

Noise Complaints and Information Service

SEASONAL WEATHER PATTERNS

This factsheet outlines why different seasonal weather patterns occur and how they can affect exposure to aircraft noise.

Weather such as wind, clouds and precipitation are all the result of the atmosphere responding to uneven heating of the Earth by the Sun. The uneven heating causes temperature differences, which in turn cause air currents (wind) to develop, as heat is moved from areas of high temperatures to areas of lower temperatures. The atmosphere becomes a giant 'heat engine', continuously driven by the sun.

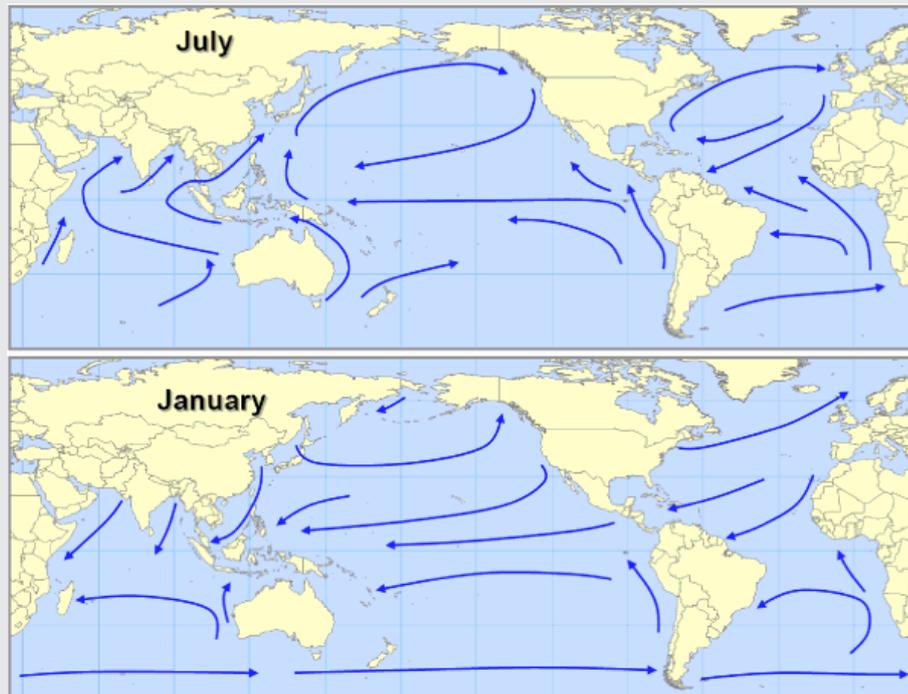
Seasonal variations in the speed and direction of the wind result from the seasonal changes in the relative inclination of the Earth towards the Sun, which in turn changes the patterns of differential heating.

So how does this affect aircraft over my home?

Wind speed and direction is the main factor in determining which runways are in use at an airport, in which direction aircraft will take off and land and which flight paths are used. For fixed wing aircraft it is advantageous to perform take-offs

and landings into the wind to reduce take-off roll by providing better lift; and reduce the ground speed on take-off and landing. In Australia the Civil Aviation Safety Authority (CASA) sets limits upon when an aircraft may operate opposite to the wind direction. Larger airports usually have more than one runway in different directions, so that one can be selected that is most nearly aligned with the wind.

As the map below shows, at different times of the year, the wind will be from a different direction. This means that a different runway will be in use more at certain times of year, which may either increase or decrease your exposure to aircraft noise. Further information on runway selection is available on the Airservices website at: www.airservicesaustralia.com. The Bureau of Meteorology publish data in the form of wind roses showing the frequency of occurrence of wind speed and direction for selected Australian sites which have data for at least 15 years. This data may be accessed at: www.bom.gov.au.



Seasonal wind patterns of the world (Source: Dr. Jean-Paul Rodrigue, Dept. of Global Studies & Geography, Hofstra University, New York, USA).

Other factors that affect wind direction

Air movement is also affected by global scale factors such as the Earth's rotation and ocean currents and on a local scale by the landscape (eg. mountains, rivers and lakes). Air-flow is rarely smooth, with most sites experiencing fairly rapid changes in wind speed and direction. Wind speed also increases with the height above the ground, due to the reduced frictional drag of the ground, vegetation and buildings. Thunderstorms and wind shear (change of wind speed and direction over a very short distance) will also have an effect on runway use.

Daily wind patterns can result from differential heating on a local scale caused by proximity to water, called sea and land breezes. On a warm summer day along the coast, as air above the land surface is heated by radiation from the sun, it expands and

begins to rise, being lighter than the surrounding air. To replace the rising air, cooler air is drawn in from above the surface of the sea (see Diagram A below) causing a sea breeze. At night time, the sea retains heat better than the land, so the process happens in reverse (see Diagram B) causing a land breeze. At airports located close to the sea, these breezes can affect runway selection.

Useful links

www.airservicesaustralia.com/aircraftnoise/factsheets

www.airservicesaustralia.com/publications/reports-and-statistics

Diagram A: Sea breeze (daytime)

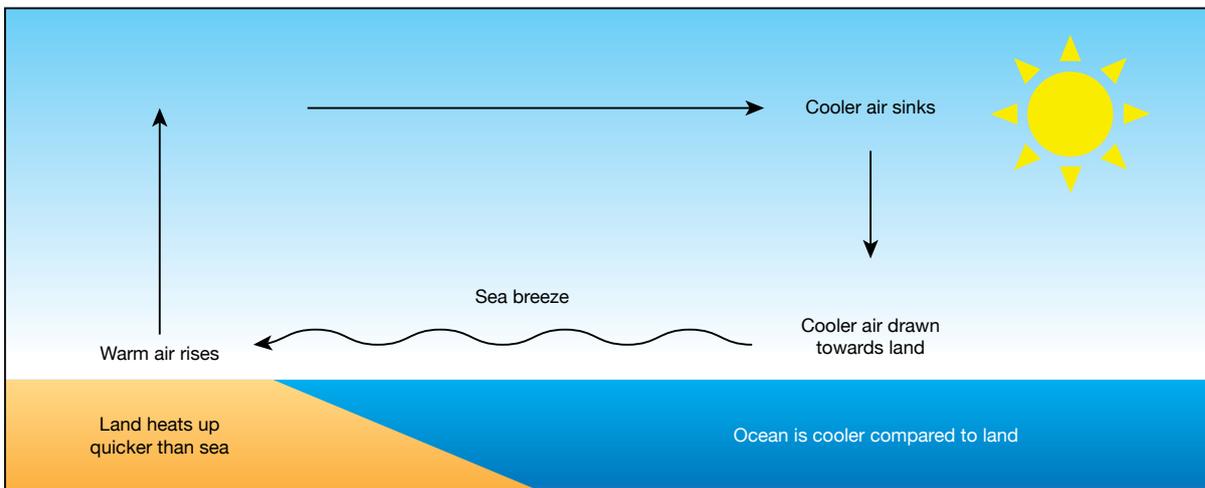
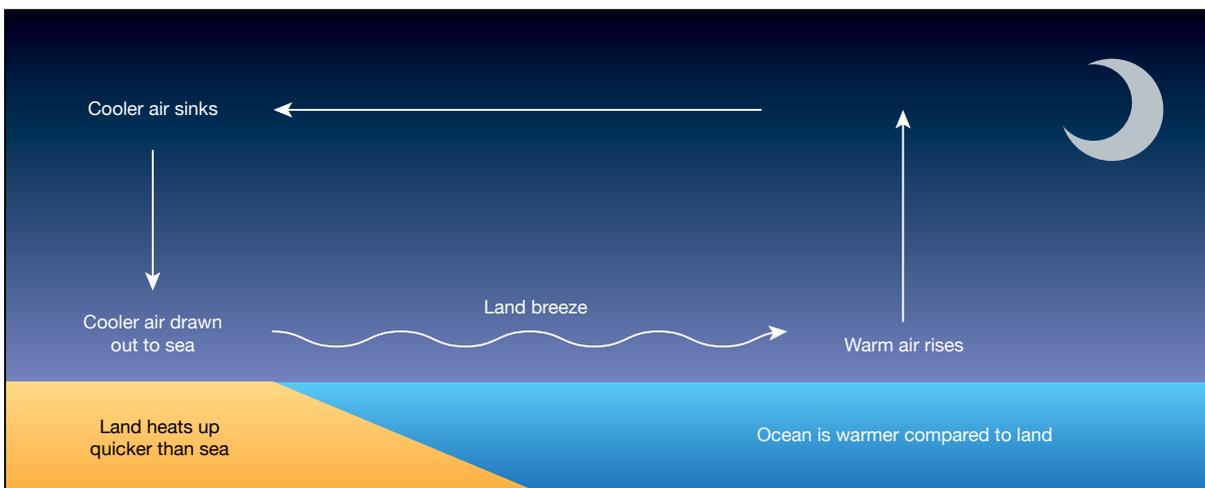


Diagram B: Land breeze (evening and night)



For more information

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