Cave Climate Graphs on the ACKMA Website

Rauleigh Webb, Andy Baker, Dave Gillieson and Andy Spate

During 2020 ACKMA instigated the deployment of data loggers to a number of cave sites throughout Australia and New Zealand. This was an attempt to capture the best baseline climate data for all of these caves, as visitation to the caves had been halted due to COVID-19 restrictions. The data collected currently starts from the 28/05/2020 and runs to 01/03/2021. Overall the number of data records is 39931 with Te Anau Cave providing the most continuous data set so far.

Andy Baker asked that interactive graphs be created online so as to provide ACKMA with a way of displaying the data. These graphs would enable the display of the data and allow visitors to interactively interpret the changes occurring in each cave site's temperature and relative humidity data. We have also obtained Internal and External temperature data for all sites. Interpretation of the data beneath each of the graphs is also provided for some sites. As more data is provided further interpretation of the data will be provided.

At present a webpage has been created that lists all of the sites that have provided data from the ACKMA data loggers, along with links to graphs that are generated online from the raw data.

The links page is shown below and is at http://www.ackma.org/CaveClimate/index.asp. When the Temperature, Relative Humidity or Internal/External link are clicked on, then the relevant graph is prepared by loading the data from the website and thus generating the graph.

ACKMA Cave Climate Graphs 2020

Click here for a map showing these cave locations

Cave Name	Temperature Graph	Relative Humidity Graph	Internal & External Temperature Graph
Calgardup	Calgardup Temperature Graph	Calgardup Relative Humidity Graph	Calgardup Internal and External Temperature Graph
Careys Cave	Careys Cave Temperature Graph	Careys Cave Relative Humidity Graph	Careys Cave Internal and External Temperature Graph
Cathedral	Cathedral Temperature Graph	Cathedral Relative Humidity Graph	Cathedral Internal and External Temperature Graph
Cathedral Cave	Cathedral Cave Temperature Graph	Cathedral Cave Relative Humidity Graph	Cathedral Cave Internal and External Temperature Graph
Crystal Cave	Crystal Cave Temperature Graph	Crystal Cave Relative Humidity Graph	Crystal Cave Internal and External Temperature Graph
Donna	Donna Temperature Graph	Donna Relative Humidity Graph	Donna has no Internal and External Temp. Data
Footwhistle	Footwhistle Temperature Graph	Footwhistle Relative Humidity Graph	Footwhistle Internal and External Temperature Graph
Gaden Cave	Gaden Cave Temperature Graph	Gaden Cave Relative Humidity Graph	Gaden Cave Internal and External Temperature Graph
Guillotine	Guillotine Temperature Graph	Guillotine Relative Humidity Graph	Guillotine Internal and External Temperature Graph
Gunns Plains	Gunns Plains Temperature Graph	Gunns Plains Relative Humidity Graph	Gunns Plains has no Internal and External Temp. Data
Jersey	Jersey Temperature Graph	Jersey Relative Humidity Graph	Jersey Internal and External Temperature Graph
Jewel Cave	Jewel Cave Temperature Graph	Jewel Cave Relative Humidity Graph	Jewel Cave has no Internal and External Temp. Data
Jillabenan	Jillabenan Temperature Graph	Jillabenan Relative Humidity Graph	Jillabenan has no Internal and External Temp. Data
Kelly Hill	Kelly Hill Temperature Graph	Kelly Hill Relative Humidity Graph	Kelly Hill has no Internal and External Temp. Data
King Solomon	King Solomon Temperature Graph	King Solomon Relative Humidity Graph	King Solomon has no Internal and External Temp. Data
Lake Cave	Lake Cave Temperature Graph	Lake Cave Relative Humidity Graph	Lake Cave has no Internal and External Temp. Data
Mammoth	Mammoth Temperature Graph	Mammoth Relative Humidity Graph	Mammoth has no Internal and External Temp. Data
Marakoopa	Marakoopa Temperature Graph	Marakoopa Relative Humidity Graph	Marakoopa has no Internal and External Temp. Data
Ngilgi	Ngilgi Temperature Graph	Ngilgi Relative Humidity Graph	Ngilgi has no Internal and External Temp. Data
Nikau	Nikau Temperature Graph	Nikau Relative Humidity Graph	Nikau has no Internal and External Temp. Data
Phosphate Mine	Phosphate Mine Temperature Graph	Phosphate Mine Relative Humidity Graph	Phosphate Mine Internal and External Temperature Graph
Shades of Death	Shades of Death Temperature Graph	Shades of Death Relative Humidity Graph	Shades of Death has no Internal and External Temp. Data
Spellbound	Spellbound Temperature Graph	Spellbound Relative Humidity Graph	Spellbound Internal and External Temperature Graph
Te Anau	Te Anau Temperature Graph	Te Anau Relative Humidity Graph	Te Anau Internal and External Temperature Graph
Trezkinn	Trezkinn Temperature Graph	Trezkinn Relative Humidity Graph	Trezkinn has no Internal and External Temp. Data
Yonderup Cave	Yonderup Cave Temperature Graph	Yonderup Cave Relative Humidity Graph	Yonderup Cave Internal and External Temperature Graph

The graph shows all of the data that has been provided for each cave site. Each data point is tagged individually so as you move your cursor over the graph you can see the date and time of the point as well as the temperature or relative humidity value.

There are limitations on the number of data points that can be displayed in a graph so we may need to restrict each graph to one year of data. The graphs and data will be adjusted accordingly as required.

If you want to "Zoom In" to a particular range of points to see finer detail, you can use the cross appearing on the graph as your cursor to select a rectangular shape around the data you want to examine and the graph will re-draw on the data selected. You can "Zoom In" multiple times if required, depending on the size of the data selected.

A Reset Zoom button appears on the graph to allow the "Zoom In" to be reset back to the entire data set.

Note that the data is collected every 10 minutes so the Time scale on the horizontal (x) axis may be lost if the data is zoomed past the overall graphs timescale.

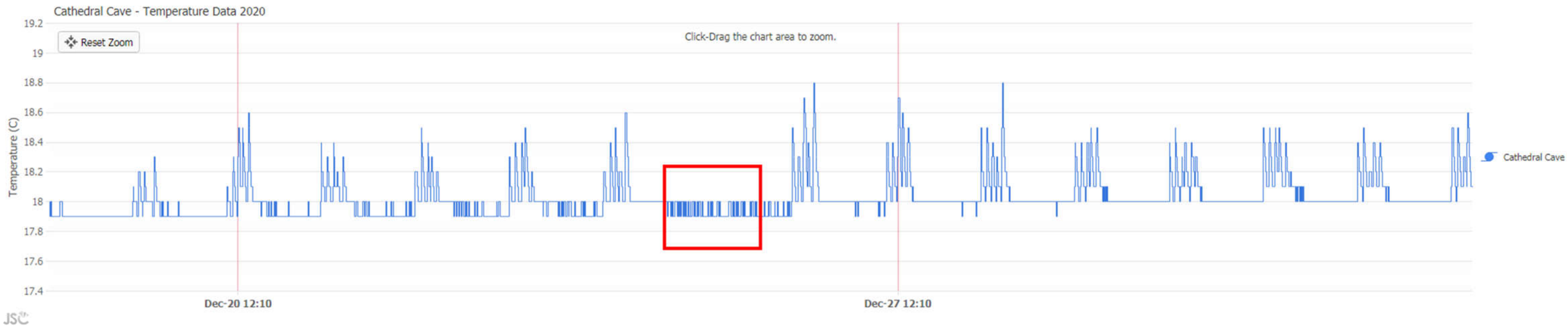
The Internal & External Temperature Graphs show the Internal Cave temperatures for the site as well as the External temperatures. This allows sites to correlate the possible effects of the external temperatures on the Internal temperatures of the cave.

The two lines on the Internal & External Temperature Graphs can be viewed at the same time but by clicking on the Legend items for each graph (e.g. Cathedral I and Cathedral E - as shown below) you will get different results.

Clicking on the Cathedral I legend item will remove that graph and only the Cathedral E line will be displayed. Clicking on the Cathedral E legend item will then remove the Cathedral E line. You can then display either line by clicking on either of the Legend items. You will note that the Temperature scales will automatically adjust as the lines are added or removed.

Please note there will be some delay in the removal or addition of each line in the graph, as you are dealing with over 20000 data points for each line.

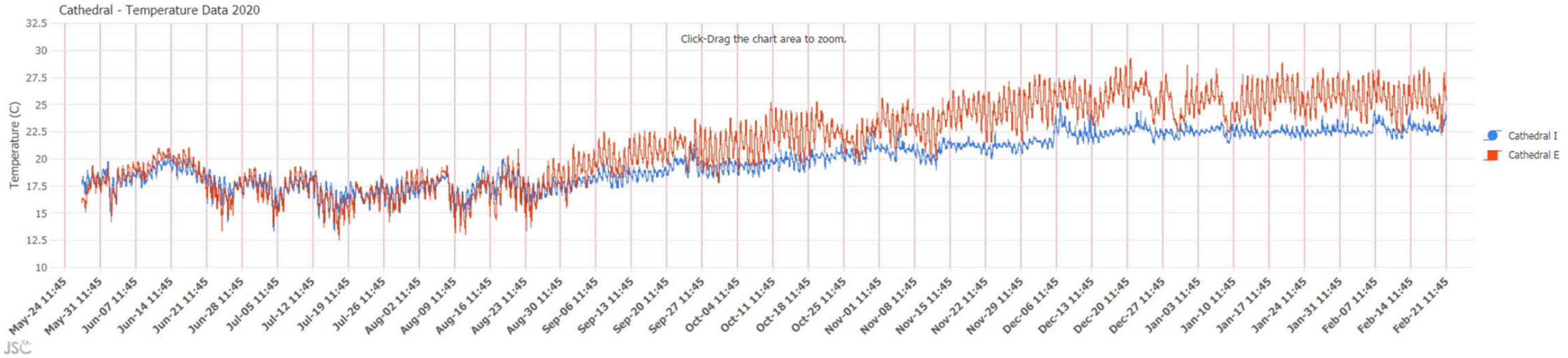
Here is an example from Cathedral Cave at Wellington, NSW, with some interpretation by Andy Baker. This uses the Zoom feature to interrogate the data around Christmas day.



This Temperature Graph is for Cathedral Cave at Wellington in New South Wales

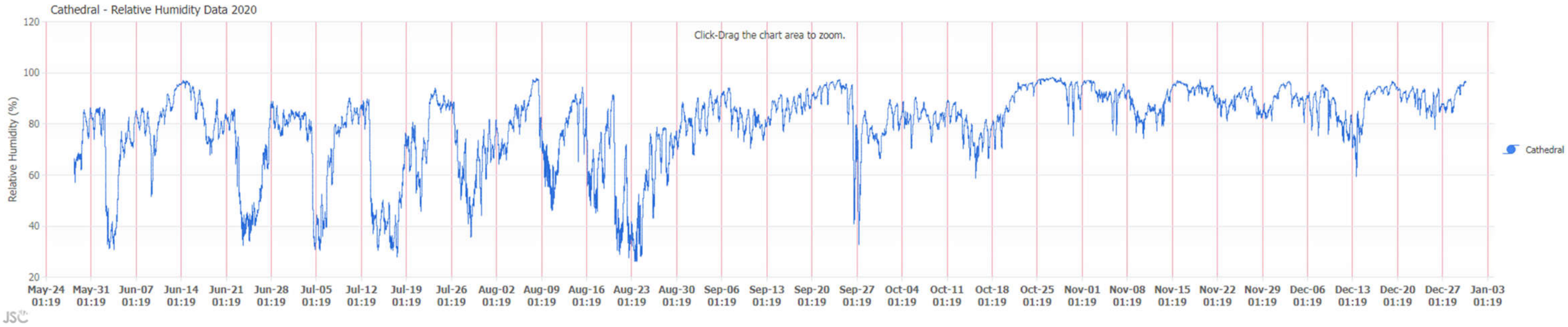
Temperature Graph Interpretation by Andy Baker
There are small temperature increases occurring after each cave tour, with larger peaks relating to higher visitor numbers, then the temperature drops between tours. Overnight, the temperature falls back to the overnight temperature for that time of year, good evidence for no long-term effect on cave air temperature. The daily temperature peaks were not there last June - it will be interesting to compare to this June. Zoom in to see the Christmas Day data. There were no tours that day as the cave was closed.

The red rectangle above is for Christmas Day 2020 and there are clearly no visitor-induced temperature changes.

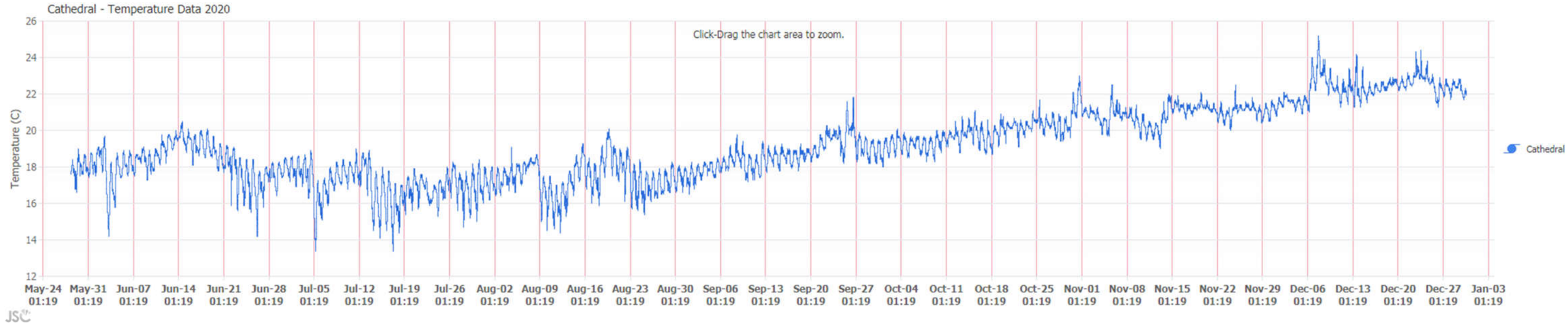


This External and Internal Temperature Graph is for the Cathedral which is a large chamber in the Capricorn Caves at The Caves in Northern Queensland

Another example of a Temperature Graph and a Relative Humidity Graph for the Cathedral chamber at Capricorn Caves are provided here but the interactive properties are lost on these screen captures. As further data is provided from sites it will be updated on the website and automatically incorporated into the existing graphs.



This Relative Humidity Graph is for the Cathedral which is a large chamber in the Capricorn Caves at The Caves in Northern Queensland



This Temperature Graph is for the Cathedral which is a large chamber in the Capricorn Caves at The Caves in Northern Queensland