.659	0.0002	0.776	0.762	0.0003	0.652	0.556	0.0007	0.561				
Christchurch Garden	4858	6/10	0.665	0.0000	0.729	0.589	0.0102	0.761	0.738	0.0000	0.725				
Blenheim	4331	6/10	0.687	0.0000	0.788	1.375	0.0000	0.669	-0.019	0.8258	0.720				
Wellington,Kelburn	3385	6/10	0.885	0.0000	0.843	1.255	0.0000	0.637	0.491	0.0000	0.850				
Mean (Ref. Stations)			0.698			0.919			0.466						

The final 3:

```
comp_3 = [stnEastGoreEstimate, stnAlexandraEstimate, stnWellingtonKelburn]

annualTempDiff = CalculateAnnualTempChangeRef(stnDunedinBetaStEstimate,
CANDIDATE_AFTER=stnDunedinMusselburghEstimate, comp_3, 1947, [6,10], -1, INCLUDE_YEAR_CHANGE=0)
```

Summary output is

```
***** SUMMARY *****
Year of site change           :      1947
Candidate station before site change :      Dunedin, Beta St      ( 5379, I50856)
Candidate station after site change  :      Dunedin, Musselburgh ( 5402, I50951)
Station      Agent    # Yrs  |----- Mean -----| |----- Maximum -----| |----- Minimum -----|
Candidate                               Shift  Sig.  Corr.  Shift  Sig.  Corr.  Shift  Sig.  Corr.
Reference Stations:
East Gore           5759    6/10  | 0.657 0.0001 0.853  | 1.013 0.0000 0.828  | 0.291 0.0234 0.597
Alexandra           5576    6/10  | 0.632 0.0001 0.854  | 0.522 0.0000 0.855  | 0.739 0.0007 0.527
Wellington, Kelburn 3385    6/10  | 0.885 0.0000 0.843  | 1.255 0.0000 0.637  | 0.491 0.0000 0.850
Mean (Ref. Stations) 0.725                                0.930                                0.507
```

Site 2→3, 1941-ish

All comparison stations

```
comp_all =
[stnEastGoreEstimate, stnQueenstownEstimate, stnAlexandraEstimate, stnNasebyForest1Estimate, stnFairlieEstimate, stn
AshburtonCouncilEstimate, stnBlenheim, stnApplebyEstimate, stnChristchurchGardens, stnWellingtonKelburn, stnHamilton
RuakuraEstimate]

annualTempDiff = CalculateAnnualTempChangeRef(stnDunedinBtlGardens, CANDIDATE_AFTER=stnDunedinBetaStEstimate,
comp_all, 1941, [10,6], -1, INCLUDE_YEAR_CHANGE=1)
```

Output:

```
***** SUMMARY *****
Year of site change           :      1941
Candidate station before site change :      Dunedin, Btl Gardens ( 5375, I50852)
Candidate station after site change  :      Dunedin, Beta St      ( 5379, I50856)
Station      Agent    # Yrs  |----- Mean -----| |----- Maximum -----| |----- Minimum -----|
Candidate                               Shift  Sig.  Corr.  Shift  Sig.  Corr.  Shift  Sig.  Corr.
Reference Stations:
Candidate           10/ 6  | -1.042 0.0000  | -1.523 0.0000  | -0.558 0.0053
```

East Gore	5759	9/ 6	-0.634	0.0001	0.932	-0.657	0.0015	0.854	-0.613	0.0003	0.816
Queenstown	5446	10/ 6	-0.647	0.0002	0.776	-1.164	0.0000	0.622	-0.139	0.2792	0.774
Alexandra	5576	10/ 6	-0.638	0.0001	0.851	-1.228	0.0000	0.718	-0.055	0.7043	0.684
Naseby Forest 1	5257	10/ 6	-0.699	0.0000	0.733	-0.922	0.0000	0.554	-0.510	0.0057	0.546
Fairlie	4991	10/ 6	-0.365	0.0402	0.720	-0.702	0.0315	0.556	-0.025	0.7506	0.830
Ashburton Council	4778	10/ 6	-0.875	0.0000	0.896	-1.412	0.0000	0.699	-0.353	0.0088	0.833
Blenheim	4331	8/ 6	-0.447	0.0014	0.930	-0.987	0.0000	0.816	0.103	0.4974	0.884
Appleby	4239	9/ 6	-0.764	0.0001	0.934	-1.336	0.0000	0.837	-0.176	0.1441	0.901
Christchurch Garden	4858	10/ 6	-0.956	0.0000	0.951	-1.604	0.0000	0.869	-0.314	0.0026	0.941
Wellington, Kelburn	3385	10/ 6	-0.918	0.0000	0.946	-1.390	0.0000	0.855	-0.425	0.0001	0.924
Hamilton, Ruakura	2101	10/ 6	-0.945	0.0008	0.835	-0.899	0.0014	0.637	-0.975	0.0067	0.794
Mean (Ref. Stations)			-0.717			-1.118			-0.317		

The short-list 6

```
comp_6 =
[stnEastGoreEstimate, stnAlexandraEstimate, stnQueenstownEstimate, stnChristchurchGardens, stnBlenheim, stnWellingtonKelburn]
```

```
annualTempDiff = CalculateAnnualTempChangeRef(stnDunedinBtlGardens, CANDIDATE_AFTER=stnDunedinBetaStEstimate,
comp_6, 1941, [10,6], -1, INCLUDE_YEAR_CHANGE=1)
```

Output:

```
***** SUMMARY *****
Year of site change : 1941
Candidate station before site change : Dunedin, Btl Gardens ( 5375, I50852)
Candidate station after site change : Dunedin, Beta St ( 5379, I50856)
```

Station	Agent	# Yrs	Shift	Mean	Sig.	Corr.	Shift	Maximum	Sig.	Corr.	Shift	Minimum	Sig.	Corr.
Candidate		10/ 6	-1.042		0.0000		-1.523	0.0000			-0.558	0.0053		
Reference Stations:														
East Gore	5759	9/ 6	-0.634	0.0001	0.932	-0.657	0.0015	0.854	-0.613	0.0003	0.816			
Alexandra	5576	10/ 6	-0.638	0.0001	0.851	-1.228	0.0000	0.718	-0.055	0.7043	0.684			
Queenstown	5446	10/ 6	-0.647	0.0002	0.776	-1.164	0.0000	0.622	-0.139	0.2792	0.774			
Christchurch Garden	4858	10/ 6	-0.956	0.0000	0.951	-1.604	0.0000	0.869	-0.314	0.0026	0.941			
Blenheim	4331	8/ 6	-0.447	0.0014	0.930	-0.987	0.0000	0.816	0.103	0.4974	0.884			
Wellington, Kelburn	3385	10/ 6	-0.918	0.0000	0.946	-1.390	0.0000	0.855	-0.425	0.0001	0.924			
Mean (Ref. Stations)			-0.707			-1.172			-0.241					

The final 3

```
comp_3 = [stnEastGoreEstimate, stnAlexandraEstimate, stnWellingtonKelburn]
```

```
annualTempDiff = CalculateAnnualTempChangeRef(stnDunedinBtlGardens, CANDIDATE_AFTER=stnDunedinBetaStEstimate,
comp_3, 1941, [10,6], -1, INCLUDE_YEAR_CHANGE=1)
```

Output:

***** SUMMARY *****

```
Year of site change           : 1941
Candidate station before site change : Dunedin, Btl Gardens ( 5375, I50852)
Candidate station after site change  : Dunedin,Beta St ( 5379, I50856)

Station      Agent  # Yrs  |----- Mean -----| |----- Maximum -----| |----- Minimum -----|
Candidate    10/ 6  Shift  Sig.  Corr.  Shift  Sig.  Corr.  Shift  Sig.  Corr.
Reference Stations:
East Gore    5759   9/ 6  -0.634 0.0001 0.932 -0.657 0.0015 0.854 -0.613 0.0003 0.816
Alexandra    5576  10/ 6  -0.638 0.0001 0.851 -1.228 0.0000 0.718 -0.055 0.7043 0.684
Wellington,Kelburn 3385  10/ 6  -0.918 0.0000 0.946 -1.390 0.0000 0.855 -0.425 0.0001 0.924
Mean (Ref. Stations)          -0.730                    -1.092                    -0.364
```

There is an independent estimate of the 2→3 change from the 25-month overlap period, with the command

```
annualTempDiff = CalculateOverlapTempDiff(stnDunedinBetaSt, stnDunedinBtlGardens, statsCodeMeanAirTemp, [[1940,
10], [1942, 11]], all_months = 1)
```

which gives the result

```
Candidate station           : I50856, 5379, Dunedin,Beta St
Reference station           : I50852, 5375, Dunedin, Btl Gardens
** Temperature statistic to be analysed : 02, Annual Statistics - Mean Air Temperature
Overlapping years of observation ( 1)  : 1941
Candidate ann. mean temp. during overlap : 9.758 9.758
Reference ann. mean temp. during overlap : 10.475 10.475
Diff. in ann. mean temp. during overlap : -0.717 -0.717
(Difference = Candidate minus Reference)
Correlation during overlapping years    : NaN
Mean annual difference in temperature  : -0.717 (Cand. minus Ref.)
** Temperature statistic to be analysed : [02, Monthly Statistics - Mean Air Temperature]
Candidate Mean Air Temperature (C)     : 10.040
Reference Mean Air Temperature (C)     : 10.728
Temperatures analysed in all overlapping months from October 1940 to November 1942.
Overlapping months ( 25) : October 1940 - November 1942
Correlation during overlapping months   : 0.997
Mean monthly difference in temperature : -0.688 (Cand. minus Ref.)
t-test statistics [tm_test(), paired samples] using null hypothesis H0 : zero difference in means
t-stat. / prob. larger abs. t.         : -13.823244 / 0.000000
```

So this agrees pretty well with the value from the reference comparison.

Is there any indication of a change of ~ 0.6 in 1942, as originally inferred from a comparison of NZT7 with the original data?

```

**** SUMMARY ****
Year of site change      : 1943
Candidate station before site change : Dunedin,Beta St ( 5379, I50856)
Candidate station after site change  : Dunedin,Beta St ( 5379, I50856)
Station Agent # Yrs |----- Mean -----| |----- Maximum -----| |----- Minimum -----|
Candidate          : | Shift Sig. Corr. | Shift Sig. Corr. | Shift Sig. Corr. |
Reference Stations:
East Gore          : 5759 2/ 4 -0.092 0.6295 0.309 -0.131 0.5040 0.613 -0.071 0.6920 -0.101
Queenstown         : 5446 2/ 4 -0.102 0.7643 0.051 -0.198 0.6785 0.263 -0.050 0.8205 -0.247
Alexandra          : 5576 2/ 4 0.002 0.9887 0.426 0.062 0.7464 0.733 -0.106 0.6130 0.099
Naseby Forest 1    : 5257 2/ 4 -0.051 0.6358 0.696 0.157 0.4432 0.659 -0.294 0.2046 0.380
Appleby            : 4239 2/ 4 -0.416 0.0079 0.865 -0.632 0.0984 0.800 -0.213 0.1268 0.741
Wellington,Kelburn : 3385 2/ 4 -0.269 0.1076 0.813 -0.533 0.0603 0.765 -0.044 0.4650 0.718
Hamilton, Ruakura  : 2101 2/ 4 -0.490 0.0801 0.513 -0.465 0.0287 0.782 -0.567 0.1788 0.132
Mean (Ref. Stations) : -0.202 -0.248 -0.192

```

No!

Site 1→2, 1913

For the change from sites 1 to 2 (Leith Valley 5380 to Botanical Gardens 5375) in 1913, Andrew Tait suggested Tapanui, Ranfurly, Lincoln and Invercargill. These are discussed (and all rejected) below.

Note that the temperature record from Dunedin Botanical Gardens has a sharp downward dip in 1921, one that is not matched by any of the other stations. This results from bad maximum temperatures from April to August (by my estimation), documented by Fouhy et al (1992). This has been corrected in the composite time series, but the comparison period for the site 1→2 change has been reduced to avoid using 1921 data.

Possible comparison stations

- Comparison with Tapanui gives a large positive shift (1.88), with the graph showing a fairly large negative difference in 1910. Station history records that thermometers and screen were not standard and changed in 1910. Reject.
- Comparison with Ranfurly, Eweburn gives a large negative shift (-2.21), with the graph showing a big shift in mean temperature at Ranfurly, Eweburn between 1915 and 1918: clearly bad data.
- Comparison with Lincoln gives a moderate positive shift (0.697), but note that the NZT7 documentation shows changes in the adjustment at 1905 and 1915: were these related to the growth of shelter belts documented by Fouhy et al (1992)? Reject.

- Invercargill has only 2 or 3 years before the change and 1905 looks very suspicious. Reject
- Waimate: the CliDB station history documents several station changes with large altitude differences, up to 200 m. Reject.
- The Levin MAF station history does not record site changes (which doesn't mean there weren't any) but overall site exposure is good. The Levin MAF data start in 1905 (so only 7 years before the change) and there is a gap from 1913 to 1918. Reject.
- Timaru Gardens: the CliDB station history documents several station changes; there are only 2 years before change. Reject.
- Queenstown looked possible but had no data between 1881 and 1929. No.
- East Gore was open from 1907 but changed site ~ 1914.
- Whakarewarewa: correlation is low and it's very distant and inland. Reject.
- New Plymouth looked promising, but there's a data gap 1914-1922.
- Comparison with Auckland Albert Park gives a smallish positive shift (0.547) Correlation is reasonably high. There was a site change in 1909, from Museum (60 m) to Albert Park (49 m)—probably not too big a deal. Accept with temperatures before 1909 shifted by -0.09 C, as estimated by the Auckland document.
- Nelson: looks OK
- Christchurch Gardens: looks OK. High correlation.

Command is

```
annualTempDiff = CalculateAnnualTempChangeRef(stnDunedinLeithValleyEstimate,
CANDIDATE_AFTER=stnDunedinBtlGardens, [stnNelson,stnChristchurchGardensEstimate,stnAucklandAlbertParkAdjust],
1913, 8, -1, INCLUDE_YEAR_CHANGE=1)
```

Summary output is

```
***** SUMMARY *****
Year of site change          : 1913
Candidate station before site change : Dunedin, Leith Valley ( 5380, I50857)
Candidate station after site change  : Dunedin, Btl Gardens ( 5375, I50852)
Station      Agent  # Yrs  Shift  Mean  Sig.  Corr.  Shift  Maximum  Sig.  Corr.  Shift  Minimum  Sig.  Corr.
Candidate                                8/ 8   0.574  0.0488  0.655  0.0643  0.485  0.0850
Reference Stations:
```

Nelson	4244	5/ 7	0.345	0.0479	0.855	0.725	0.0557	0.571	-0.029	0.9379	0.818
Christchurch Garden	4858	8/ 8	0.194	0.0027	0.974	0.292	0.0727	0.873	0.089	0.6336	0.882
Auckland,Albert Par	1427	7/ 8	0.581	0.0002	0.863	0.657	0.0052	0.733	0.579	0.0062	0.848
Mean (Ref. Stations)			0.373			0.558			0.213		