ROYAL METEOROLOGICAL SOCIETY: AUSTRALIAN BRANCH MEETING

5 October 1976

The Role of Gliding in Meteorological Research

C. E. Wallington

Before a large audience of Branch members and visitors from the Victorian Gliding Association, Mr C.E. Wallington, Head of the School of Applied Science at the Canberra College of Advanced Education, developed a theme of research of atmospheric phenomena by involvement and intuition leading to theoretical modelling and scientific investigation. He described the glider as a probe responding to variations in vertical motion and then made use of the spectrum of meteorological technology from pilot balloons, radar, and satellite photography through computer modelling to describe the various aspects of flow in the troposphere as experienced by the glider pilot. The talk was extensively complemented by slides describing the glider pilot's techniques, the meteorologist's science, and some beautiful photographs of nature.

By necessity, the flows most suited to gliding are those supplying lift to the craft. Suitable meteorological situations vary from a heated plain with individual thermals, through mountain lee waves; sea-breeze fronts; organised cloud streets; the vicinity of thunderstorms, particularly the downdraft outflow wedge and above pileus caps; in a narrow layer upwind of mountain slopes and converging terrain; and the edge of local air mass boundaries such as formed by cloud sheets, differential heating at the edge of local shower tracks, pollution boundaries near cities, and at the edge of heated plateaux. Diagrams and photographs were used to advantage when describing the above phenomena, particularly variations of the lee wave phenomenon with phase effects of parallel ridges and the occasional development of a turbulent rotor.

While meteorological conditions suitable for gliding could be broadly classified, variations in wind shear (both speed and direction) or stability could lead to quite marked changes in gliding conditions. This is particularly pertinent to topography induced effects. For gliding purposes, the mesoscale distribution of clouds and sea-breeze fronts was shown to be critical if optimum use is to be made of the meteorology. Penetrating tongues of cloud, or the local retardation of the sea-breeze over high ground, is important, while the development of a rotor in lee waves may spell disaster.

A brief description of the development in glider technology was given. Over the past decade, there has been a rapid switch from wooden framed to fibreglass craft. Performance has improved dramatically with typical gliding angles reducing from 1:32 to near 1:45. Flying techniques have also changed with 'dolphin soaring' being more common as the need for circling ascent has decreased. Better utilisation of previously marginal gliding conditions requires more information from the meteorological forecaster and greater demands are being placed on these services, particularly during championships.

Some of the more memorable slides included thousands of swallows eating insects showing on radar as streets of echoes and reflecting the organisation of the wind borne insects by the prevailing flow; satellite photographs of well marked thermally induced cloud streets; a 'gaggle' of gliders climbing the same thermal; and a spectacular photograph of a glider soaring on the ascending air close to a mountain face in Europe.

Mr Wallington's talk was a refreshing reminder that research of nature is not necessarily an esoteric exercise in data processing. Constant reference to and probing of the phenomenon leads to further insights that can be systematically examined with the technology available.

W.R.K.