

## Aircraft-based Droplet and Ice Crystal Measurements

Size and shape

Velocity

Number density

Liquid and Ice Water  
Content

*Designed for aircraft  
based applications*

*Icing cloud studies*

*Icing wind-tunnel  
applications*

*Turnkey operation*

## HSI Flight Probe

The **HSI-FPDR** has been developed specifically for aircraft-based icing cloud studies that require precise measurement of liquid droplet and ice crystal size distributions, velocity distribution, number density, liquid water content (LWC), and ice water content (IWC).

The HSI is a high-speed imaging system that takes advantage of the latest advances in CMOS sensing technology and combines it with an innovative particle illumination method to deliver precise measurements of particulate size and shape. The flight probe incorporates multiple diode lasers that are used to simultaneously illuminate the particulate field from multiple directions. A dedicated laser and photodetector are used to detect the presence of particles in the measurement probe volume. This information is used to pulse the multiple illumination beams. The laser beams are combined by a receiver lens which creates a frozen shadow (or bright-field image) of the particles on the CMOS sensor.

The use of multi-angle illumination significantly reduces measurement errors due to depth-of-field variations that are a problem for legacy instruments. The optics and electronics are packaged in a rugged canister design that is proven to be air-worthy. The probe heads are well heated to prevent ice accretion while flying in extreme icing environments. The pulsed diode lasers used in the probe provide stability, compactness, ruggedness, and high reliability.

The HSI Flight Probe offers turnkey operation with a fully automated setup feature. The complete instrument includes the flight probe, data acquisition computer, image acquisition card, and the AIMS system software. The software analysis package includes sophisticated algorithms for identifying particles that are in focus, calculating various shape parameters, and classifying ice crystals into its various habits. Methods for differentiating between liquid drops and ice crystals are also included.





Fluid Mechanics



Spray Diagnostics



Particulate Emissions



Cloud Research

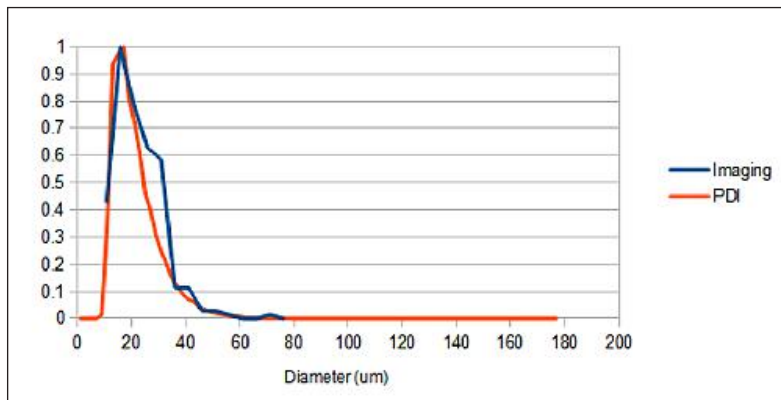
## Technical Specifications

### HSI Flight Probe

Size measurement range	Single size range: 10 to 1500 $\mu\text{m}$
Size dynamic range	150:1 or 300:1 depending on model
Estimated size accuracy	+/- 5 $\mu\text{m}$
Estimated size resolution	+/- 2 $\mu\text{m}$
Velocity measurement range	Up to 300m/s
Velocity accuracy	+/- 1 %
Liquid Water Content (LWC) accuracy	+/- 15%
Distance between receiver and transmitter windows	100 mm
Laser type	Multiple diode lasers
Wavelength	660 nm



Ice Crystals.



Comparison of HSI and PDI results.

## Global Presence:

Artium's offices, research facilities & manufacturing plant are located in Sunnyvale, California. Our customers in North America are served directly from our Sunnyvale office. We have also established a world-wide distributorship to serve our customers in other parts of the world.

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