



Federal Aviation
Administration

Terminal Area Icing Weather Information for NextGen (TAIWIN)

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Introduction

- **FAA released new aircraft certification icing regulations on November 4, 2014.**
- **Affects a portion of Part 25 aircraft, addressing Supercooled Large Drop (SLD) icing conditions**
 - **Changes how affected fleet operate en-route and in terminal area icing conditions**
- **TAIWIN addresses SLD and other icing conditions in the terminal area**



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14 CFR Parts 25 and 33
Airplane and Engine Certification Requirements in Supercooled Large Drop, Mixed Phase, and Ice Crystal Icing Conditions; Final Rule



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Appendix O (1/2)

- **Refer to:**
DOT/FAA/AR-09/10, “Data and Analysis for the Development of an Engineering Standard for Supercooled Large Drop Conditions,” March 2009.
 - **Note. Appendix O was known as Appendix X when report was published.**
 - **Provides explanation of data and analysis used in the development of Appendix O.**



Appendix O (2/2)

- **SLD environments are freezing drizzle (FZDZ) or freezing rain (FZRA) environments**
 - **FZDZ Environments - Conditions with spectra maximum drop diameters from 100 μm to 500 μm**
 - **FZRA Environments - Conditions with spectra maximum drop diameters greater than 500 μm**



TAIWIN Objectives

- **To develop a capability that encompasses:**
 - Real-time representative rate measurement of all ground-level precipitation types and accurate identification of precipitation type
 - Highly resolved, timely icing conditions aloft in the terminal area that quantify cloud properties in four-dimensions (4-D) to support aircraft trajectories
 - Highly resolved, timely **diagnoses** and **forecasts** for terminal area freezing precipitation



TAIWIN Stages

- **Stage I:** current state of observational weather information for icing conditions, both at the ground and aloft.
- **Stage II:** *capable of identifying and distinguishing between Appendix C and Appendix O icing conditions.*
- **Stage III:** capable of distinguishing between the icing conditions defined in Appendix C and the **subsets** of Appendix O (FZDZ versus FZRA aloft).
- **Stage IV:** capability at a **spatial and temporal resolution** that allows arrival and departure routings within the terminal area to be tailored with respect to the icing conditions.



TAIWIN Stages

Terminal Area

30 nautical mile radius and 10,000 feet vertical extent

STAGES	In-flight			Data Possibilities	Spacing Possibilities
	App C & App O	FZDZ & FZRA	High Res		
I				CIP/FIP	13 km / 500 ft
II	X			HRRR/RAP, then add improved use of GOES, ASOS w/FZDZ, radar, etc.	3 km / 500 ft
III	X	X		Model/Obs improvements	3 km / 500 ft
IV	X	X	X	+ GOES-R, RadIA, etc. Grids match hi-res OBS	1-3 km / <500 ft

Goal: Improve Information, Resolution, and Capability Throughout Stages

10 n. mi./10,000 ft.

10 n. mi./4,000 ft.

5 n. mi./2,500 ft.

