DISPERSION MODELLING OF PARTICULATE MATTER CONCENTRATIONS AT THE INTRAURBAN SCALE: EPIDEMIOLOGICAL APPLICATIONS

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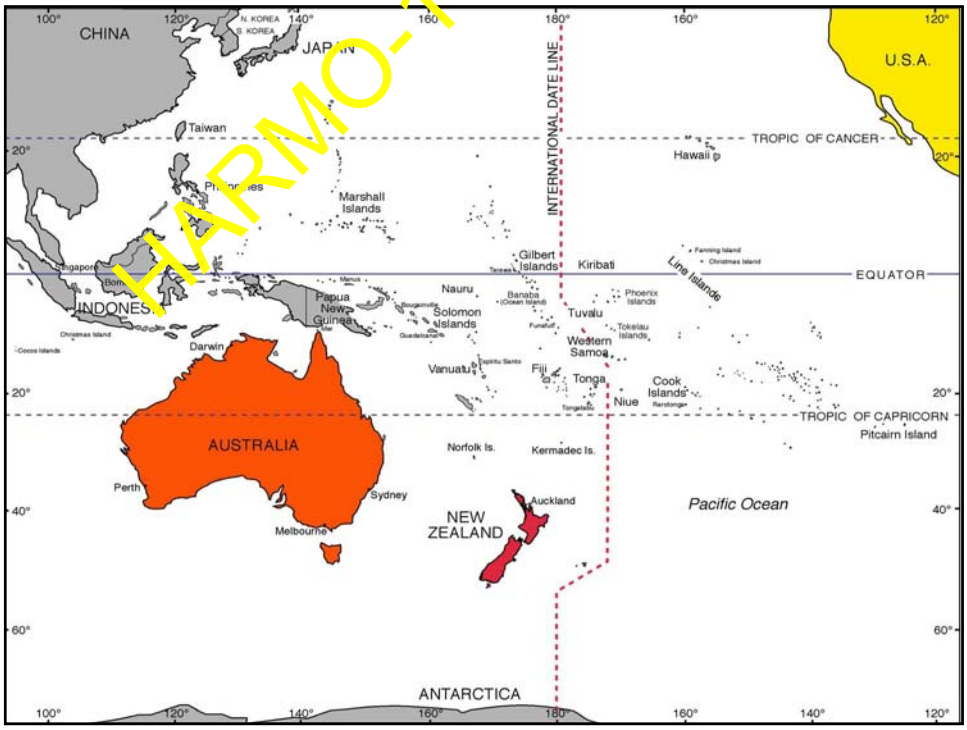
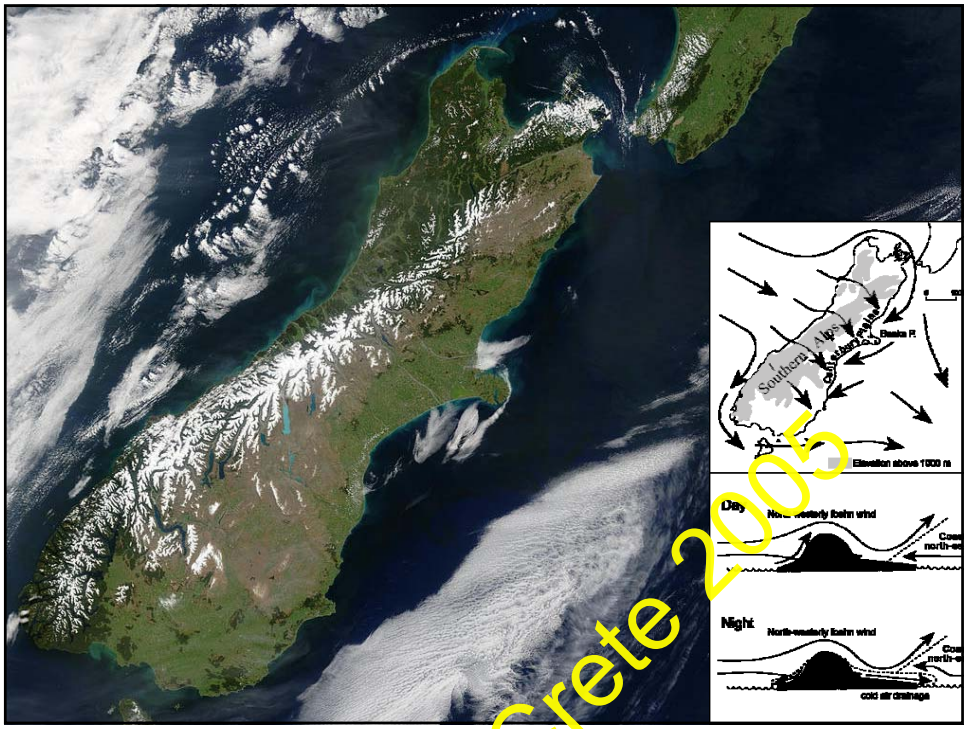
10th International Conference on Harmonisation within Atmospheric Dispersion Modelling for Regulatory Purposes

HARMO-10 Crete 2005

UC UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND





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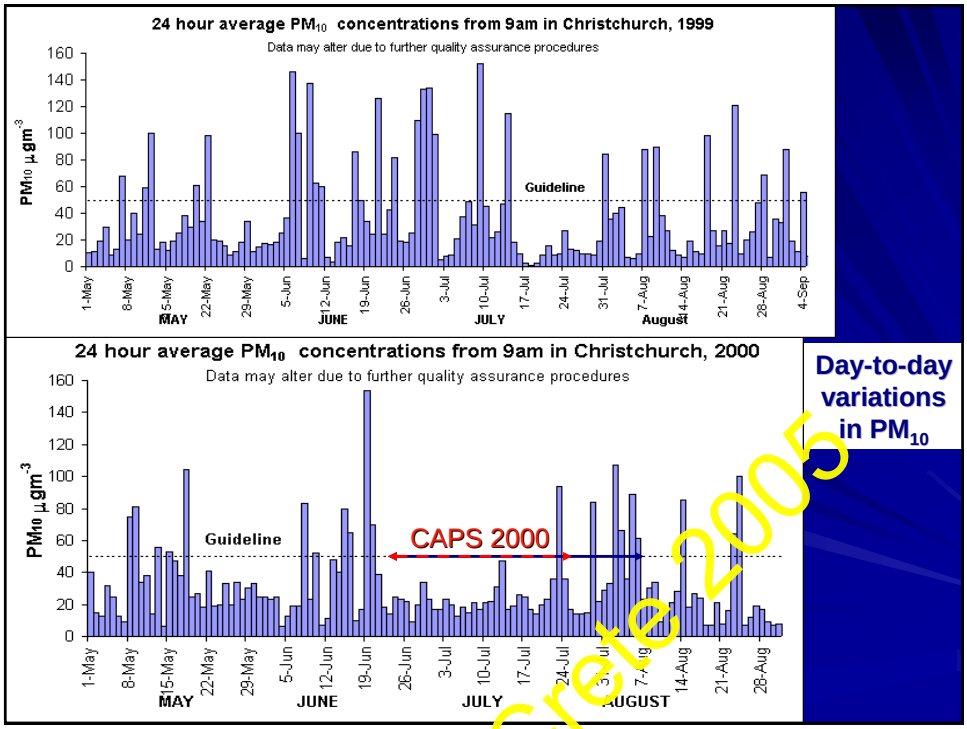
Background to the air pollution problem

- Poor dispersion characteristics due to the formation of a nocturnal inversion layer
- Emissions from solid-fuel burners
- Some contribution from traffic



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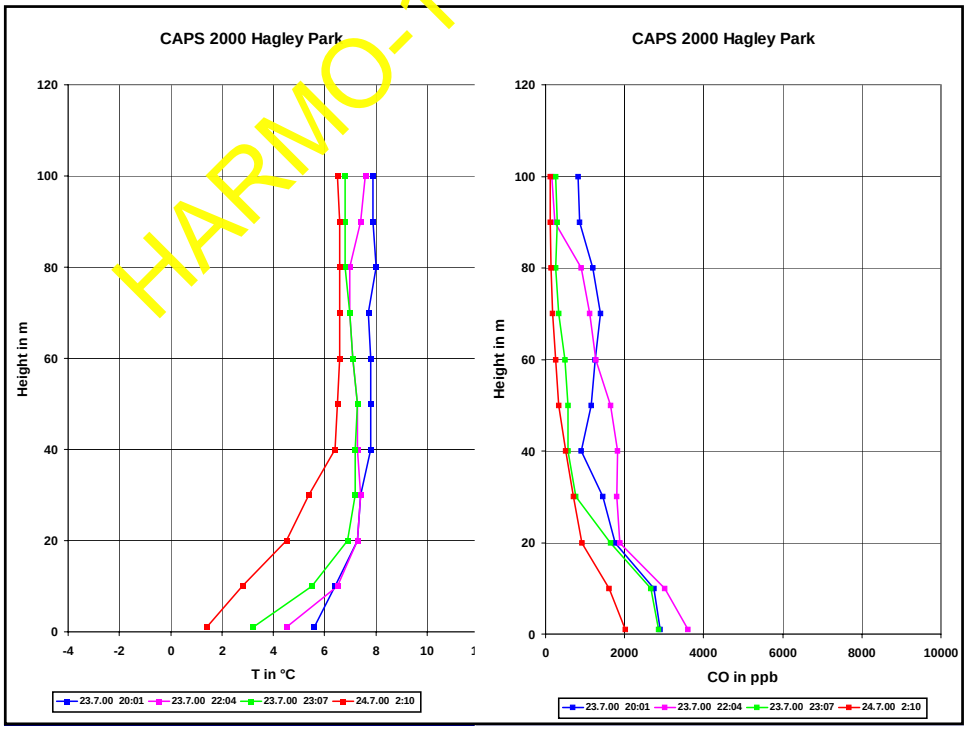
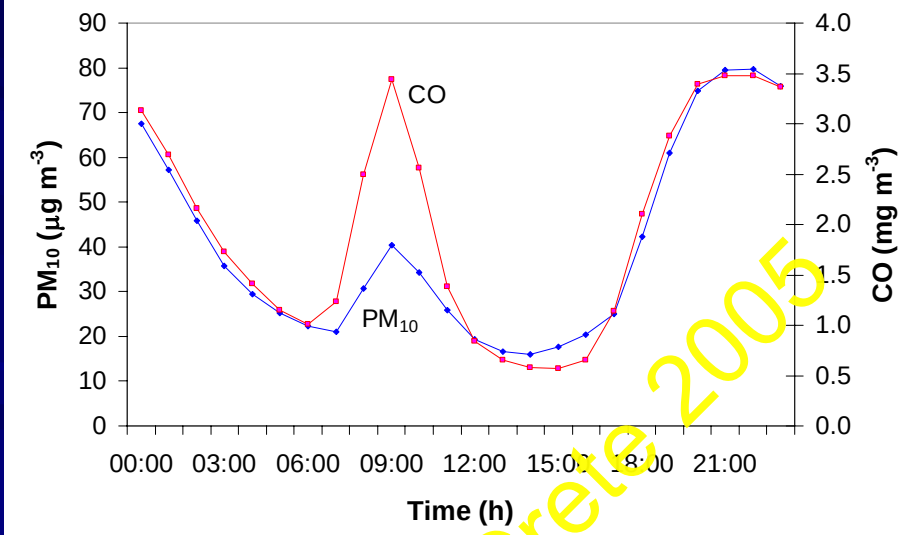


Diurnal cycle of PM_{10} and CO (average of 1988-99 winter days)



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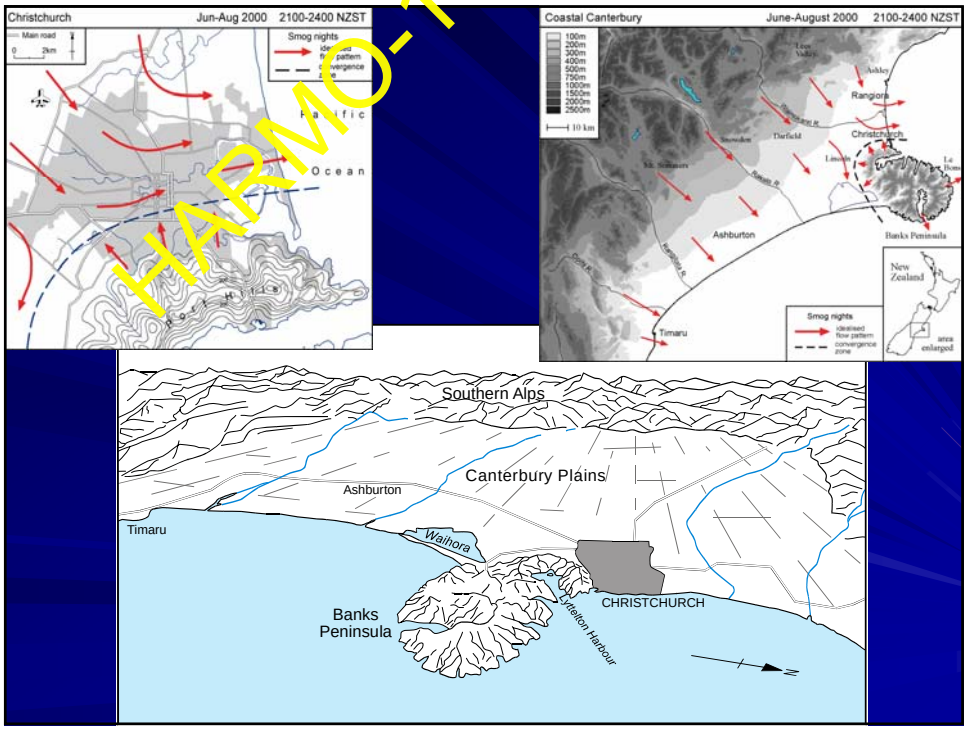

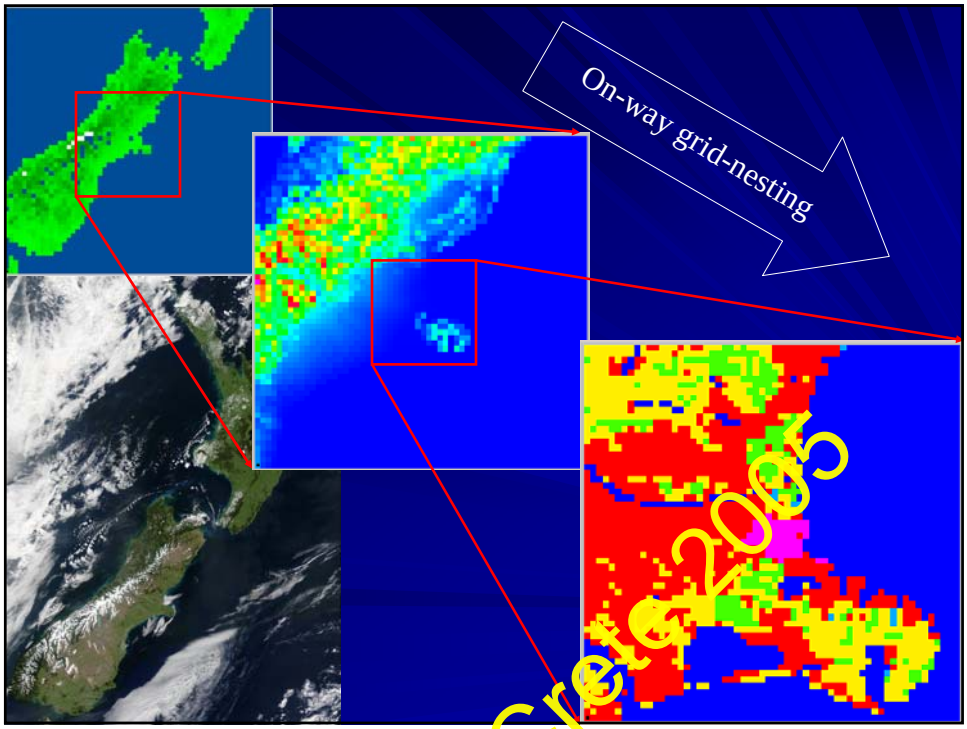

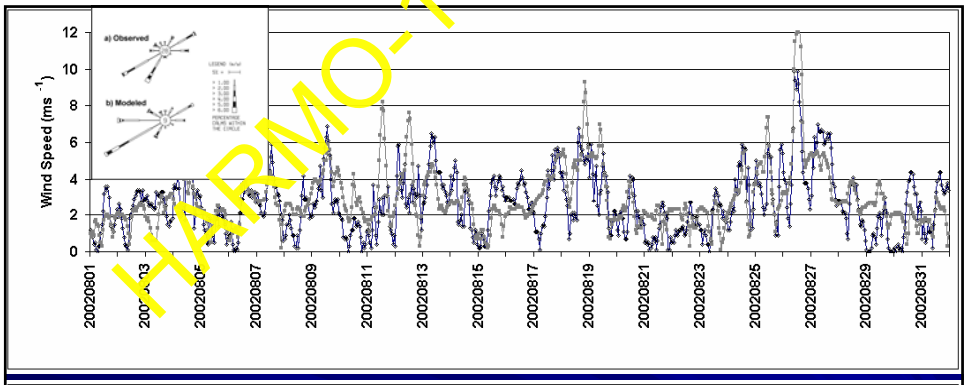

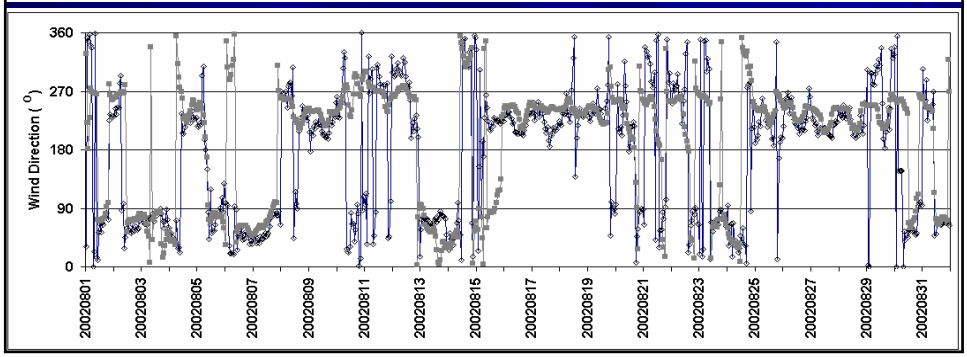

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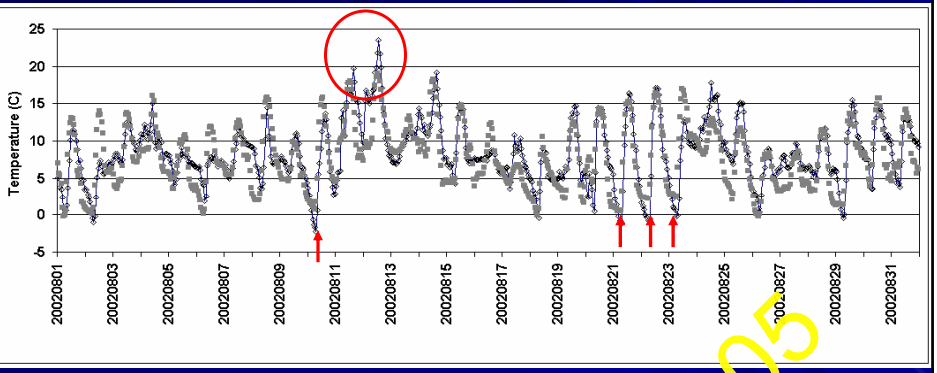

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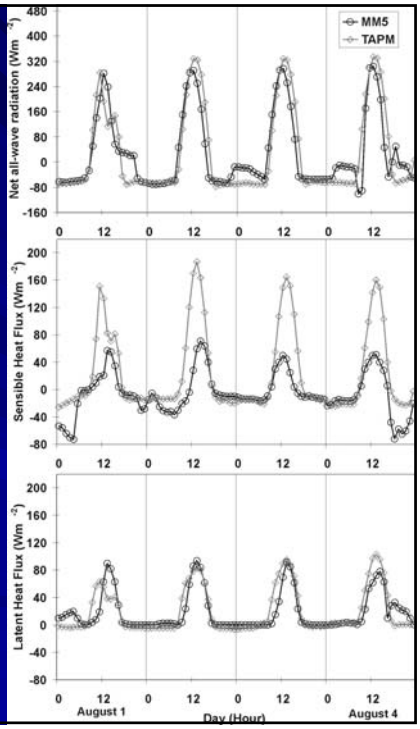
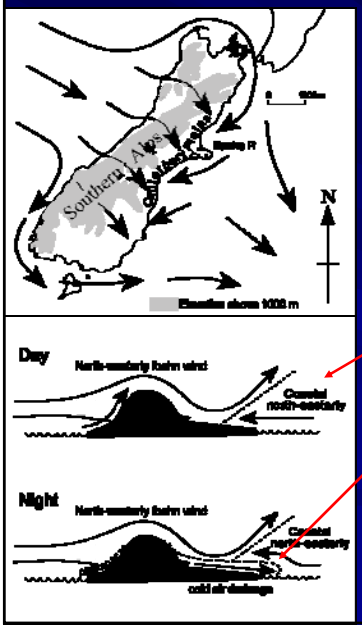
Net-all wave and Surface Energy Balance

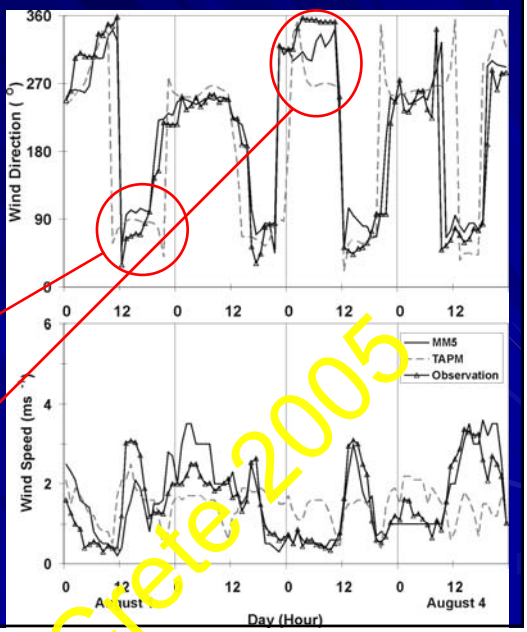
$$Q^* = Q_F + Q_L + Q_G$$

- Q^* = net-all wave energy
- Q_F = Sensible heat flux
- Q_L = Latent heat flux
- Q_G = Ground heat flux



Local Winds





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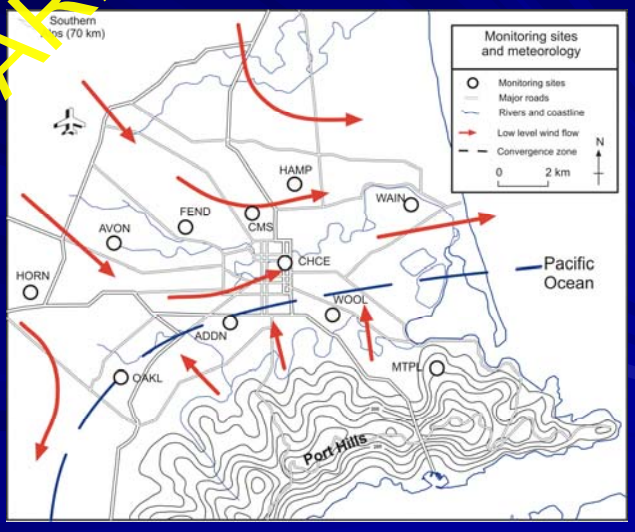
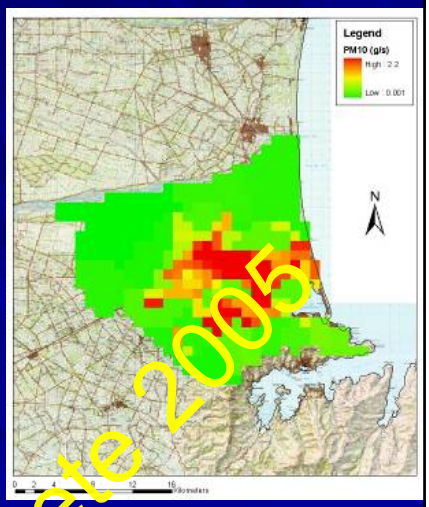
Monitoring Network



PM_{10} Emission Scenario

- Prepared by Environment Canterbury
- Coarse temporally
- Represents a 'typical winter day'
- No weekday, weekend differences.



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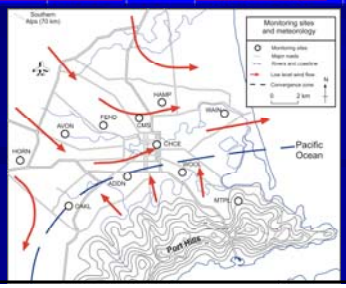
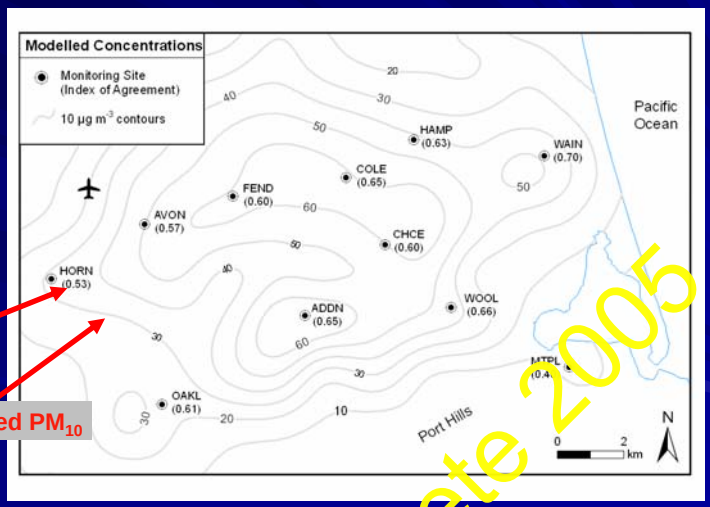
Site ID	Observed					Modelled				
	n	Mean ± SD*	Min*	Max*	Ex[1]	Mean ± SD*	Min*	Max*	Ex[1]	COD[6]
HAMP	59	47.8 ± 29.2	[illegible]	133.0	19	35.1 ± 30.0	2.1	114.6	16	0.44
CHCE	58	44.7 ± [illegible]	[illegible]	148.9	20	64.4 ± 55.0	4.7	205.5	28	0.42
FEND	59	43.6 ± [illegible]	11.0	132.8	19	59.1 ± 42.9	5.2	156.8	29	0.37
ADDN	59	[illegible]	14.5	147.5	19	66.8 ± 50.8	5.2	188.0	32	0.37
WOOL	59	52.[illegible] ± 33.2	13.7	171.3	23	46.5 ± 32.9	4.8	124.8	27	0.39
WAIN	59	[illegible] ± 30.7	9.3	154.0	23	53.3 ± 39.8	5.8	144.5	28	0.36
AVON	58	40.5 ± 21.8	3.2	95.4	18	41.5 ± 30.5	6.7	122.7	20	0.34
OAKL	58	44.1 ± 26.7	11.2	167.2	18	20.8 ± 16.7	2.3	85.6	3	0.49
MTPL	59	16.3 ± 8.0	1.9	38.9	0	10.9 ± 7.5	1.9	35.1	0	0.42
HORN	59	41.7 ± 18.3	7.3	93.6	19	35.5 ± 23.9	6.6	104.6	14	0.33
COLE	59	53.6 ± 34.5	7.6	144.5	27	65.3 ± 51.9	4.8	189.5	32	0.40
MEAN	59	42.9 ± 25.3	8.8	128.3	18	43.4 ± 33.0	4.5	128.2	20	0.39



Average PM_{10} (June 2003 and June 2004)



IOA

Modelled PM_{10}

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