

GACA Safety Bulletin

GACA SB-2023-02R

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Potential Hazard Presented by Dust Devils on Aircraft Operation

Applicability:

This safety bulletin is applicable to:

Aerodromes:	All Certificated/Authorized Aerodromes under GACAR Parts 138 and 139.
Air Traffic:	The provider of Air Traffic Services in KSA (SANS).
Flight Operations:	All Air Operators Certificated/Authorized by GACA.
MET service provider	The provider of Aeronautical Meteorology services in KSA National Center of Meteorology (NCM)

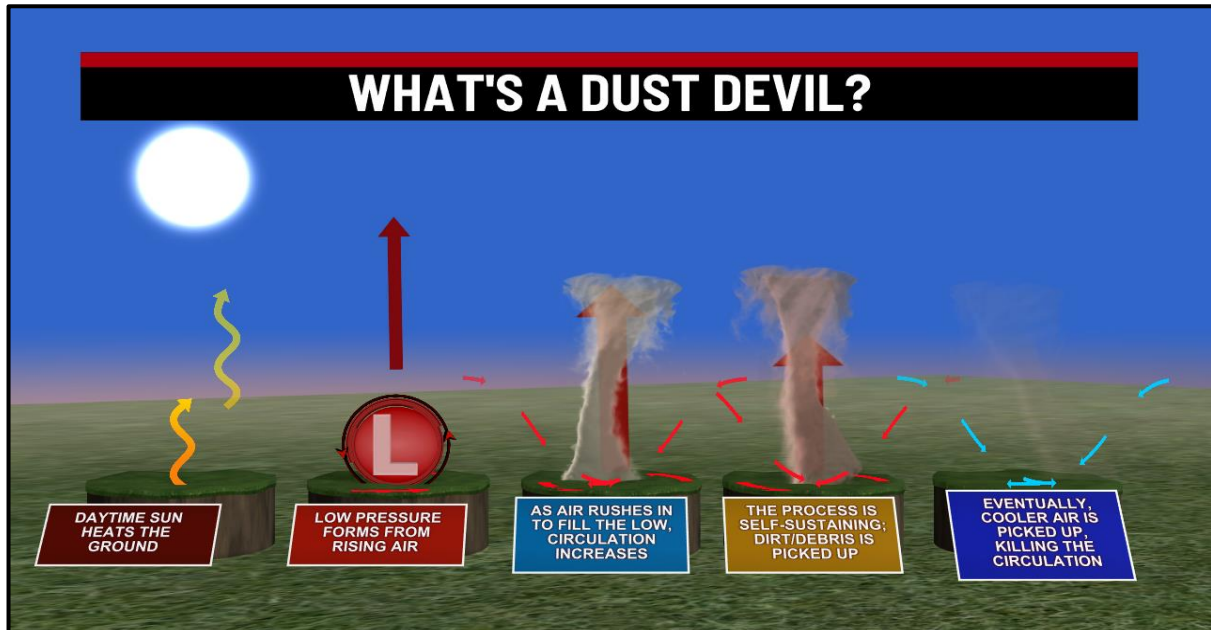
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General:

GACA Safety Bulletins (SB) are issued under the authority of the GACA Executive Vice President of Aviation Safety & Environmental Sustainability. GACA SBs contain important safety information and may include recommended actions. Besides the specific action recommended in a GACA-SB, an alternative action may be as effective in addressing the safety issue named in the GACA-SB. The contents of a GACA-SB document do not have the force and effect of law and are not meant to bind the public in any way.

GACA SBs are intended only to provide clarity to the public regarding existing requirements under GACA regulations.

What is a Dust Devil?



A Dust Devil is a common wind phenomenon that occurs in various regions of the world. These dust-filled vortices, created by rising and rotating warm air, are generally smaller and less intense than a tornado. Typical diameters of dust devils range from 10 to 300 feet, with an average height of approximately 500 to 1000 feet. In most locations, dust devils typically last only a few minutes before dissipating. However, in desert areas, dust devils can reach several thousand feet and last an hour or more. Wind speeds in more enormous dust devils can reach 70 km/h or more. Even though they are generally smaller than tornadoes, dust devils can still be destructive as they lift dust and other debris into the atmosphere. Small structures can be damaged and even destroyed if they are in the path of a strong dust devil.

Background:

If a dust devil is encountered during takeoff or landing, it can cause sudden and unpredictable changes in the prevailing wind direction and speed. This can result in turbulence, buffeting, and loss of control of the aircraft. Dust devils can also damage aircraft, particularly the engines, by ingesting dust and debris.

Flying through a dust devil at high speed may produce accelerations above the airplane design load factors. Since the high accelerations experienced during such flight can continue for only a fraction of a second, it is generally insufficient for the work of deformation exerted on the aircraft structure to rupture the primary structural parts of the airplane.

Consequently, physical damage may not be noted even though the design loads of the aircraft were instantaneously exceeded. Pilots should certainly not treat dust devils lightly, especially pilots of light aircraft flying at low altitudes and speeds. Pilots must exercise caution and be aware of the potential risks.

Hence, GACA is releasing this Safety Bulletin to emphasize the potential dangers of this weather phenomenon, especially during the summer season when the likelihood of dust devil formation increases.

Recommendations

It is crucial to follow the recommendations below to minimize the impact of dust devil phenomena.

Air Operators:

- GACA urges all air operators to educate their pilots of the potential danger posed by dust devils. When operating in areas where they are known to occur, it is important to maintain a safe altitude and speed and to be prepared for sudden changes in prevailing wind direction and speed.
- Operators should instruct pilots to avoid flying through dust devils when encountered and instead maneuver around them, if possible. It is recommended that they do not fly through them below 500 feet above the ground and further point out that it is safer to avoid them entirely.
- Instruct pilots intending to land on a superheated runway, especially in desert/remote areas, should carefully scan the aerodrome and an area 2-3 miles upwind for dust swirls to preclude the possibility of penetrating a dust devil at low altitude and near stall speeds. They should also be alert to the possibility of the formation of a dust devil during the landing or takeoff maneuver and take the required precautions if one forms along or crosses the intended flight path.

Air Traffic Services provider:

When a dust devil is observed around the vicinity of an aerodrome, the ATS provider should take the following precautions:

- Alert all aircraft around the dust devil, advising them of its location and direction considering the RWY in use.
- Inform the aerodrome operations and ground staff of potential dust devil activities in the aerodrome area.
- Consider dust devil direction of movement in the aircraft departure and arrival sequence and coordinate with APP or ACC ATCOs.
- Continuously monitor dust devils when spotted, and keep all aircraft updated with any changes in their size, location, and direction of movement.
- Continue to provide updates and notifications to all parties until the dust devil dissipates or moves away from the vicinity of the aerodrome.

It is important to take dust devils seriously as they can affect the safe and efficient operation of aircraft. By following these recommendations, Air Operators and ATS provider can help ensure the safety of all involved.

MET service provider:

When a dust devil is observed around/in the vicinity of the aerodrome, the MET service provider should take the following actions:

- Report on the event to the ATS provider and the aerodrome, including the expected duration and direction of the phenomenon.
- Report on the event to the fire station and the aerodrome operations in case of uncontrolled aerodrome.
- Continuously monitor dust devils when detected and update stakeholders with any changes in their size, location, and direction of movement.
- Continue to provide updates and notifications to all stakeholders until the dust devil dissipates or moves away from the aerodrome's vicinity.

Additional Related Information:

- Australian Transport Safety Bureau (ATSB) – The Dangers of Dust Devils.
<https://www.atsb.gov.au/media/news-items/2012/dangers-of-dust>
- National Transportation Safety Board (NTSB) Safety Alert - Dust Devils: Silent Sky Snares, <https://youtu.be/N-bYCzSYCic>

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