Queensland Cloud Seeding Research Program
QCSRP

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Project overview

Due to increasing demands on water supplies and the negative effects of climate variability and change, south east Queensland frequently suffers severe water shortages. Based on recent scientific advances in cloud seeding techniques, a research project was commissioned by the Queensland Government in 2007. The aim of the project is to investigate the potential for cloud seeding technologies in the Somerset and Wivenhoe catchments of south east Queensland as part of the solution to the regions water shortages.

The ongoing project has involved over 40 dedicated personnel, research aircraft and the Bureau of Meteorology's advanced weather radar facilities located at Redbank Plains and Mt Stapylton. During the first season, which took place from December 2007 to March 2008, randomised seeding experiments were carried out to quantify the effect of hygroscopic seeding using pyrotechnic flares which release small particles of potassium chloride at the base of convective clouds (Bruintjes, 1999).

Research into the climatological characteristics of precipitation in the target area including the frequency of cumulus clouds suitable for seeding has also been undertaken. The CP2 polarimetric radar at Redbank Plains and the local Bureau of Meteorology radar network are used to evaluate the effects of seeding on precipitation flux, duration and storm dynamics including secondary cell initiation. Radar estimates of precipitation are calibrated using a ground-based video disdrometer. Cloud microphysical data was collected by the research aircraft which was equipped with over 20 microphysical recording instruments.

The program has been highly successful in providing cloud statistical data for the target area in addition to evaluating aircraft based hygroscopic seeding activities. Sub-tropical maritime warm shallow convective clouds rather than the more potentially suitable deep convective cloud systems were a feature of the first seasons weather. Although positive trends in terms of increased cell duration are apparent in the data, the number of randomised cases (27) is not sufficient to draw statistically significant conclusions regarding the efficacy of hygroscopic seeding of these clouds. This important scientific research program has continued into the 2008-2009 season. Based on results to date there is strong incentive for further research into the hygroscopic seeding of deep convective clouds throughout south east Queensland and its potential for inland catchments.

Bruintjes, R. 1999 A review of cloud seeding experiments to enhance precipitation and some new prospects. Bull. Am. Met. Soc. 80(5) 805-820.

Tessendorf, S.A., and co-authors, 2008: Preliminary observations of cloud and precipitation characteristics in the Brisbane, Australia region. International Conf. on Clouds and Precipitation, International Commission on Clouds and Precipitation, Cancun, Mexico

Craig I[1], Stone R [1], Bruintjes R[2], Tessendorf S[2], Axisa D[2], Dixon M[2], Pocernich M[2], Brandes E[2], Ikeda K[2], Wilson J[2], Roberts R[2], Breed D[2], Ziady L[2], Peter J[3], Manton M[3], Seims S[3], May P[4] Keenan T[4], Glasson K[4], Gunn B[4], Collis S[4], Abbs D[5] Piketh S[6], Orsmond R[6], McGarry H[6], Edwards S[6], Burger R[6], Kruger H[6], Wiggins G[6], Hingst J[6], Broccardo S[6], Nierop N[6], Waal K[6], Kroese N[6], Nchpa X[6], Brailall S[6], Walton N[6], Brady P[7], Choma G[7], Smith D[7], O'Donnell N[7], Carr J[7], O'Doherty N[7] McRae D[8] Fitzmaurice L[8]

1 University of Southern Queensland (USQ); 2 US National Centre for Atmospheric Research (NCAR)
3 Monash University, Melbourne (Monash) 4 Australian Bureau of Meteorology (BoM)
5 Commonwealth Scientific and Industrial Research Organisation (CSIRO)
6 Witwatersrand University / South African Weather Service (WITS/SAWS)
7 Weather Modification Inc / MIPD (WMI / MIPD)
8 Queensland Climate Change Centre of Excellence/Environmental Protection Agency (QCCCE/EPA)

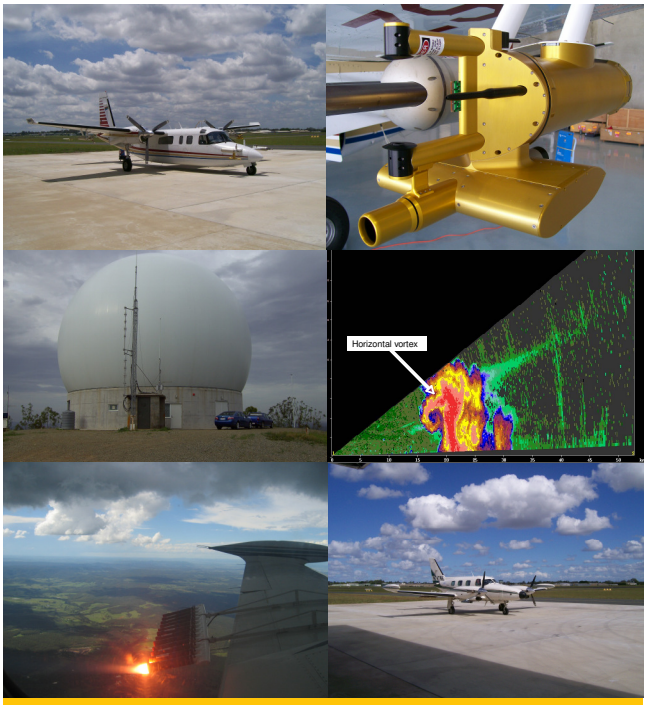
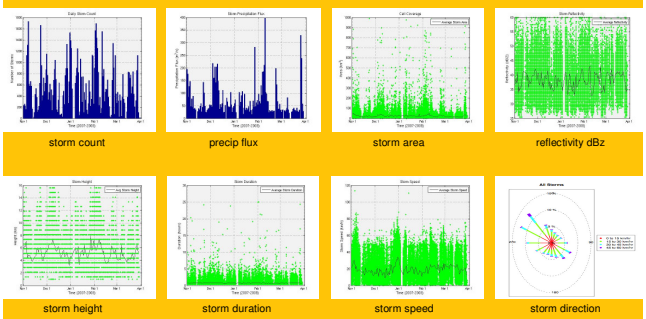
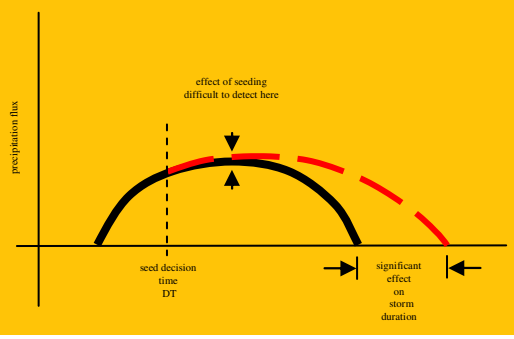


Figure 1: SAWS/WITS Aerocommander 690A research aircraft (upper left), DMT CAPS probe (upper right), BOM/NCAR CP2 dual wavelength polarimetric radar (centre left), vertical section image through a hail storm (centre right), hygroscopic flare in operation below a convective cloud (lower left), WMI/MIPD Cheyenne II randomised seeding aircraft (lower right),





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