Cloud seeding technology to maximise precipitation

By making use of the latest advancements in rain-enhancing technology, Middelburg-based firm, WAS seeks to use cloud seeding to increase precipitation.

WAS is equipped with a Piper Cheyenne twin turbine aircraft fitted with a flare deployment system for cloud seeding.

Cloud seeding is the process of applying chemicals such as dry ice or silver iodide to clouds in order to stimulate precipitation, thereby creating rainfall. This is done through the creation of ice crystals from cloud droplets in a super cooled state. The chemicals are dispersed using light aircraft fitted with flares that distribute the chemicals over gathered clouds. The cloud droplets react with the silver iodide or dry ice and form ice crystals that are too heavy to stay suspended in the air and they then melt and fall, creating rain.

"At its essence, this process alters the microphysical processes within the cloud," explains Franco van der Merwe, managing director of Water Analytical Services (WAS). "This process has been used all over the world for decades now and we believe that South Africa can benefit from using this technology to enhance rainfall where it is needed most."

Cloud seeding has numerous applications in agriculture, for the event and tourism industries as well as for government as a means of securing water security in drought stricken areas. South Africa has experimented with cloud seeding in the past but with the current drought crisis affecting the Cape region, now may be the time to revisit this technology. "Whether it is used for encouraging rainfall in areas affected by the drought, or helping farmers in other parts of the country ensure rainfall for their crops, cloud seeding has clear benefits," says van der Merwe.

The use of cloud seeding is growing worldwide with recent journal reports indicating that the global cloud seeding technology market is set to grow substantially by 2024. In 2016 some 56 countries around the world had cloud seeding operations. "We are witnessing a decline in the rainfall rate across the globe due to global warming, while pollution is also increasing the threat of drought conditions globally," says Van der Merwe. "Looking at case studies around the word, we have seen how effective this technology is. It has the capability to provide much needed water security for farmers who see the benefit of proper rainfall for their operations and decreased risk. This may even have a wider benefit for the insurance requirements for crops."

There are numerous cases backing up the effectiveness of cloud seeding worldwide. In one case, a team of scientists from the National Centre for Atmospheric Research spent three years seeding clouds in the drought-stricken northern Mexican state of Coahuila. They found that rainfall from seeded clouds lasted longer than rain from unseeded clouds, the rainfall covered a larger area, and that the total precipitation was higher – sometimes even doubled. In many cases, they reported that results began just 20 minutes after the seeding.

According to van der Merwe, cloud seeding has potential beyond creating rain. "The usual intent is to increase precipitation, but cloud seeding technology also has advantages for weather regulation and curbing pollution."

Practical examples of this are evident in hail and fog suppression – achieved with cloud seeding – that is widely practiced at airports. Major events have also benefited from this technology. At the 2008 Beijing Olympics in China, officials used cloud seeding to ensure that it rained before and not on the night of the opening ceremony – and throughout the event to secure favourable weather conditions for the games. In 2017, cloud seeding was used in Dubai that achieved 30% more rainfall for the area. The practice has been used on an on-going basis since then with positive results and the team responsible was recognised for their groundbreaking work in January 2018 when they received an award from the UAE Research Programme for Rain Enhancement Science.

In spite of the potential of the technology, there are several concerns that have been raised regarding the measured success and the safety of cloud seeding. Van der Merwe is keen to dispel this apprehension, pointing out that over 50 years of research has led to what cloud seeding is today. "Over the years there has also been concern that adding chemicals to clouds would pollute the earth, but the national Weather Modification Association insists that the amounts are so low as to be insignificant. The amount of silver used in seeding a cloud is less than 0.1 micrograms per litre, about 1/500th of the concentration listed as acceptable by the United States Public Health Service," Van der Merwe explains.

WAS has the ability to assist with cloud seeding in all parts of Southern Africa. They are equipped with a Piper Cheyenne twin turbine aircraft fitted with a flare deployment system. According to Van der Merwe, the process has been extensively tested to the highest safety standards. "Investment in cloud seeding technology has clear benefits for the private and public sectors in South Africa. Technology has the potential to improve our lives in every sphere, so why not explore its ability to bring rain to those who need it most?" ❑

Water Analytical Services' (WAS) Piper Cheyenne twin turbine aircraft, which is customised to offer cloud seeding services.

How to measure salt water

ELIS PLZEN, based in the Czech Republic, is a top quality manufacturer of induction flow meters for saline applications, such as the FLONET DN700.

Salt or seawater contains chemicals that cause different physical and chemical properties in comparison to fresh water. The salinity of seawater has an influence on density, on the different temperatures of freezing and on the corrosion of any construction material with which it may come into contact.

The average salinity of seawater is around 3.5%. This means that each kilogram of seawater contains approximately 35 g of dissolved salts, making seawater highly corrosive. Not only does it rapidly dissolve the metal ions of different alloys, seawater also has a negative effect on many other materials used in the manufacture of devices for measuring the flow of seawater.

It is, therefore, critically important to choose suitable materials for sensor linings as well as the electrodes of induction flow meters used for continuous measurement of seawater. This ensures not only that the durability, longevity and functionality is optimal, but that it is economical too.

Instrotech has recently signed-up a new agency, ELIS PLZEN, the Czech Republic manufacturer and supplier of FLONET induction flow meters for saline applications. It may be a land-locked country, but that has not deterred ELIS PLZEN dedicating many years of R&D test experience with applications for seawater, to ensure their induction flow meter's reliability and durability.

ELIS PLZEN's induction flow meters for saline application have sparked interest in the market, and particularly their FLONET model DN700, which was recently dispatched within three weeks of order to a client in Greece. ELIS PLZEN expects continued interest in their products for this demanding and growing market segment. ❑