MetService and DEEPWAVE

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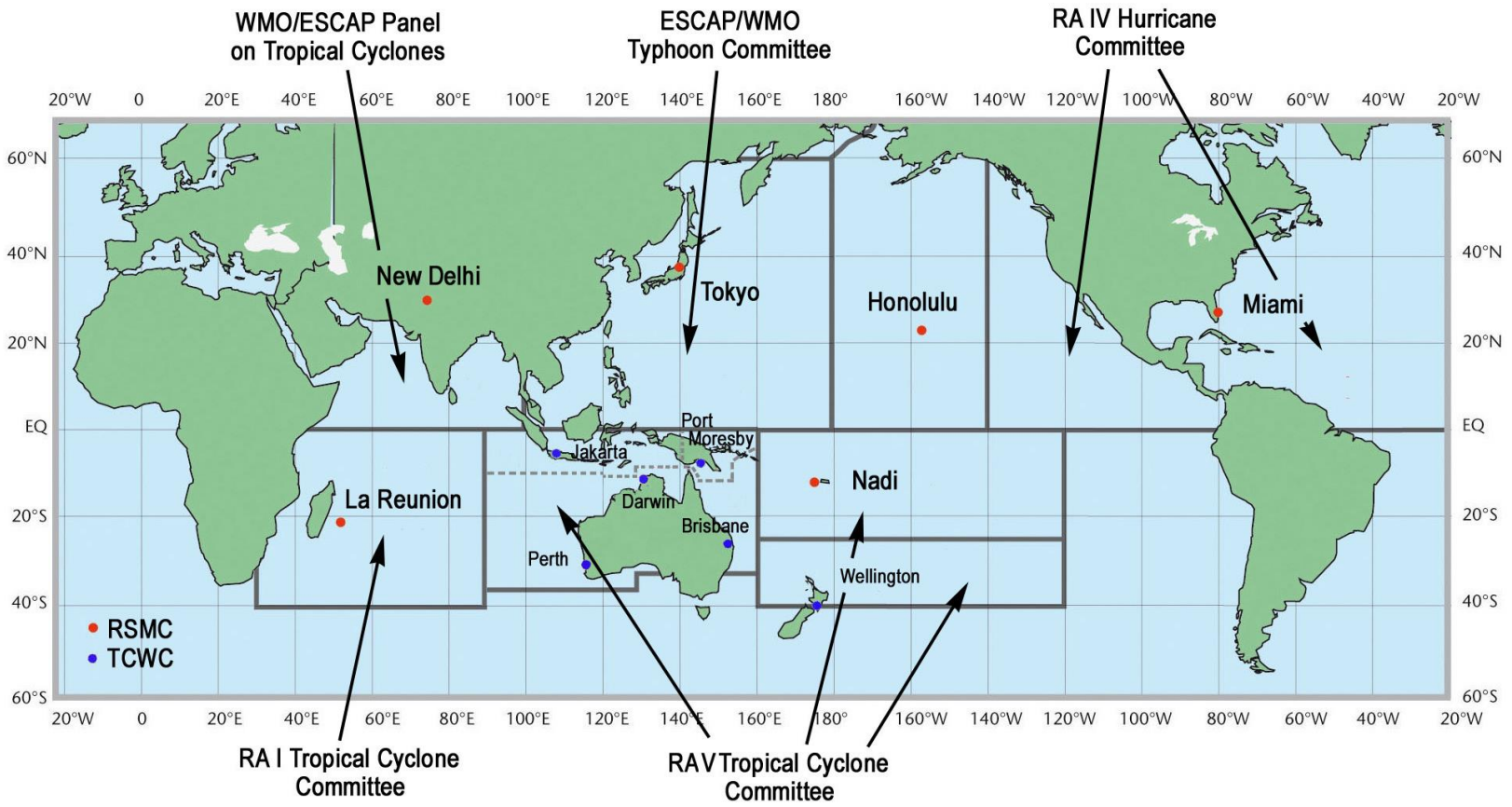
MetService: brief overview

- New Zealand's National Weather Service
- State-Owned Enterprise
- Many decades of knowledge / experience:
  - Observing systems (New Zealand and Pacific)
  - Numerical modelling
  - 24 x 7 forecasting operations
- Strong involvement in WMO activities
- Outside of New Zealand, MetService owns forecasting operations in Australia and United Kingdom largely focused on the energy market

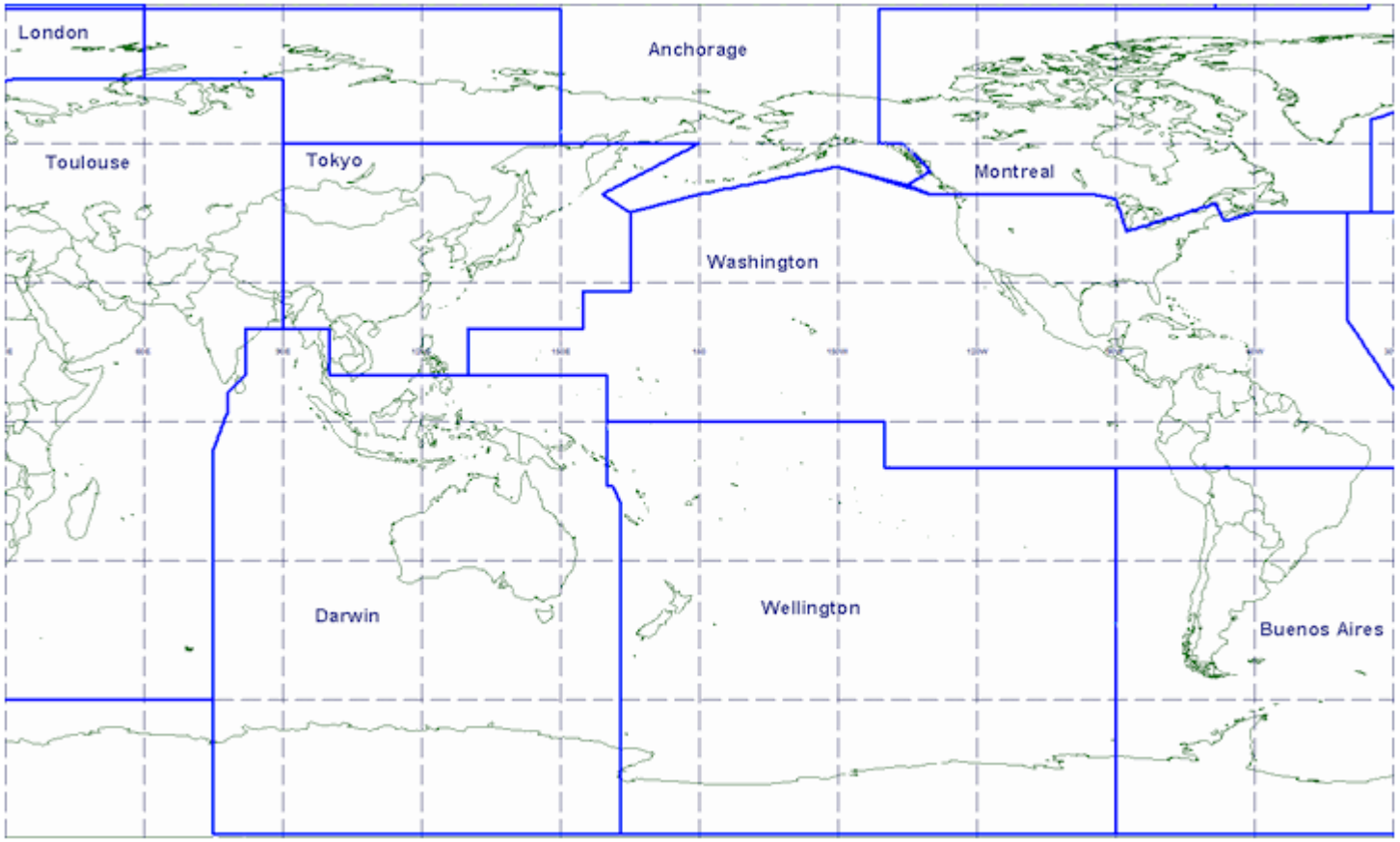
Areas of responsibility: tropical cyclones

TCWC Wellington



Areas of responsibility: volcanic ash

Wellington VAAC



Areas of responsibility: SIGMETs

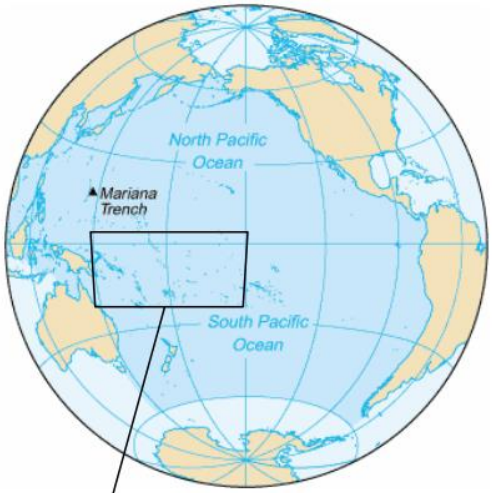
Wellington Meteorological Watch Office

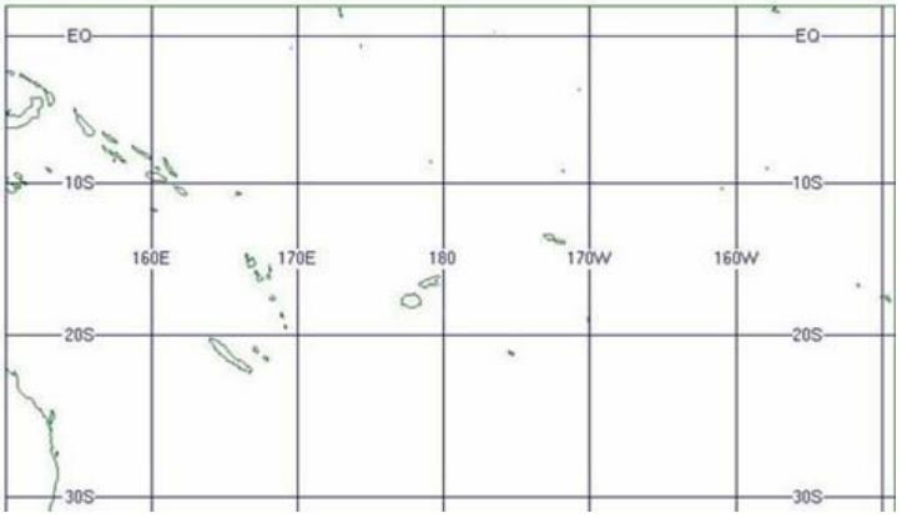
Areas of responsibility: high seas

New Zealand as Issuing Service

Areas of responsibility: regional severe weather

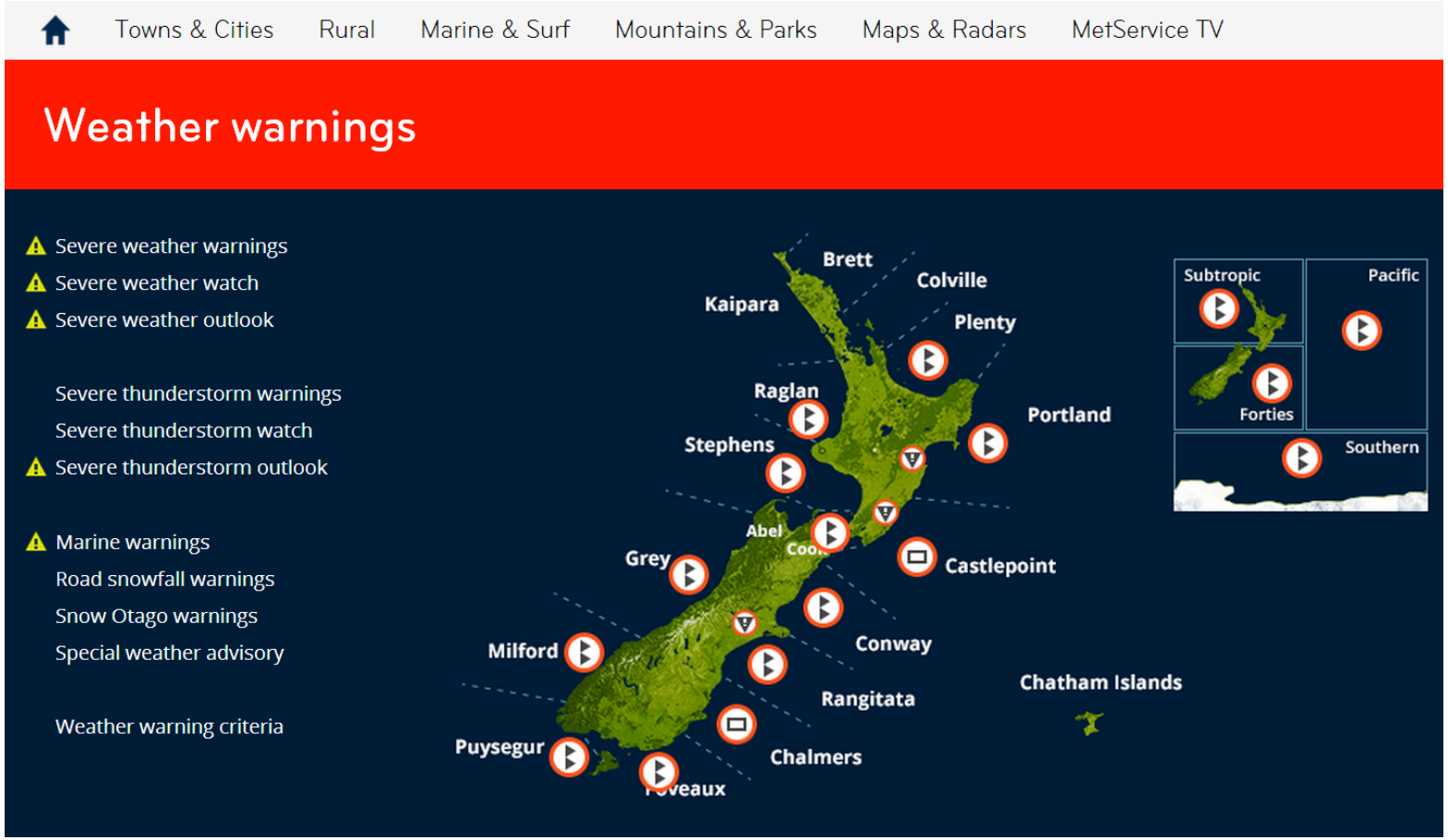
Wellington as Lead RSMC





Areas of responsibility: local severe weather

MetService as Responsible Agency under National CDEM Plan



Scientific focus: operational forecasting

- 65-odd on-shift meteorologists* organised in groups:
  - Severe weather
  - Regional, including RSMC / TCWC responsibilities
  - Marine, including GMDSS responsibilities
  - Public / media
  - Aviation
- Average operational meteorologist experience
  - Severe weather: ~ 19 years
  - Regional and forecast policy: ~ 13 years
  - Overall: ~ 12 years

* Either ab-initio-trained at MetService or recruited from overseas with technical backgrounds and experience which well exceeds the WMO Meteorologist standard

Scientific focus: modelling, NWP data, research

- Multi-model approach*: ensembles and model “flavours”
    - Global: UKMO, ECMWF, etc.
    - Local: various configurations of WRF
- Tuning models to work best for New Zealand (land use, orography, etc.)
- Customisation (using information theory) of forecast products for decision-making – both by external customers and by forecasters
- 10 scientists; strong mix of physics, maths, computer science
    - Remote sensing
    - Statistics
    - Modelling of physical processes
    - Synoptic and mesoscale meteorology
    - Software development

* 91 different models; 226 forecasts per day; and all are wrong

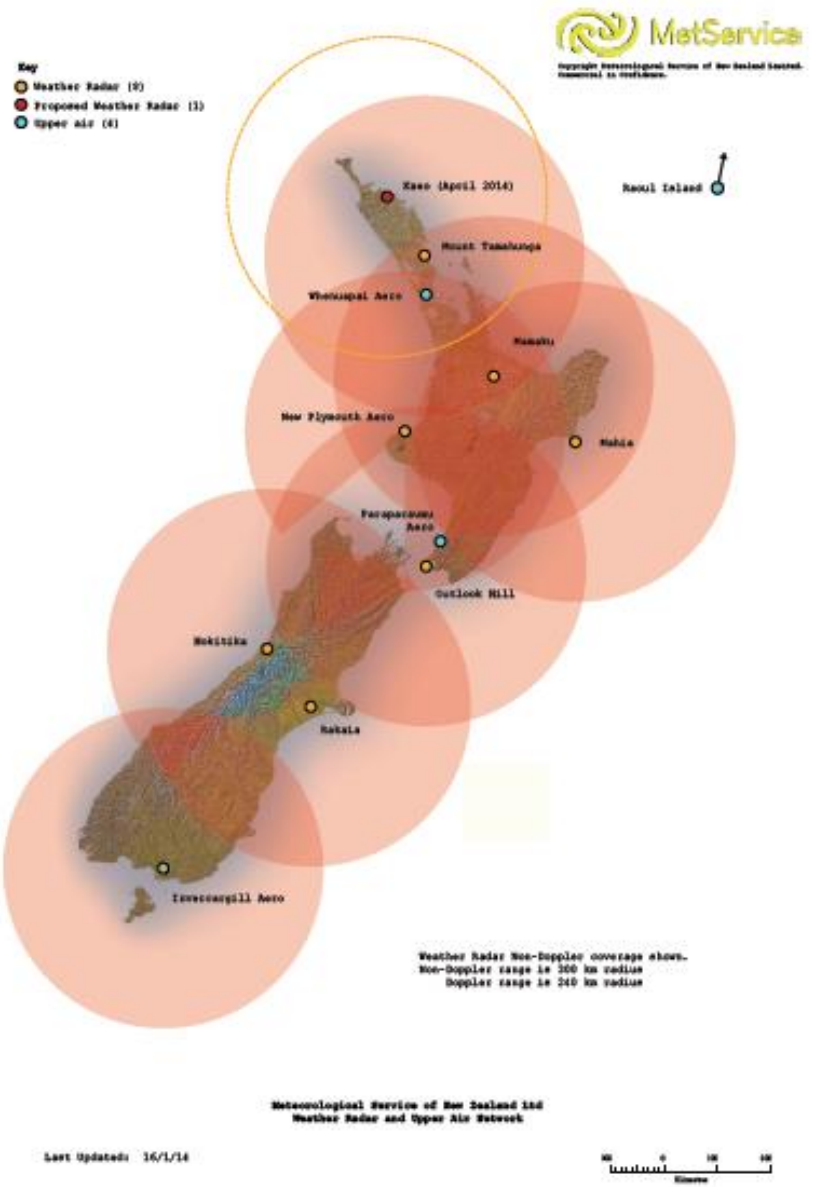
Radar and Upper Air

Doppler radar

- Scans every 7.5 minutes
- Dual-polarised radar near Hokitika and conventional radar near Christchurch
- Selected PPI-type imagery available via MetConnect
- Polar volume data available
- Coverage shown on slide after next

Upper Air

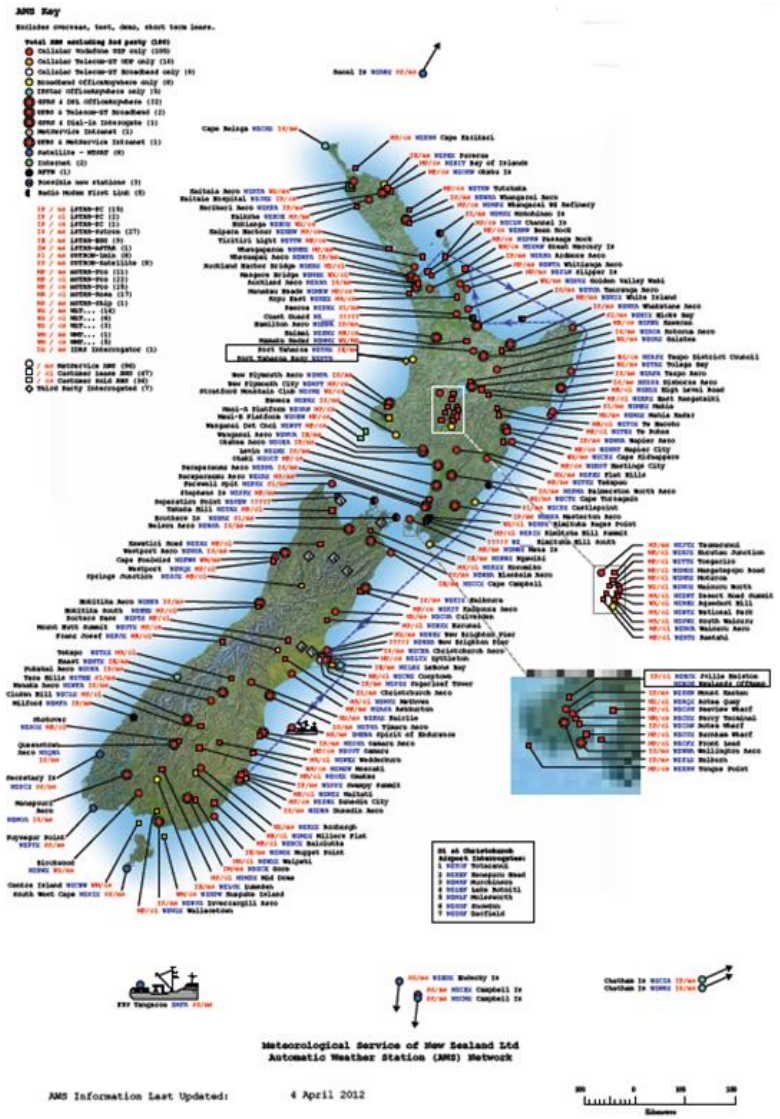
- Whenuapai, Paraparaumu, Invercargill
- 0000UTC and 1200 UTC (midday and midnight in New Zealand Standard Time)
- Standard and significant levels
- Can modify hardware and software at Invercargill to provide 10-second data – at a cost, and would need a reasonable period of notice



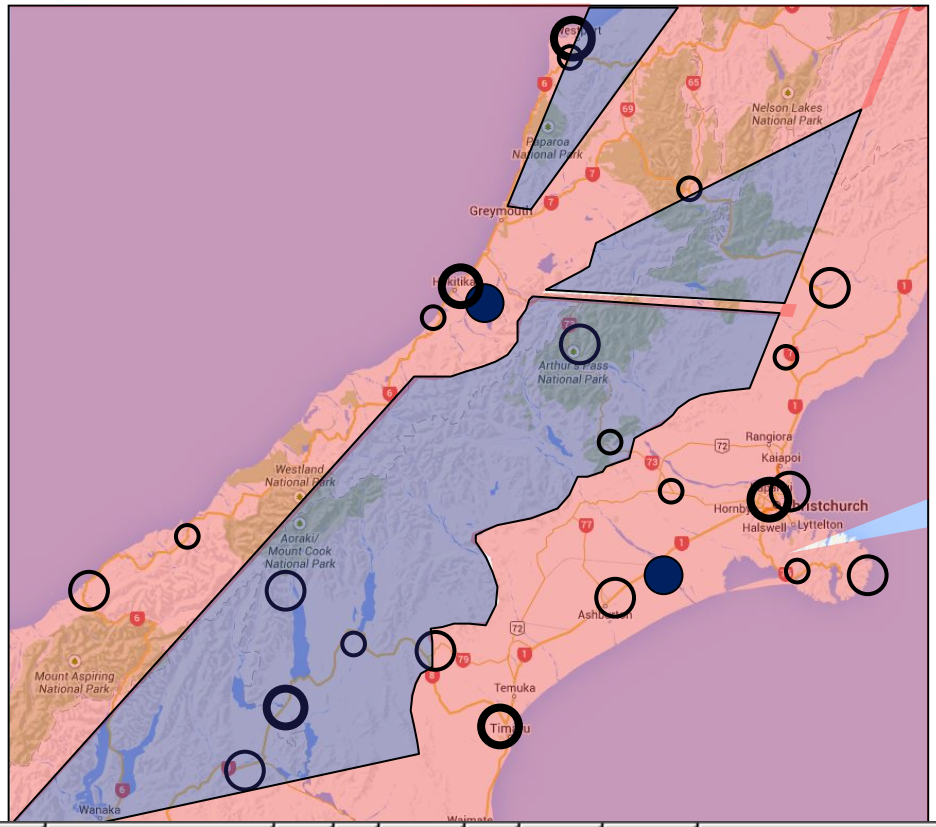
Surface observations

- About 200 automatic weather stations
- Most report every minute
- Data of very high technical quality
- Like radar and upper air:
  - Regularly calibrated
  - Strict maintenance service level agreements in place

- Also gather observations from drifting buoys and voluntary observing ships



Weather stations in project area



Weather radar coverage at 0.5 degree beam elevation

Weather radar coverage above 2 degree beam elevation

Weather radar

Full AWS (includes cloud, visibility, present weather)

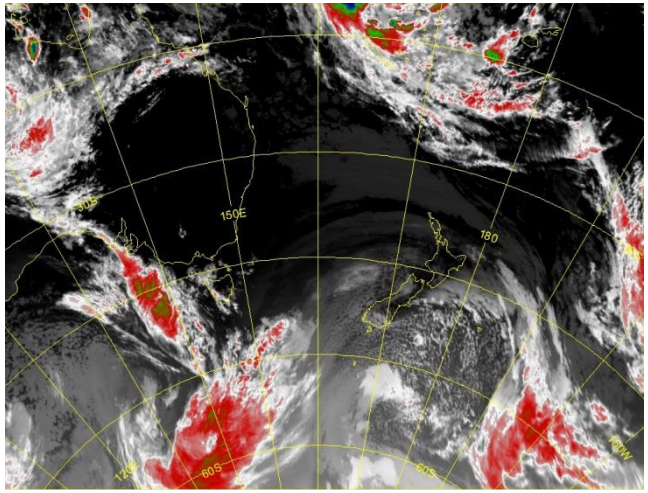
Standard weather station

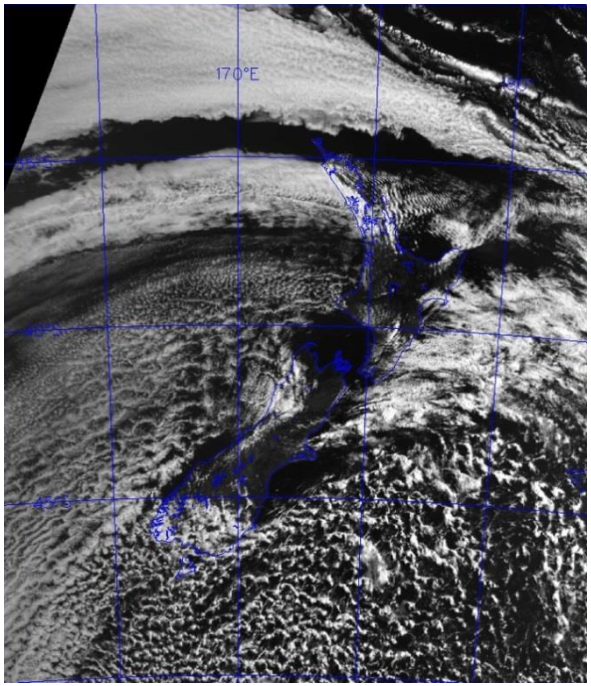
Road weather station

▲ ID	VALID	ddd	ff	fm(10)	GG	VVVV	ww	Clouds	TT	Td	RH(1)	PPPP	RRR	WBPT	RMK
WSA	17-Jan-2014 03:00	220	19	29	32	17KM	-SHRA	SCT035/// SCT049/// BKN060///	14.1	8.7	70	1008.2	0.0	10.7	
SJX	17-Jan-2014 03:00	300	02	06	14		//		11.6	3.5	58		0.0		
ASA	17-Jan-2014 03:00	190	26	39	39		//		15.9	2.0	39		0.0		

Satellite data

- Geostationary:
  - Hourly MT-SAT imagery available via MetConnect
  - Raw-ish hourly MT-SAT data (GRIB) available soon
- Polar-orbiting:
  - Various satellites received / processed
  - Raw-ish hourly data (again, likely to be GRIB) could be made available – but probably some cost involved





Identifying sources

- From https://ams.confex.com/ams/19Fluid17Middle/webprogram/Paper226862.html: " …_waves that don't seem to be connected with any topography … "