

The Salinger Thesis

In tracking the provenance of the official New Zealand temperature record, all roads lead to an “Appendix C”, which was annexed to a doctoral thesis written long before the heyday of “global warming”. This Appendix has never been published or digitised and the sole copy resides in the ‘reserved’ section of the library at Victoria University of Wellington.

The lengthy Appendix discusses some 25 weather stations throughout New Zealand which were shown by MetService records to have undergone site changes at various times. It raises diverse ways of adjusting data, ranging from measuring the rate of glacial melt to alignment with comparable stations. It makes no reference to scientific authority, because there was nothing available in the literature in those early days.

The Appendix then suggests a series of possible adjustments which do not follow any discernible set of rules, but rely heavily on the author’s instincts and preferences. The details are relegated to annexed Worksheets.

There is nothing complicated about the idea of calculating missing data by reference to nearby substitutes. The whole trick is in the execution. Is reliable data available for the period in question? Is it sufficiently comparable? How long a series is required? What objective rules should guide the analyst’s choices? Is any independent confirmation available? What are the error margins?

All of these key issues, as well as the metadata and the actual calculations of possible temperature changes, are assigned to the Worksheets.

So where are these critical supplementary documents? Alas, they are lost.

In response to an Official Information Act request, NIWA confided on 29 January 2010: *“The original worksheets and/or computer records used for the calculations in Dr Salinger’s thesis work are the property of Dr Salinger, who no longer works for NIWA. NIWA does not hold copies.”*

But copyright is not the only problem.

In answer to Parliamentary Question 1200 (2010) the Minister of Research, the Hon Dr Wayne Mapp, advised the House:

“NIWA holds the ‘raw’ climate data in its National Climate Database, site history information and the adjusted time series. The original worksheets and/or computer records used by Dr Jim Salinger to construct the seven-station temperature series are no longer available having been held on a superceded computer system”

It turns out that the sole copy of the Worksheets was held on the mainframe at VUW, when it was replaced in 1983. The key details of the ‘Salinger adjustments’ are gone forever.

Without the Worksheets, it is not possible to replicate the results shown in the Appendix.

A well-documented attempt to replicate the 30-year-old calculations is set out in “Creating a Composite Temperature Record for Hokitika”, prepared by NIWA’s Dr Brett Mullan and published on NIWA’s website on 9 February 2010. As with so many attempts, Dr Mullan

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failed to reproduce Dr Salinger's adjustments in respect of the alleged 1912 discontinuity at Hokitika.

Dr Mullan comments that his broad methodology for adjusting the pre-1912 data is taken from the suggestion made by Dr Salinger that Hokitika be aligned with comparable stations. The difficulty is that there are no pre-1912 records from any neighbouring weather stations in Hokitika or, indeed, from any other station anywhere along the West Coast of the South Island.

Undaunted, Dr Salinger chose four distant stations as his Hokitika comparators – Musselburgh in Dunedin, Appleby in Nelson, Christchurch Gardens, and Lincoln. He used 1881-1945 as the alignment period. No reasons are offered for any of these selections and, if they existed, they must have been confined to the Worksheets.

Musselburgh, Dunedin: From Mullan's "The NIWA Seven-station Temperature Series" (Schedule of Adjustments) we learn that the Dunedin station moved from Leith Valley to the Botanical Gardens to the Reservoir, during the alignment period, and needed four temperature adjustments. The whole period is then further affected by an adjustment for consistency with Musselburgh.

Appleby, Nelson: The Schedule of Adjustments discloses that Nelson moved from the City to Nile Street to Cawthron Institute to Appleby during the alignment period, and required multiple adjustments. Perhaps worse, all data from 1881 to 1907 is missing.

Christchurch Gardens: All data for the key period 1881-1904 is missing. In his peer-reviewed paper "Apparent Trends of Real Temperature in New Zealand Since 1930", (1980), JWD Hessel notes that this station's records are biased by urbanisation and extensive tree growth.

Lincoln: During the alignment period, the Lincoln station moved (within the University grounds) on no less than five occasions. It required 4 downward adjustments prior to 1943, and two upward adjustments subsequently.

Did Dr Salinger use the original data in these cases – even when he believed it to be wrong? If not, did he adjust Dunedin by comparison to Hokitika or vice-versa? Were Lincoln and Christchurch Gardens corrected before being used as comparators for Nelson? It is difficult to resist the image of a dog chasing its own tail.

With all of the Nelson and Christchurch data missing for most of the relevant time, it is a mystery how their pre-1912 temperatures could have been compared with anything.

Dr Salinger calculates that the Hokitika records for 1866-80 should be reduced by 0.2°. As the MetService Note indicates that nothing changed for the 1881-1912 period, one would expect to see the same adjustment for that period. But Dr Salinger inexplicably increases the adjustment to 1.1°. (In the Schedule of Adjustments, Dr Mullan calls it -1.3°). Why these disparities?

The Salinger thesis explicitly recognises that different parts of the country respond differently to oscillations such as ENSO, and considers 8 indices defined by Trenberth

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(1975). It is surprising, therefore, that he sought to require Hokitika variances to clone those of (say) Dunedin.

Sadly, Dr Mullan is unable to shed any light on how Dr Salinger might have coped with all these challenges and mysteries. The recorded reasoning, if any, was lost with the Worksheets in 1983 and NIWA has never been able to second-guess or reverse-engineer them.

Faced with all these imponderables, and unable to replicate the Worksheet, Dr Mullan abandoned the Salinger process entirely. Instead, he set about a wholly new project of comparing the pre-1912 Hokitika data with a weather station in Auckland (Albert Park), and using 1900-25 as his truncated alignment period.

It is troubling that different analysts are apparently free to choose whatever comparator or time period might suit their purposes. Such subjectivity is more usually associated with art, rather than science.

Even the decision whether to simply use the Hokitika original data or to attempt some form of adjustment is apparently a subjective one. In the Schedule of Adjustments, we find a footnote: *“Rather than delete this [Hokitika] data permanently from the records, the period 1894-1912 is flagged, and it is up to the analyst to decide whether to use the data or not. This has long been the philosophy of the climate section at NIWA”.*

So NIWA’s “philosophy” is that the official temperature record is a discretionary matter, left to the whim of the analyst of the day? Little wonder no independent scientist has ever been able to replicate NIWA’s series.

There are four additional comments which should be made:

1. NIWA has been inclined to defend its failure to review the Salinger adjustments on the grounds that they would have been checked by the supervisors and examiners of the thesis. It is now clear that such problems as decades of missing comparative data were not picked up. But that is not too surprising, as these calculations were in the nature of an aside to the mainstream proposition – Worksheets supporting a minor Appendix. Further, neither supervisor was either a climate scientist or a statistician, and this excursion into temperature adjustments was very far from their respective areas of expertise.

2. The constant refrain that “all the data is available on the NIWA online database” has never been true of the Hokitika station. Quite simply, the 1943 site change was never disclosed until 2010 – see footnote 3 to the Mullan paper:
“This database oversight will be corrected shortly. All Site 1 data for the overlap period will need to be digitised ... then a new agent number created, and the Site 2 data for Aug-1943 to Dec-1964 transferred from agent number 3907 to the new agent number.”

3. The claim that the Salinger thesis method was published in the Rhoades & Salinger paper of 1993 is nonsense. The abstract of that paper makes it abundantly clear it is focused on methodology that is usable only when close neighbours are available for comparison – and it uses an entirely different base of calculations:

“Parallel cumulative sums of seasonally adjusted series from neighbouring stations are a

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useful exploratory tool for recognizing site-change effects at a station that has a number of near neighbours”.

4. Finally, it is a real concern that NIWA has made no attempt to assess the error margins of the Hokitika adjustment. Adequate techniques are available. Hessel (supra) demonstrates a ‘median runs test’ to determine the trend bias at Albert Park in Auckland. Rhoades & Salinger (supra) discuss single-site statistical analysis to identify inhomogeneities within a series. No proposed adjustment should ever be accepted until objective statistical tests show it be a clear improvement on the original data.