

# Package ‘ssNZ’

5 June 2010

**Title** Catalogue of NZ Earthquake Events

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**Version** 2.2-7

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**Description** Contains the NZ Catalogue of earthquake events. This version of the NZ catalogue contains data from 1460 AD until 31 May 2010. The catalogue is incomplete for recent months.

**Depends** ssBase, utils

**License** GPL (>=2)

**URL** <http://www.statsresearch.co.nz/software.html>

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changes *Changes Made to the Package*

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## Description

This page contains a list of recent changes made to the package.

**Details**

1. Data available up to 8 October 2003 downloaded from GeoNet and added to package. (8 Oct 2003)
2. `read.download`: changed to directly read the multiple downloaded CSV files, and rewrite into one CSV file containing only the required fields for SSLib. (8 Oct 2003)
3. `joinfiles`: now redundant, deleted. (8 Oct 2003)
4. `read.basic` renamed to `readNZ`. (8 Oct 2003)
5. Revised data for 2002 and 2003 downloaded from GeoNet, up to 7 November 2003, and added to package. (8 Nov 2003)
6. Minor formatting changes to manual pages. (27 Jan 2004)
7. Revised data from 1 Jan 1993 until 19 Apr 2004 downloaded from GeoNet. (20 Apr 2004)
8. `read.download`: default argument values added. (20 Apr 2004)
9. '`ssNZ/src/Makefile`' modified to be compatible with MS Windows. (20 Apr 2004)
10. '`ssNZ/src/Makefile`' and '`ssNZ/src/Makefile.win`' modified to function for both R 1.8.1 and 1.9.0. (7 May 2004)
11. All data downloaded from GeoNet. (14 Feb 2005)
12. Updated '`src/Makefile`' (handling of empty shared libraries) and '`R/NZ.R`' (`delay` deprecated) for R-2.1.0. (09 Jun 2005)
13. `read.download`: renamed to `joinNZ`. (12 Dec 2005)
14. All current data downloaded from GeoNet. (12 Dec 2005)
15. Package vignettes added. (12 Dec 2005)
16. All current data downloaded from GeoNet. (12 Feb 2006)
17. Modified file '`R/NZ.R`': `warn.conflicts=FALSE` added to line starting with `delayedAssign`. (15 Feb 2006)
18. All current data downloaded from GeoNet. (30 Mar 2006)
19. All current data downloaded from GeoNet. (4 May 2006)
20. '`ssNZ/src/Makefile.win`' modified to be compatible with R version 2.3.0. (9 June 2006)
21. "utils" added to "Depends" line in file '`ssNZ/DESCRIPTION`'; needed in R version 2.4.0. (12 Oct 2006)
22. All current data downloaded from GeoNet. (16 Mar 2007)
23. All current data downloaded from GeoNet. (17 Jun 2007)
24. All occurrences of `subset.rect` in the Examples have been changed to `subsetrect`. See Changes in **ssBase**. (8 Nov 2007)
25. All current data downloaded from GeoNet. (11 Jan 2008)
26. All current data downloaded from GeoNet. (23 Sep 2008)
27. Removal of LaTeX markups from DESCRIPTION file. (31 May 2009)
28. All current data downloaded from GeoNet. (24 Jun 2009)
29. All current data downloaded from GeoNet. (24 Aug 2009)
30. All current data downloaded from GeoNet. (10 Mar 2010)
31. All current data downloaded from GeoNet. (31 May 2010)
32. `joinNZ`, `readNZ`, `NZ`: include variable `status.code` from GeoNet source file. (5 Jun 2010)

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`joinNZ`*Read Downloaded Data From GeoNet*

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**Description**

Reads the data downloaded from GeoNet. This function is only required if you intend to update the catalogue directly from GeoNet.

**Usage**

```
joinNZ(filenamees = system("ls nz*.csv", intern=TRUE),
        basicname = "temp.csv")
```

**Arguments**

<code>filenamees</code>	names of downloaded CSV files.
<code>basicname</code>	name of output CSV file, default is "temp.csv".

**Details**

The function reads the multiple number of downloaded CSV files, extracts the required fields, and writes one CSV file for inclusion into the package source code. The function reads the file header in each CSV file and parses this information so that it is used to construct the required scan statement to read the remaining data records.

**Value**

One CSV file is written for inclusion into the package source code.

**Author(s)**

David Harte, 2003

**See Also**

[readNZ](#)

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`NZ`*Catalogue of NZ Earthquake Events*

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**Description**

The NZ catalogue contains earthquake events in the New Zealand region. Most events are contained within the region 35°S–50°S and 160°E–185°E. The catalogue becomes less complete for smaller magnitude events at greater offshore distances. Completeness issues have been discussed by Harte & Vere-Jones (1999).

**Usage**

```
NZ
```

## Format

The catalogue is stored as a list object and has classes "catalogue" and "data.frame". It contains the following variables.

**time** vector giving the number of days (and fractions thereof) from 00:00:00 hrs on 1 January 1970. It has class "datetimes" (see the function `datetimes`). The attribute "dp.second" records the number of decimal places to which seconds were recorded in the ASCII source file of events.

**missing.time** character vector the same length as `time` indicating the degree of missing values in `time`. The original ASCII catalogue listing contains separate variables for year, month, day, hour, minute and second. For some events one or more of these values are missing. In these cases, `missing.time` contains the first of "Y", "M", "D", "h", "m" or "s", respectively. Otherwise it will be ". In cases where there were missing values, the variable `time` will be calculated by using a one in the case of a missing month or day, and a zero for a missing hour, minute or second.

**latitude** vector giving the latitude of each event. These are positive in the northern hemisphere and negative in the southern hemisphere.

**longitude** vector giving the longitude of each event. They are the number of degrees east of Greenwich (i.e. between 0 and 360 degrees).

**depth** vector giving the depth (km) of each event.

**magnitude** vector giving the local magnitude of each event. This variable has an attribute called "magn.type" giving the magnitude type, i.e. "ML".

**status.code** character vector giving the solution status (i.e. `status.code` from GeoNet source file). It takes values "A" for autolocation, "D" for Deleted, "F" for Final, "P" for Provisional, "R" for Reviewed, or "T" for Trigger.

## Updating the Catalogue

Data contained in the installed R package can be updated directly from GeoNet (<http://www.geonet.org.nz/datacentre.html>) as follows. The functions cited below are contained in this package.

1. Download the required data from GeoNet. It may be necessary to split the required time period up, resulting in multiple downloaded CSV files, e.g. 'earthquakes1.csv', 'earthquakes2.csv' and 'earthquakes3.csv'. Place these files into a convenient temporary directory.
2. Start R in this directory, and attach this package, i.e. `library(ssNZ)`.
3. Use the function `joinNZ` to read the downloaded files, and write another CSV file containing only the minimal fields to make a legitimate SSlib catalogue, e.g.
 

```
joinNZ(c("earthquakes1.csv", "earthquakes2.csv", "earthquakes3.csv"),
      "temp.csv")
```

 This will write the dataset containing only the required fields into a file called 'temp.csv'.
4. Unpack the tar archive containing the source code for this package, e.g.
 

```
tar -zxvf ssNZ_*.tar.gz
```

 where "\*" denotes the appropriate version numbers. Copy the CSV file 'temp.csv' created above into the 'src' directory. If the entire catalogue was downloaded, then 'temp.csv' replaces 'nz.csv'. If only some data have been downloaded, then include the new data from 'temp.csv' into 'nz.csv', and then remove 'temp.csv'.
5. Reinstall the ssNZ package (see Harte, 2003).

## Wellington Catalogue

The New Zealand catalogue now contains all data from the Wellington local area network, which were previously contained in the Wellington Catalogue. See Examples below.

For 1978–1986, the events from this network were based on readings from film records, with a distance cutoff of 12 sec S-P time (i.e., a half sphere of about radius 108 km). For 1978–1982 all locatable events are included. For 1983–1986 a rough magnitude criterion was applied, so events of magnitude less than 2.3 were never analyzed.

For 1987–1996 the events are from the CUSP analysis. All locatable events with epicentres within the box defined by 40.5°S–42.2°S and 173.6°E–176.0°E are included, irrespective of depth. Note that the magnitudes of the film events (1978–1986) have been adjusted to conform with the CUSP magnitudes.

If you want a more-or-less homogeneous and complete catalogue for the whole time period, you should reject events with a radial distance (i.e., including depth) of more than 100 km from (41.286°S, 174.768°E, 0.0 depth) or with a magnitude less than 2.3.

When the Wellington local area network began in 1975, there were 5 stations recording. The network was then expanded as follows:

**1976:** 7 stations (2 stations installed)

**1977:** 7 stations ( 1 new, 1 removed)

**1978:** 9 stations (2 new)

**1979:** 11 stations (2 new)

**1980:** 10 stations ( 1 removed)

**1981-1985:** 11 stations ( 1 new in 1981)

**1986:** 12 stations (Quartz Hill installed, but removed in 1987)

**1987:** 11 stations

## Source

The earthquake event origins are determined and catalogued by the Institute of Geological and Nuclear Sciences, Wellington, New Zealand (<http://www.gns.cri.nz>). Data have been downloaded from the GeoNet website (<http://www.geonet.org.nz/datacentre.html>).

We acknowledge the New Zealand GeoNet (<http://www.geonet.org.nz>) project and its sponsors EQC, GNS and FRST, for providing these data.

## References

Harte, D.S. & Vere-Jones, D. (1999). Differences in coverage between the PDE and New Zealand local earthquake catalogues. *NZ Journal of Geology and Geophysics* **42(2)**, 237–253. (Abstract: <http://www.rsnz.org/publish/nzjgg/1999/17.php>)

Harte, D. (2003). *Users Guide for the Statistical Seismology Library*. Statistics Research Associates, Wellington.

## See Also

[subsetcircle](#), [subsetpolygon](#), [subsetrect](#), [subsetsphere](#), [summary.catalogue](#)

**Examples**

```
# catalogue summary including events with missing date components
summary(NZ)
table(years1(NZ$time), months1(NZ$time))

# table of annual counts
table(years1(NZ$time))

# solution status by year
table(years1(NZ$time), NZ$status.code)

# make the Wellington Catalogue
as.catalogue(subsetrect(NZ, minlat=-42.2, maxlat=-40.5,
                        minlong=173.6, maxlong=176.0, minday=julian(1,1,1978)),
             catname="Wellington")
```

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`readNZ`*Read Catalogue CSV File*

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**Description**

Reads the basic CSV file output by `joinNZ` and creates a catalogue object called `NZ`. This function is used when the package is installed into the R system files.

**Usage**

```
readNZ(filename)
```

**Arguments**

`filename`      name of CSV file.

**Value**

NULL

**Author(s)**

David Harte, 2003

**See Also**

`joinNZ`

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