



# Investing in Rainfall Enhancement: An Innovative Plan for Arid Regions



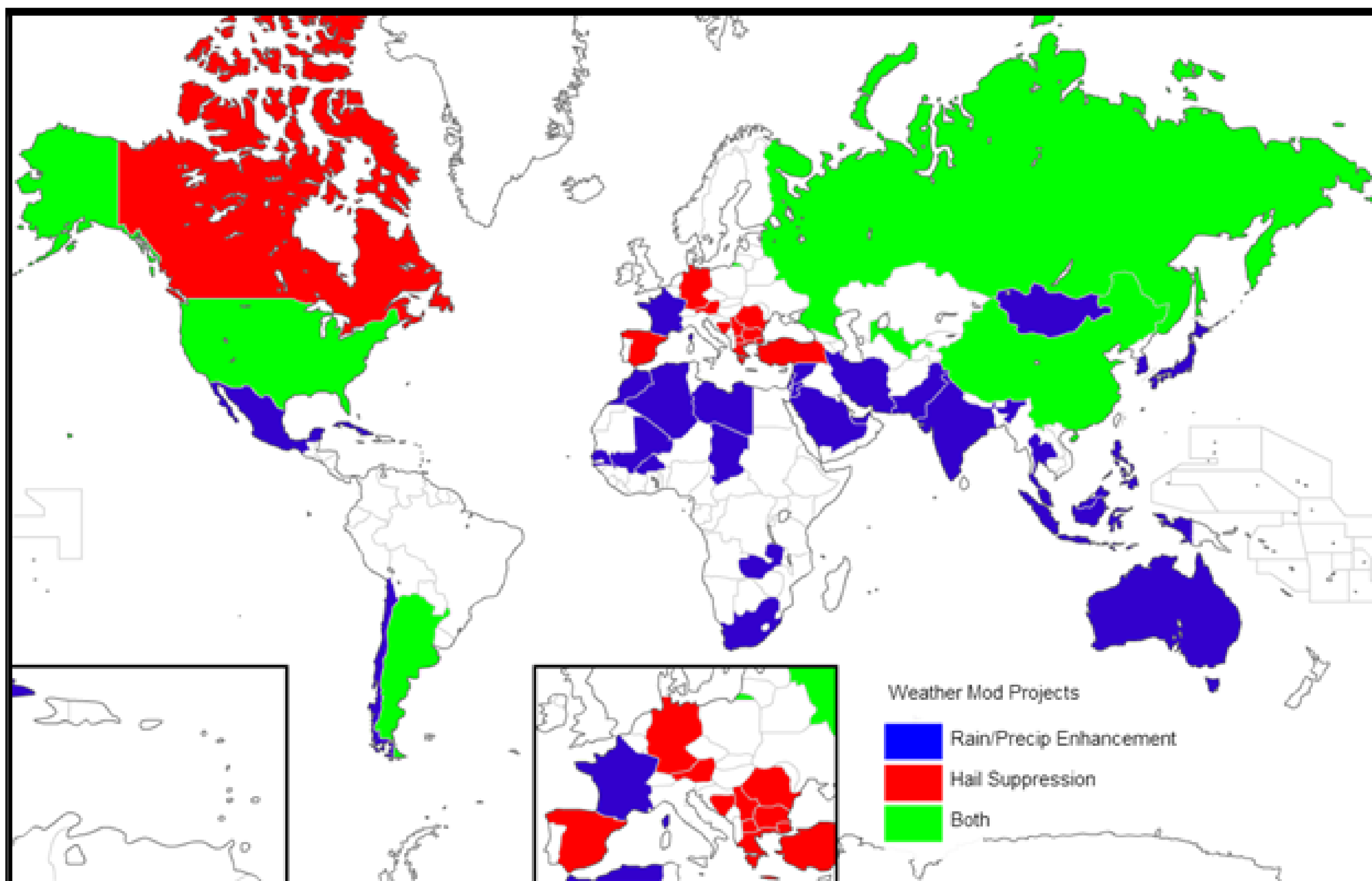
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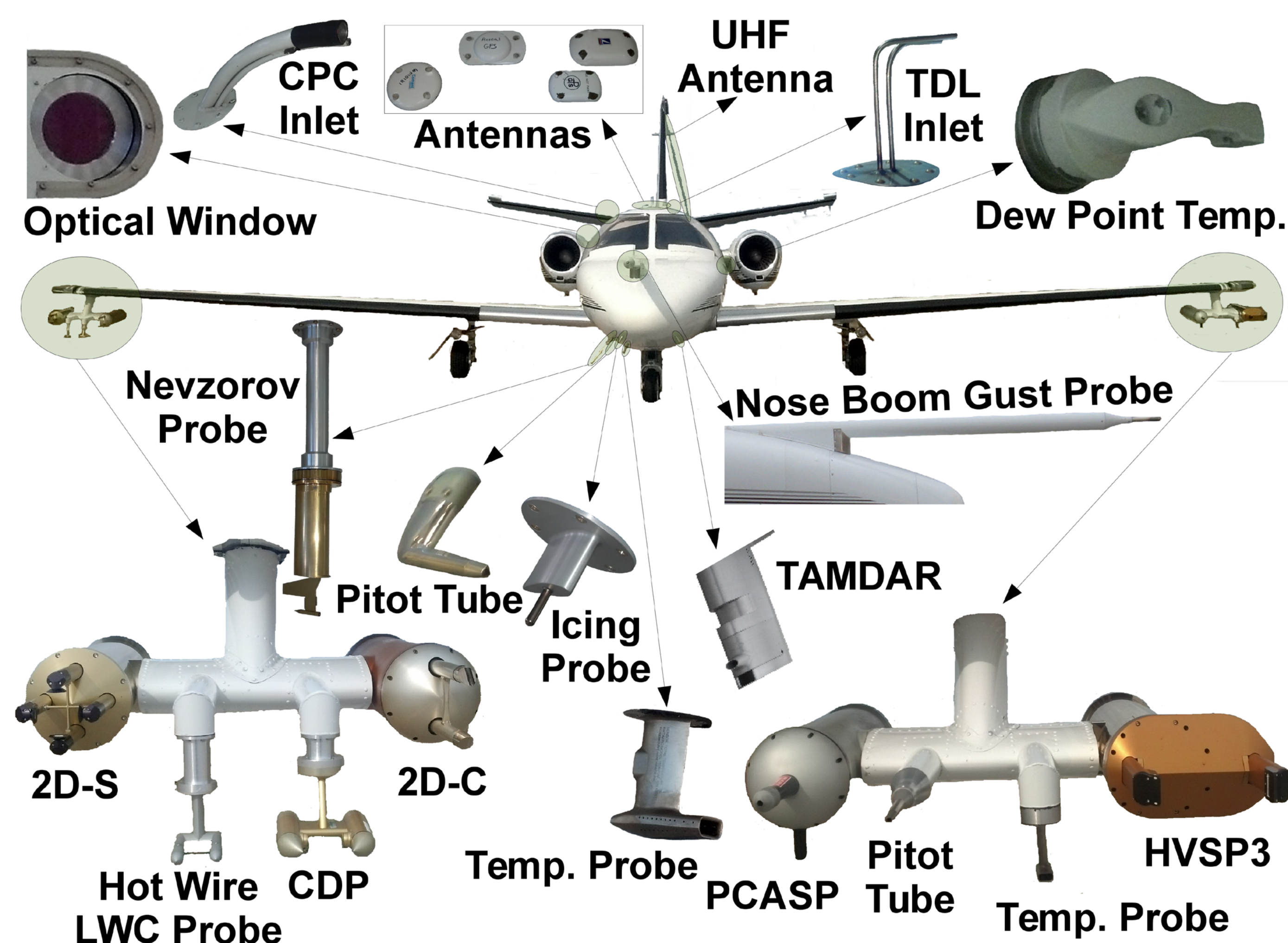
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The map above shows countries conducting weather modification projects. Map created by Timm Uhlmann using information from Brintjes (2013).

## North Dakota Citation Research Aircraft

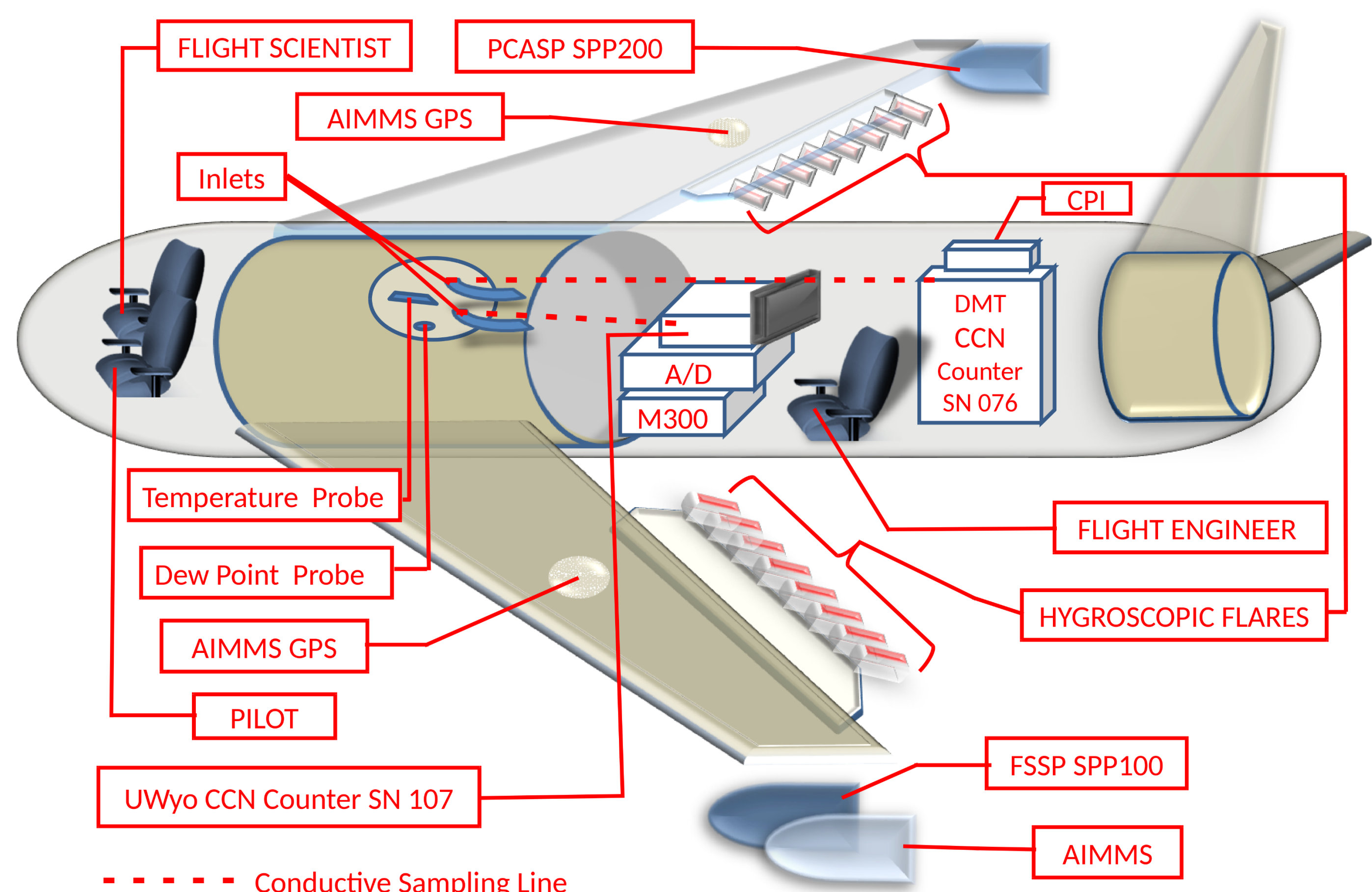


## Rainfall Enhancement Techniques

Glaciogenic and hygroscopic seeding are two techniques for enhancing rainfall to increase water resources. Glaciogenic seeding involves releasing ice nuclei into super-cooled cloud regions, while hygroscopic seeding involves introducing large-sized particles at cloud base. To enable effective targeting, rainfall enhancement programs use aircraft to deploy material. Cloud seeding material improves the efficiency of the precipitation process by increasing atmospheric particles concentrations which are typically not naturally abundant.

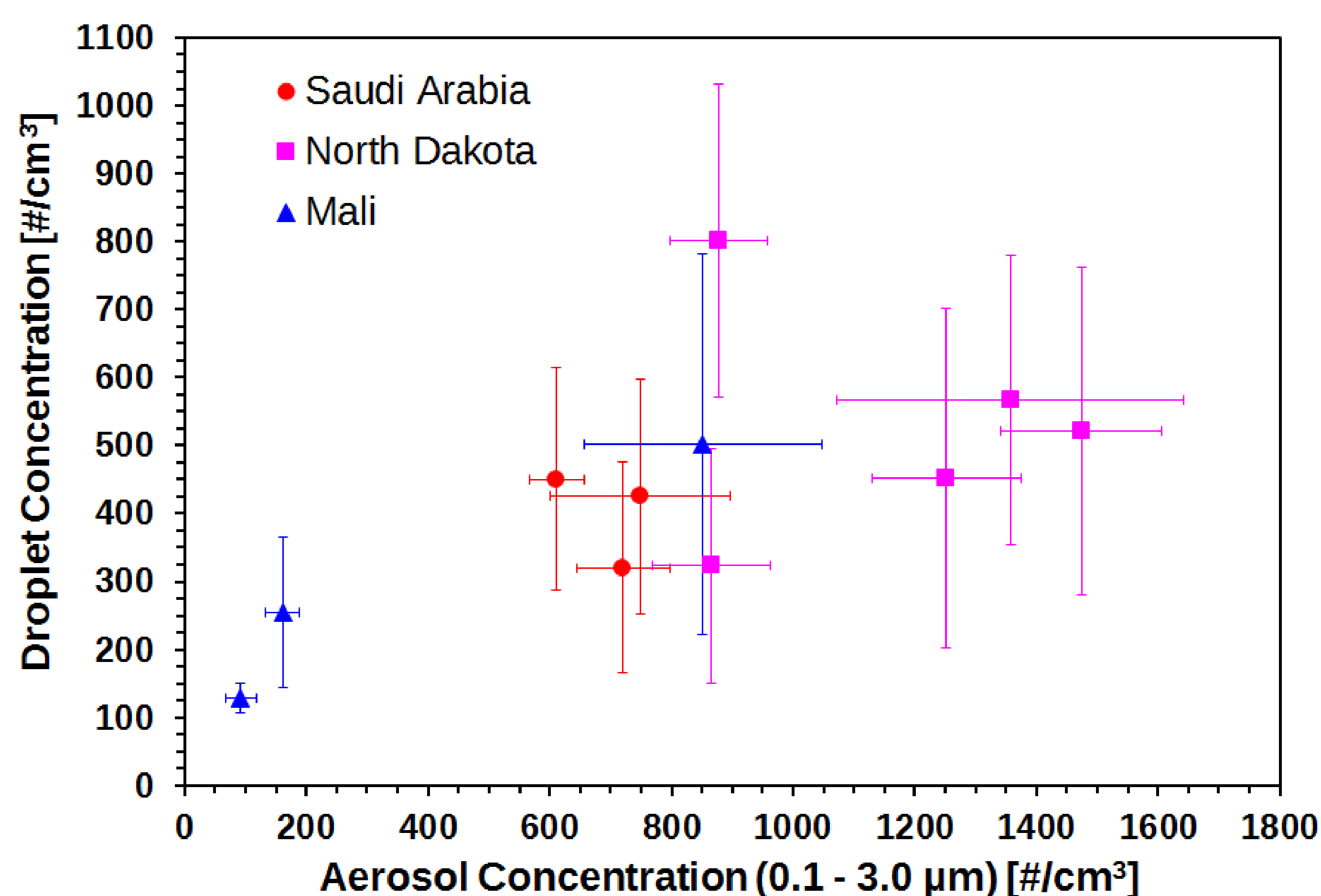


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## Importance of Local Conditions

Atmospheric conditions vary widely so rain enhancement program assess environmental conditions, such as aerosol and cloud concentrations, using aircrafts during Phase I of well-planned program. The operational plan's effectiveness would be assessed during Phase II. Scientists determine cloud seeding effectiveness by fully understanding the physical processes involved and by conducting randomized seeding experiments.



Airborne measurements from rainfall enhancement programs.

## Conclusion

An effective rainfall enhancement program requires a great deal of infrastructure and highly skilled personnel. Hence, it is best to plan a program over several years with continuous commitment over a 5-10 year period. Ideally, a program would be cyclic, repeating the regional environment assessment, cloud seeding effectiveness evaluation, and operational program design. Just as water security is a long-standing concern, governments must plan solutions over the long-term.