About Weather Dependent Spacing

The uncertainty about the occurrence of long lived and dangerous wake vortices has long driven the need to find a safe spacing between aircraft on arrival and departure, particularly when aircraft are close to the ground. The current spacing rules are not able to safely maximise runway capacity because of this deficiency, and hence there has been a large effort to better understand wake vortices and their effect on utilisation of safe spacing distances with many improvements being made.

The dream of weather dependent spacing has also been partly fulfilled but uncertainty about wake behaviour in all weather conditions and remains a limiting factor in achieving reliable and safe operations. This uncertainty is driven by a lack of the real time measuring technology that has the all-weather capability with associated spatial and temporal resolution.

Recent measuring technology developments by WakeWatch clearly show the link between long lived vortices and atmospheric discontinuities such as temperature inversions. Examples of such effects are given on this site where wake lifetimes are considerably extended when wakes are close to the top of an inversion layer.

However, managing the transitions from an unstable atmosphere where the wake lifetimes are quite short, through a neutral atmosphere where the wake lifetimes are longer, to a stable atmosphere where the probability of inversion layers when the longest wake lifetimes occur will always be a challenge. There is thus a clear need for real time wind and atmosphere profiles together with wake measurements to ensure the continuous safety of weather dependent operations, in particular, weather dependent spacing. Real-time measurements of wake vortices will greatly enhance this capability.

The real-time met measurements shown on this site provide a path to understanding wake behaviour in all weather conditions from unstable conditions through neutral conditions, to stable conditions. This could enable the development of micro-scale met models to cover an airport and provide the predictive capability needed for weather dependent operations. Such micro-scale met models will of necessity be specific to a particular airport, with each airport requiring a different model due to the many different environments in which airport operate. This will require a separate met data acquisition project for each airport to enable the development of the required models.