

### Supplementary Materials

The most commonly used cloud-precipitation interference methods are characterized as follows.

**Table S1.** Comparison of cloud-precipitation interference operation.

Operation method	Features	Keywords
Manned aircraft	Largest fixed investment, unclear operation area, inaccurate precipitation estimation, Fixed aircraft routes. Catalysts are required to be seeded in suitable clouds. Significantly affected by the ambient environment, droplet spectrum, and seeding height.	Large area operation, large investment, airspace restrictions, chemical catalysis
UAVs	UAVs can operate in mountainous areas where manned aircraft have difficulty taking off and landing. The cost will be reduced when the amount of catalyst dispersed increases.	Localized operation, precise and efficient, chemical catalysis
Rockets, artillery	The catalyst is driven into the clouds by vehicles such as rockets and artillery. The effect is influenced by the accuracy of the artillery shell striking the clouds, are highly influenced by wind speed and direction.	Directional operation, mature operation process, uncertain effect, chemical catalysis
Acoustic operation	The acoustic waves with high energy are utilized to promote cloud droplet agglomeration. Relatively clear operating region with low cost.	Directional operation, high mobility, physical catalysis