

Reg Clarke: life and work

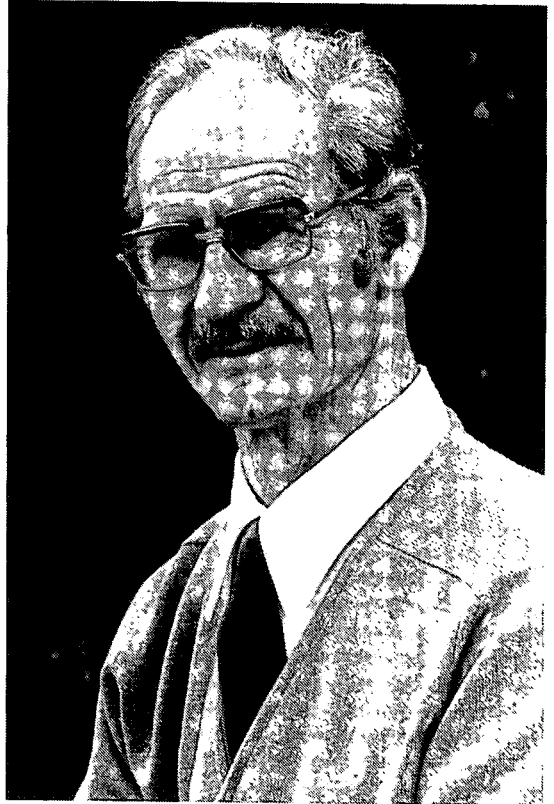
We meet today to hear a series of talks on problems that were of continuing interest to Reg Clarke during his years of research at CSIRO in Aspendale, those of his leadership of the Australian Numerical Meteorology Research Centre, and his final year of active and then increasingly restricted retirement. Most of our speakers have worked directly with Reg; all have been affected by his passionate interest in and concern for his science of meteorology, and by his wider interest in his physical and social environment. Reg Clarke was in many ways an unassuming man, but he was one of a small group that has established standards and has contributed to the international acceptance of Australian meteorology. The speakers who follow me will concentrate on the science of meteorology; I shall start by surveying briefly Reg's life, using notes prepared for his Cremation Service at the Wilson Chapel on 15 June 1990.

Reginald Harry Clarke was born on 1 December 1914 and died on 12 June 1990. He was the oldest of a battling family of eight children brought up on a farm in the dry wheat belt of northern South Australia. His English teacher at Adelaide High recognised him as intelligent, but limited by his background. In spite of this he became a meteorologist and scientist whose influence on meteorology in Australia was splendidly positive and whose effect on younger workers was immense.

Throughout his life, Reg was driven by curiosity in the very best intellectual sense, and was passionately concerned to develop the science of meteorology in Australia; an able scientist but a humble man; generous in the support he gave others, but firm in the standards he set himself; a man with strong love of family, and an excellent but sometimes shy friend.

Had it not been for his mother, who had herself been a primary teacher, Reg might as eldest son have stayed on the farm. In any event, he enjoyed school far better than the long hours of farm work, and a series of scholarships took him through training college to a BSc at Adelaide University and later to a BA. His BA included English, Latin, ethics, psychology and education and he regretted that Greek was not available. Thus Reg was a scholar in the true tradition.

In 1940 he joined the Air Force and was put in the Meteorological Branch, a chance of fate that fitted well with his inclinations. There he learned of the hazards to aircrews presented by 'fronts



and 'fog', and his interest in sea-breeze and other fronts lasted until the end of his life. Soon he was off using his precious ration of petrol to track the sea-breeze front between the coast and Canberra, a sign of his lifelong interest in field observations. At the end of the war he joined the Commonwealth Public Service, but fate had decided and he was immediately returned to the civilian equivalent of his former job, OIC Meteorological Office, Canberra Airport.

There were then three parts to Reg's career, and you must excuse me if I cover them all too briefly.

From 1949 until 1957 he worked in the Air Mass and Frontal Analysis section, forerunner of

the National Meteorological Analysis Centre in the Bureau of Meteorology in Melbourne. There was some resistance from the Regional Offices to the charts sent out from AMFA and too little data to do a decent job. Reg became dissatisfied and wanted 'to do research rather than draw lines on maps'. In modern terms he was I suppose a bench forecaster at the Bureau.

In 1957 he joined Bill Priestley's section at Aspendale and worked first with Andreij Berson for whom he had a very great respect, and then Keith Ball and many others; he had also a warm memory of Bill Priestley's guidance at that time, and I must say that Bill is another of our founding fathers. Reg developed tremendously as a scientist at Aspendale. He was always ready to do a synoptic analysis, but his technical development was on the one hand in field experiments and on the other in numerical techniques for solving the differential equations for the atmosphere, and these three made him a broad and effective scientist. I should say also that meteorology remains a science in which a broad mix of theory, numerical simulation and field observation yields a return in research. In the field he worked on sea-breezes at Renmark in 1959 and Coonalpyn in 1961; on the boundary layer with Arch Dyer in 1963 (though he called it 'Arch's sort of boundary layer with 4 m masts'); then his own field experiment at Hay, the Wangara experiment with '40 people for 40 days and 40 nights' to test his idea that frontal systems might play a significant role in transporting angular momentum from the upper westerlies to the ground. Wangara (west wind) was perhaps Reg's best experiment; it disproved his hypotheses, but his data set is used to this day. Finally Koorin (the east wind) at Daly Waters looking at the boundary layer in the tropical east wind belt. Meanwhile, Reg relished the open discussion at CSIRO. He became concerned that he 'couldn't solve these rotten equations by any way other than numerical' and was lucky to spend two periods between '65 and '68 at GFDL with Joe Smagorinsky in a program to prove that the atmosphere could be modelled numerically on a global scale.

One of Reg Clarke's significant scientific contributions was to unravel the mysteries of the 'morning glory' phenomenon, a nocturnal wind surge, often accompanied by a spectacular low-level roll cloud that is observed frequently at certain times of the year in the southeastern Gulf of Carpentaria region. He first heard about the phenomenon while on a meteorological training course in 1940 and had discussed it at length with Aub Gotley, a forecasting colleague who served in Karumba for two years during World War II and had become familiar with the early morning cloud lines. While at CSIRO, Reg's interest in the morning glory was reawakened by a query which was passed on to him, asking 'what was this funny thing that happened at Burketown, which blew

over chairs and sundry other things, and was accompanied by a roll cloud at 6 am?' In 1972 he published a paper in the *Journal of Applied Meteorology*, claiming that it was a moving hydraulic jump and suggesting that it might be caused by katabatic drainage. These ideas were supported by some calculations using a simple numerical model, but the model was crude and the suggested origin continued to trouble him. Years later he said that he always felt, after discussing it with Gotley, that the phenomenon was really in some way a continuation of the east coast sea-breeze reaching the west coast. He resolved that, as soon as he retired, he would aim to '... sort the matter out', and this he did.

In late 1974 Reg was appointed OIC of the Australian Numerical Meteorology Research Centre, an appointment which was soon recognised as a very good one. He found it a difficult job. Brian Tucker had originally developed the Commonwealth Meteorological Research Centre to create numerical models for the Bureau and he had done a good job. ANMRC was a hybrid of part CSIRO and part Bureau staff, with a management committee representing quite different CSIRO and Bureau perceptions. Reg had to steer a path between his managers and convince a sceptical National Meteorological Centre that he was serving its interests. Under Reg ANMRC went a long way towards satisfying NMC and earned an excellent reputation for its products.

Reg retired in early 1978 and later that year made a personal trip with Els to the Gulf region to observe the morning glory. He said '... it was fascinating, camping out in the bush and getting up at 2 am, somewhere near Normanton, and waiting for the thing to happen. It happened alright! The night was black as pitch, but we were able to follow the cloud line by car as far as Karumba, and set up our instruments in the main street there to measure surface wind, pressure, temperature and humidity as it passed over in the middle of the night'. The following year he returned to the Gulf to carry out a joint experiment with a party under Roger Smith. In order to investigate the origin of disturbances, he and Els maintained a line of autographic instruments across Cape York Peninsula under the most difficult circumstances: the road was a challenge to the best four-wheel drive vehicles, the heat was extreme and dust got into everything including the instruments. The experiment was an unqualified success and led to a definite paper on the phenomenon published in *Monthly Weather Review*. The bore-like nature of the glory was confirmed and the data over the Cape supported Reg's convictions about the origins of the disturbance as a continuation of the east coast sea-breeze. A larger experiment was organised for 1981, again with Roger Smith, in which Reg had planned to carry out upper air soundings over the Peninsula. Unfortunately, he

was forced to pull out because of ill health, but his place was taken by Derek Reid. Analysis of data coupled with a series of numerical model simulations led to a two part paper in the *Australian Meteorological Magazine* which argued that the morning glory is initiated when the east and west coast sea-breezes collide over the western side of the Peninsula in the late evening. For these papers, Reg was awarded the 1983-84 Priestley Medal of the Australian Branch of the Royal Meteorological Society, a fitting reward for a dedicated piece of personal research. In 1983 he was awarded a DSc at Melbourne University where he had been a Senior Research Fellow since retirement.

Reg's retirement was increasingly troubled by ill health, but he continued his research until almost the end of his life. He took up also the study of his family history with the same commitment and enthusiasm that had characterised his science, and his account 'A family history of the Clarkes of Melrose, South Australia' was published in 1989.

Reg was brought up on a dry wheat farm and came to lead ANMRC at a time when it was making major contributions to the Bureau's numerical weather prediction capability. He would have loved to contribute to a seasonal forecasting skill that might have meant so much to dry country farmers, but that remains a task for the future. He combined the skills of field scientist, meteorologist and numerical modeller, and he developed skill as a leader who cared for his staff.

What should I say at the end: that Reg was extraordinarily fortunate in Els and she in him; that he was a man of generosity of spirit, giving of his own money to the then Australian Branch of the Royal Meteorological Society to establish a fund to support activities of young meteorologists; and that in his unassuming way he retained the wonder of the scientist, his conviction of the importance of his science, and his hope for its future.

