

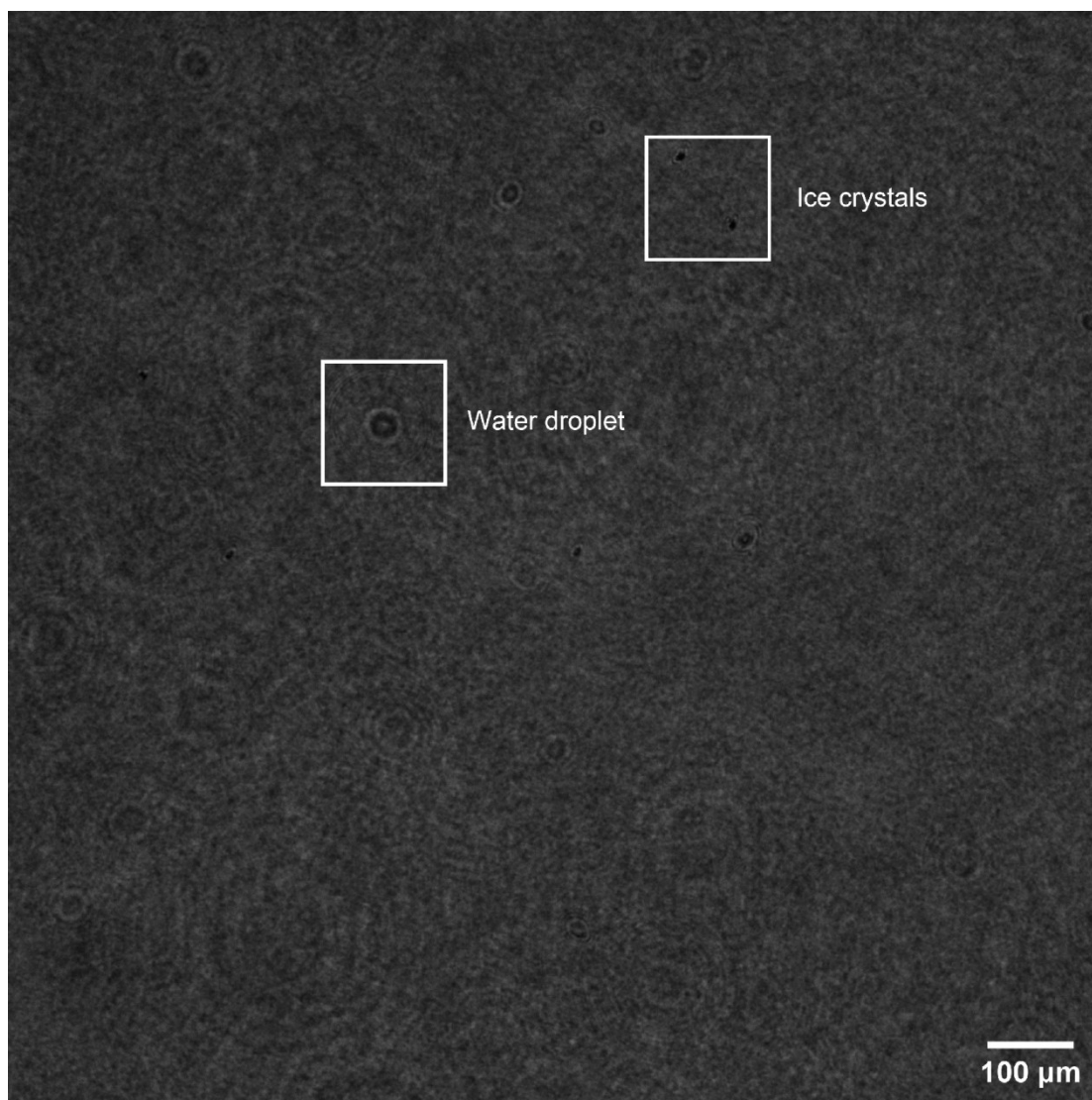
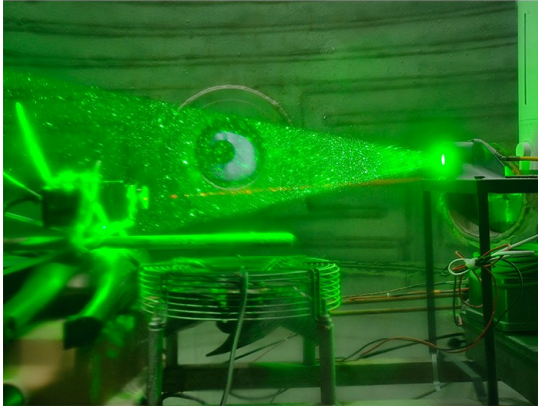


Figure S1. Image of ice crystals and liquid droplets in the cloud chamber at -6°C observed by a holographic fog droplet spectrometer.

(a)



(b)



Figure S2. (a) Photograph of the cloud chamber experiment on 28–29 January 2026; (b) photograph of GFAS conducting in-situ observation at the Mt. Liupan Meteorological Station.

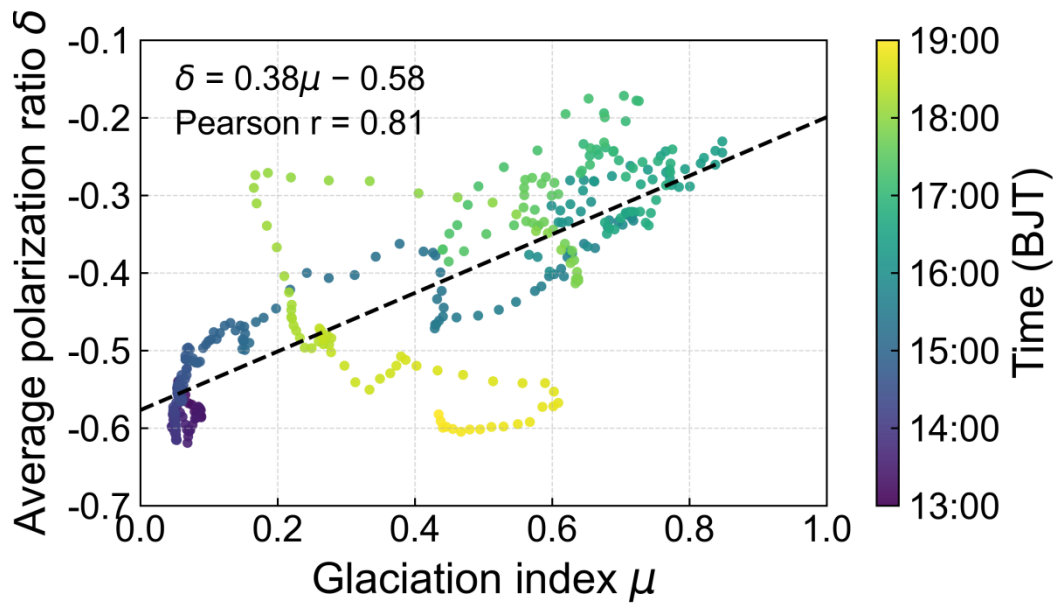


Figure S3. Scatter diagram of the 1-min average particle polarization ratio (δ) versus the glaciation index (μ) during the mixed-phase cloud event on 26 February 2024 (13:00–19:00 BJT). Point colour indicates time of day; the black dashed line shows the least-squares linear fit ($\delta = 0.38\mu - 0.58$), and r denotes the Pearson correlation coefficient. Note that μ is derived from the δ -based phase classification (Sect. 2.4); the tight co-variation therefore reflects the internal coherence of the framework rather than an independent validation.