

## From Russian Theory to World Markets: Weather

### Modification Process through Ionization of the Atmosphere

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Based on the **ILAP Technology** (*Influence on the Local Atmospheric Processes*), **AST Clear Sky Manager™** has been developed by **Advanced Synoptic Technologies Ltd (AST)** for managing, at a local atmospheric level, humidity density in the sky in order to conduct any type of atmospheric action that may improve working/living conditions at ground level.

Based on top of the art technology, **AST Clear Sky Manager™** relies on **high-speed ionic generators** for initiating and managing upwards/downwards air streams within a given area, up to 100 km diameter.

### Background : A Traditional Russian Field of Research

Draughts are known to be a natural phenomenon that causes harm to agricultural crops and favors forests fires in large areas every year. The usual meteorological situation that favors draughts is the presence of persistent anticyclones.

This problem has been investigated since the middle of the past century by many researchers belonging to various scientific schools, in different directions:

- Use of radioactive ionizing materials (radionuclide tablets);
- Hydroionization (water microdrops spraying);
- High radiofrequencies or UV-emission usage (disadvantages are high power consumption and unhandiness of the equipment used);
- Brush (or "glow") discharge or "quiet" corona effect usage (benefits include low power consumption and portability with no ionization byproducts generated).

### The Selected Technology

**Advanced Synoptic Technologies** company is engaged in theoretic development, manufacture and subsequent practical employment of state-of-the-art technologies for local influence on atmospheric processes in the professional services market segment.

The system of influencing the atmospheric process has been developed around the idea of a rational product that meets the requirements imposed on the advanced technologies in this area:

- urgent need
- environmental safety
- optimal power consumption
- high effectiveness /cost ratio
- fast deployment and commissioning
- reliability, flexibility and simple in use

With the above principles in mind, the experts of **Advanced Synoptic Technologies** chose to develop the corona ionizers as this is the most effective and safe method to produce the vital part of the technology:: **light negative oxygen ions** and created the **Influence on the Local Atmospheric Processes (ILAP) Technology** distributed worldwide under the trademark “**CLEAR SKY MANAGER**”.

## **Purpose and Fields of Applications of CLEAR SKY MANAGER**

Based on results of long-term investigation of atmospheric process algorithms, and on theoretical footing of the system for controlling atmospheric situation on a given territory, one can define basic lines of what the equipment is designed for and where it may be used.

### **Purpose**

- Inducement of **atmospheric precipitation** in relevant regions.
- Increase of **atmospheric precipitation** intensity.
- Destruction of **cloudiness** (creation of fine sunny weather).
- Destruction of **fog** and its prevention.
- Elimination of **smog** in cities, open industrial installations, open pit mines etc.

### **Fields of Application**

- Agriculture** (prevention of hail, timely watering, termination or reduction of precipitation in time of harvesting).
- Water supply** for cities, regions (retention or increase of the required level in water-storage reservoirs or water scoops).
- Aviation and marine navigation** (upkeep of the required visibility ranges and cloud base).
- Forest fire fighting** (inducement of atmospheric precipitation or increase of its intensity).
- Social and sporting events, festivals, air shows**
- Environmental protection support** (soil salinization and soil drought prevention or reduction)

## **The ILAP Technology**

The key elements on which the technology is based are the **negative ions**.

An **Ion** (Greek, present participle of *ienai*, “to go”) is an electrically charged atom or group of atoms the electrical charge of which results when a neutral atom or group of atoms loses or gains one or more electrons (or other electrically charged particles). The loss of electrons results in a positively charged atom, and the gain of electrons in a negatively charged atom. Atoms (as well as molecules) acquired an electric charge are called "ions".

The natural environment contains both positive (hydrogenic) and negative (oxygenic) ions. Ions with different polarity are attracting each other attempting to create an electrically neutral compound.

Negative ions are used widely in medicine and home appliances due to their electrophysical properties. These appliances include home ionizers, air conditioners,

ILAP technology is based on the method of electrical air ionization with the emission of **electrons** (negatively charged oxygen ions) created by high voltage (from 10 to 32 kV) **ion generators** (ionizers). The electrons emitted from the electrode couple with neutral molecules creating negative molecular ions that in turn create an ascending atmospheric ionic flow due to the repulsion by the negative field of the Earth.

These molecular ions become centers around which neutral molecules are grouped. In the natural air environment, electrons are mostly coupled by the neutral mater causing generation of tiny drops. The water molecule is involved in this process due to its electric polarization as distinct from hydrogen and oxygen molecules in the air. When water molecules are coupled, the thermal power emission occurs, which results in higher air temperature. The permanent emission of electrons from the ion generator causes permanent air heating, resulting in a stable upward air stream .

This upward air stream carries a great amount of atmospheric moisture. On the way to the upper atmosphere, the air is

cooling. The atmospheric moisture is condensed, **creating clouds** or intensifying already existing ones so that precipitation occurs. The upward air stream height and intensity are adjusted according to the desired results by setting up (by local or remote control) the parameters of the ion generator's working mode.

This "Rainfall" mode is meant for initiating or intensifying atmospheric precipitation within a given area, up to 100 km wide. It may be used for agricultural development (possibly in connection with an irrigation infrastructure) or for the prevention and fighting of forest fires. This mode is typically of use in sunny and dry regions.

## **Other Applications: Fog and Smog dispersion**

The upward air streams created by *AST Clear Sky Manager*™ cause the compensating downward air streams that can be used for enforcing **dissipation of clouds and fogs**. The area under control can expand to 100 km<sup>2</sup> (10 x 10 km). The specific area to protect may be an airport or a seaport, where traffic congestion can be created in case of heavy fog. *AST Clear Sky Manager*™ guarantees a **clear visibility up to a 1,000 m distance**, meeting the criteria of fog destruction.

In regions where industry, traffic or land fires create **haze** or **smog**, the same technology is able to clear large portions of cities and countryside, diminishing the risks and dangers for health and traffic.

The upward air stream height and intensity are adjusted according to the current tasks by setting up the ion generator working mode parameters. The upward or downward air stream is generated according to the specific tasks for the territory being handled. In such a way, it is possible to provide contrary effects when needed: to enforce precipitation or to dissipate clouds and fogs. The principles on which this new technology is based enable on demand control over atmospheric precipitation, fog dissipation and effective improvement of urban ecology as a result of air pollution level being decreased.



**Let the Sunshine In!**

## **Environmental Neutrality**

When creating this technology, its authors have also used special know-how eliminating any danger to the human health and ecology.

The automatic control of the ionizer working mode parameters prevents ion and ozone overproduction, and the adjusted voltage level excludes generation of toxic components.

This electric method of active influence poses no danger for human health and environment. Check-out measurements conducted both in Russia and in the European Union in terms of EMC-emission and have demonstrated have shown that the ionic generator electromagnetic emission level does not exceed natural values within 20 m radius from the equipment position point.

## Equipment

The hardware comprises stationary and mobile influence means and operational control equipment to be positioned on the relevant territory as per layout agreed upon with the Customer. The arrangement layout is to be elaborated considering statistical climatic data on the region, service zones dimensions, terrain nature, available water reservoirs etc.

One complex includes 3--6 units used both in stationary and in mobile modes, combined by one remote control post. A means of influence is composed of a compact ionic generator with dimensions  $1.5 \times 1.5 \times 2$  mm, a multi-purpose power supply unit operating from 220—240 V mains or from battery 12—24 V (including a motor-car cigarette lighter), and a control unit with software. The consumed power for one complex is not in excess of 1.0 kW/h.

In case of long-term deployment, the equipment may be complemented by direct and return communication facilities (radio set and modem) to enable a remote control and to monitor the parameters. Additional outfit may also include necessary meteorological devices and video systems to provide visual observation at the spot of influence means position.

The equipment is easy to use and can be quickly deployed at the specified site. It is presently being built in the Federation of Russia. A production under European Union label is presently organized in Belgium.

## Experimentation on Site

**CLEAR SKY MANAGER** has been tested on various occasions such as in Russia (Vladivostok, October 2003) as well as put into practice with success in DUBAI in the period September 2006-January 2007.



**Ionizer installed on a flat roof in Dubai (2006)**

**Dubai skyline during tests in 2006**

## Cooperation between Russian developer and European partner

The main problem for Russian technologies on world market is their relative lack of credibility. Even if potential customers have a high esteem for Russian science and understand the high probability of a quality product, they are quite a few obstacles to be overcome. Russian companies are actually known for a lack of reliability in management, quality control and supply problems, as well as for fluctuating price policies.

After constructive contacts held in 2006 on the basis of mutual knowledge dating back to a few years before, a partnership in distribution was established between the Advanced Synoptic Technologies in which the European partner, **Corporate Technology Services** in Brussels, Belgium<sup>1</sup>, would assist in organizing credibility to markets and organize access to Western potential clients.

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The European partner succeeded in particular in:

- Organizing EMC-emission tests at an industrial laboratory at the University of Louvain, Belgium;
- Establishing and monitoring industrial links for the production of the equipment in the European Union with EC label;
- Organizing the legal follow-up of operations, mainly in connection with the protection of industrial property rights;
- Opening access to municipalities and regional governments in France and Belgium;
- Starting organizing distribution on other countries of the European Union, as well as establishing first contacts in African and Asian countries;
- Providing some day-to-day small financing for immediate actions to be taken;

## **Services provided**

At present, *AST Clear Sky Manager*™ is a service consisting of:

- Analysis of weather statistics and local conditions for installation of AST equipment
- Preliminary study determining number and location of ionic generators to be used in the project
- Installation of the equipment on site and testing
- Installation of protection fences and additional equipment (video, ...) around the ionizers
- 24/24 monitoring of weather conditions based on data made available by local institution
- Permanent adjustment of ion generation to objectives. Maintenance of equipment.

Service contracts are established for periods of 3 to 6 months, aimed at satisfying a specific need (rainfall, snowfall, for dispersion, pollution destruction...) and based on the standard use of five (5) ionizers. Adjustments can occur at the end of the project if the actual number of ionizers can be reduced or has to be increased.

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