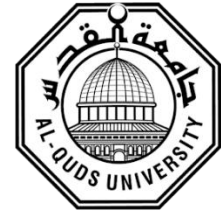




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## ABSTRACT

### **Data-Driven Insights on the Effectiveness of Cloud Seeding in Oman**

*Ahmad Al-Ghafri*

*Sultan Qaboos University, Oman.*

Oman, one of the most water-scarce countries, experiences an arid desert climate with limited rainfall. This study investigates the impact of cloud seeding on increasing rainfall during the summers of 2015, 2016, and 2017, using data-driven analysis.

Datasets provided by the Ministry of Agriculture, Fisheries, and Water Resources (MAFWR), along with data from weather stations and other sources, were thoroughly analyzed to assess the effects of cloud seeding.

The findings reveal that cloud seeding had a significant positive impact on rainfall in 2017, while no notable effects were observed in 2015 and 2016. Variations in performance across different stations highlighted differences in the effectiveness of the intervention. The study also identified the Spatiotemporal Balanced Design as a reliable method for cloud seeding operations. Key environmental factors, including humidity, temperature, wind speed, and storm development, were found to significantly influence the success of cloud seeding.

This research provides a data-driven framework for evaluating cloud seeding interventions, offering valuable insights to guide and optimize future rainfall enhancement efforts in arid regions.

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**Correspondence concerning this article should be addressed to the mentioned authors at the mentioned institutes.**

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**E-mail: [research@admin.alquds.edu](mailto:research@admin.alquds.edu)**

**Palestine, Abu Dis, Al-Quds University**