# Final Year Project Preliminary Research Stage

3 - 4 hours research, not even past first page of google search: “weather balloons nz”

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Here are some websites/companies/sources of information pertaining to weather balloons in New Zealand.

Weather balloons are typically launched by weather stations all across the world twice daily at 1100 NZT and 2300 NZT. The payload is usually a [radiosonde](https://en.wikipedia.org/wiki/Radiosonde) This is part of an international effort to which [Metservice](http://metservice.com/national/home) is responsible for providing this on behalf of NZ. Of their 5 [locations](http://www.metvuw.com/upperair/) Whenuapai, the location of an RNZAF base, would be the most accessible due to its proximity to the DTA in Auckland.

A brief [blog](http://blog.metservice.com/weather-balloons) by metservice describes their process for launching weather balloons. They say that the maximum height of the balloon is determined by its construction (size and surface strength). The balloon expands as it rises in altitude until it finally bursts. Metservice balloons commonly reach altitudes of 70,000 feet, much more than we need.

Visual and radar tracking has been used in the past however, as expected, GPS is used now. They say pressure measurements can be made from GPS altitude function.

Their typical balloon weighs 350g before inflation and can carry a typical load of 1.1kg.

A contractor provides balloon launches for Metservice; perhaps they are worth contacting. However, it may be worth talking to the DTA first to see if this has been done in the past by RNZAF or DTA.

They say a balloon flight takes between 60 and 90 minutes on average. It is unclear how they define a flight (I presume take off to nominal altitude).

I know this is only a [newspaper article](http://www.nzherald.co.nz/wairarapa-times-age/news/article.cfm?c_id=1503414&objectid=11344054) that describes a recovered Metservice radiosonde but it is some initial info. They say that the balloon cost approximately $250 to launch from the Paraparaumu site. Uses a 40cm by 40cm biodegradable target made of cardboard and aluminium foil. This serves to slow the fall and means they can use RADAR tracking. Could be a cheap way of tracking, however, it is more likely that we will use gps for our device anyway. Power consumption will need to be considered for a 60min ascent though.

For that launch, the highest altitude was 69,000 feet and measured the coldest temperature of -63 degC at 40,000 feet (our nominal altitude target). Clearly we are going to have to carefully consider thermal management. The strongest wind was 70km/h

I found the federal meteorological [handbook](http://www.ofcm.gov/fmh3/text/default.htm) which provides info for launching weather balloons in the US. (system/antennas/launch procedures etc.) Haven’t read it but could prove to be an unofficial guide for build and launch considerations. Perhaps there as a New Zealand equivalent.

[Forum](http://www.weatherforum.org.nz/phpBB3/viewtopic.php?f=2&t=5005) about non-routine balloon launches in NZ. “weatherforum” - could be a useful resource. Haven’t had a good read but contains a few links about weather balloon launches.

I found this reddit [post](https://www.reddit.com/r/auckland/comments/2fyqn7/anyone_knows_where_to_buy_a_weather_balloon/) in which a guy said he got authority to launch weather balloons from [Airways](http://www.airways.co.nz) who manage NZ air space on behalf of the CAA. They provide a link to [Airshare](https://www.airshare.co.nz) which provide info on UAVs in particular. Here you can register UAV flights in airspaces across the country. Even if we get specific authority from elsewhere for large flights, this could be useful for small test flights in CHCH.

## Further Research

* GPS weather balloon tracking (position/altitude)
* Find the contractor for metservice
* Research balloon ascent paths to determine how far they move in wind
* Check civil aviation authority for rules/resources on UAV and weather balloon flights (maybe RNZAF can provide liason/advice) The military has their own exceptions to civil aviation rules so worth checking
* Find published research on balloons/weather/UAV aviation