ECOLOGICAL PROBLEMS AT REALIZATION OF ACTIVE INFLUENCE ON HAIL PROCESSES

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Abstract: *The problems of environmental pollution are discussed at realization of activities of active influencet on hail. The results on application effective and rather ecological secure method against hail of protection in terrain of Republic Armenia are leaded. It`s necessary to realize activities on hail the continuous radar control of changes of aircraft attitude of clouds evolution.*
Technology of protection from hailstones beaten, as any technologies of environmental impact, should be ecological secure. Therefore one of prominent aspects for an estimation of technologies of protection from hail is the estimation of levels of an ill effect on an environment, collateral effects and ecological safety of used technologies.
An effect is recognized successful, if the radar parameters of a cloud descend or terminate to grow, in this case cloud passes in stage of dissipation. One of the symptoms of a dissipation of polycell cloud is the termination of originating of filial cells or transition in one cell with cloud tendentious destructions of last cell. The agriculture of Armenia is responsive to instability of a climate and consequently requires to protection. The agriculture is in econiomical trouble and has low adaptation.
The purpose of the present paper is: detection of contamination of an ambient environment in region against hails activities.

Keywords: *Environmental pollution, hail, hailstones, cannon, radar, cloud dissipation, noise,*

1. Introduction

Hail can cause serious damage for society - and most commonly for agriculture, for farmer`s crops. Hail occurs most frequently within continental interiors at mid-latitudes and is less common in the tropics, despite a much higher frequency of thunderstorms than in the midlatitudes [1].

When hail stones exceed 13 mm in diameter the automobiles, aircraft, skylights, glasses and other planes can be seriously damaged within seconds [2]. Rarely, massive hailstones can to cause concussions or fatal head trauma [3], for instance, hail is one of India`s, China`s and Canada's most expensive hazards [3,4].

Hail is formed in space and time an incidentally, but it`s a possible to insure against this damage. One of method for hail insuring hail formation and against hail fall processes are used the hail cannons. The cannon is a large impressive apparatus, it makes a lot of noise, and it comes with confidence-building detailed instruction. More ever, any times that are used the acetylene explosion for sound and infrared waves burning. That make also ecological problem for surrounding. In the present paper the problems of early warning of ecological danger in region of realization of fissile effects are discussed.

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The extreme weather phenomena invoke sometimes loss of crop. So, in 2009 around 9 dangerous phenomena of hail took place, when diameter of hailstones made 20 mms and more, from behind that agricultural branch of country the huge damage was is marked. Because of hail activities, with 2005 for 2010 from behind hail the people - three have perished

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Discussion

In the present paper the problems of early warning of ecological danger in region of realization of active influence on hail are discussed.

It is known, the interplay implements on hail processes by operating depositing ice formed reactants directly in on cloudy medium, in area laying ahead hail formation [5]. The hail cannons are used for that process. The cannon are large impressive apparatus, it makes a lot of noise, and it comes with confidence-building detailed instruction. More ever, any times that are used the acetylene explosion for rocket moving. That make also ecological problem for surrounding.

The rockets used against hails basically consist of a nose cone, engine, deflocculant with pens and system of safety control. The nose cone of rockets is supplied with the pyrotechnic generator of crystallizing aerosols of silver iodide. The engines are equipped with ballistic firm fuel. The security system contains a charge of explosives with hollow-charge extractions ensuring splitting of cotton-bakelite bodies of rockets on small-sized debris.

For example, the rocket „Alazav" against hails has a duraluminium body, engine and parachute system of safety control. The generator of crystallizing fragments is the sustainer equipped with mixed fuel with %2 -s' contents of silver iodide (Agl), creating indispensable thrust force on all flight path. And, the rocket „WR-98Z" automatically starts to reduce landing speed of a rocket.

So, the pollution of the environment in case of activities against hailstones with application of rocket technology of protection is conditioned by the following factors:

1. Contamination of free air, soil and water of the open pools by combustion products of pyrotechnic structures, reactant of an inoculation (Agl), charge of engines and explosive of a system of self-liquidation of bodies (debris and oddments of bodies) against hailstones of rockets;
2. The derivated fumes of combustion products particulate is outwashed by precipitations and fall in soil, in the open pools in atmosphere, are diffused by airflows and are born for limits of defended terrains. The formation of

iodate acid and its potassium salt is connected to interplay the iodine with strong oxidants, much more likely with ozone. It is necessary to mark, that much more likely, the oxidation is promoted by strong ozone formation during a thunderstorm.

It was earlier rotined, that the level of contamination of environment at realization anti tail activities by iodides, reaction products is lower than the sanitary regulations, though the writers approve there can be strong local contaminations [6].

AgI ------- $AgJO_3 + HJO_3 + I_2 + HJ$

The derivated materials are toxic in a miscellaneous degree toxic activity. For example, even such widespread material as the iodine has toxic effect on the people at absorption more than 1 milligram. The maximum tolerable dose of the iodine for the miscellaneous age qualifications of the people is determined in the field of doses 0,150 and 1,000 mg per day. The elementary iodine is toxic, and its fume stimulates of an eyes and pulmones. All iodides also are toxic in reduced limits, as the iodine, on the chemical nature is easily freed at stand from an iodide anion containing compounds [7]. Moreover, known isotope - Iodine 131 - one of radioactive materials, live in atmospheric test of automatic weapons. Reduced causes to transition to new technologies of processing of hail clouds.

The rocket-artillery method on active influence hail processes is the most expensive method.

Besides there are also other of this method:

-The inoculation of clouds is made anti-hail by shells or rockets issued with cannon KC-19, rocket installation TKB-40, or other / anti-hail installations /this military weapon/.

- The rockets and the shells are unguided, after launch a rocket or shell can knock dawn from a pathway and detonate in the other place, that can result in tragical consequences.

- The statistics of country of CIS on the average annually spend 187500 rockets, rockets firings with tragical outcome 94

- The usages of this methods, before launch anti-hail items are necessary need the sanction from bodies(organs) of aircraft, it detains spent activities on anti-hail to protection

- In a consequence of realization of perennial activities on anti hail protection there is, a contamination of free air, soil, water of the open pools etc., are diffused by airflows and are born for limits defended территорий.

There is account documentation:

- The stuffs of overseeings by a condition of atmosphere in a site of negotiations of activities on active influence on hail processes on paper and electronic carriers,
- The concludings of organizations and experts on stuffs of observations,
- Minutes of commissions extending the concludings of organizations and the specialists.

For a super-power cloud of hail one of the first symptom for discontinuance of hail formation in a cloud is the steady lowering of a zone heightened radar reflection on a wavelength $\lambda = 10$ cm. The reduction of the geometrical sizes of a shed, and also absence of a zone of a gentle radio echo are symptoms of the discontinuance of new development of a cloud and formation in a cloud of new blastemals of hailstones.

The basic symptom of transition of hail cell in stage of dissipation are:

- The steady reduction of the size of falling out hailstones;
- The steady reduction of probability of loss of hails or complex yardstick of hail risk;

- The steady reduction maximum radar reflection of a cloud;
- The downturn of a radio echo maximum;
- The reduction of horizontal gradients radar reflection in a zone at a level of 1-3 kms overland:
- The downturn of high bound of a zone heightened radar reflection λ = 10 cm is lower than a level of an isotherm -10^{o}C;
- The activity in a mode of exposure implements so long as above defended or accumbent terrains are watched hail risk of a cloud.

The outcomes of experiment are estimated by commission, in a structure which one included the specialists in the field of atmospheric physics and meteorology.

Recently large application is found audio-signal generators with a directional sound wave - technological “know-how” in this area. In these generators as fuel will be used either gas of acetylene or propane-butane gas. Though acetylene has a high scale of endothermicity and at incineration the plenty of heat is excreted, usage of this gas for some reasons should be eliminated. On our view the reasonable causes for transition to system propane - butane, which one ecological cleaner in many aspects. Usage of acetylene in fuel grade as contrasted to this gas creates following troubles:

1. Acetylene in a mixture with oxygen blasts out in a very broad band of concentrations. The explosion-hazard decreases at a dilution of acetylene with inert gases, for example N_2.
2. Acetylene blasts out at the temperature of about 500oC or pressure above 0,2 MP At long-lived stand in copper medium will be formed copper acetylenide, that blasts out at impact or temperature rise. Therefore at storage of acetylene the stuffs keeping cuprum (for example, valves of bottles) will not be used.
3. Difficulty of storage, / store and transport it in filled inert porous weight (for example, char coal) steel bottles of white colour (with a red placard "«A") by the way of solution in an acetone under pressure 1,5-2,5 MP./
4. Toxicity / 0.3 mg/m^3 /. Though it is considered, that of acetylene has gentle toxic operating, in matching about a propane - butane fraction, that despite of a smaller endothermicity, is less toxic on 1000 times / 300 mg/m^3 /, is less explosion-hazard, storage is less problematic.

It is necessary to mark, that at combustion of using organic compounds the same materials are excreted water and carbon dioxide. However, for acetylenes is formed more carbon dioxide - / about 15 %/:

$2C_2H_2 + 5O_2$ ------- $4CO_2 + 2H_2O$

$2C_3H_8 + 10\ O_2$ ------- $6CO_2 + 8H_2O$

$2C_4H_{10} + 13\ O_2$ ------- $8CO_2 + 10\ H_2O$

Now the problem to made everything for reduction quantity of carbon dioxide / Kioto`s protocol / . So that, and in this aspect, application of a mixture the propane - butane is more justified.

The propane - butane fraction is liquefied easily (below 0^{o}C and on normal pressure or at heightened pressure and customary temperature – volatile liquid) and transported, nor creates of any difficulties with stuffs of storing systems.

The application of acetylene is connected also to high operating cost. So, 40 liter bottles acetylene contain 7,4 kgs of acetylene, with the cost about 110 000AmD /300 US dollars /, in that врема as 40 liters жжиженного the propane - butane of a fraction from 20 kgs of gas costs 20 000 AmD /about 55 US dollars /. Acetylene it is possible to store no more than 6 months, then the bottle can be blasted. In case of explosion the trotil equivalent of an acethylene bottle is peer 2,75кг. The explosion of an acetylene

bottle results to let of metallical debris up to 300м. Therefore, from many aspects, and with ecological, there is a necessity of replacement of acetylene on propane - butane a fraction. By the way, it 5-6 times more cheaply acetylene, and is easy to application.
The reduced data convincingly testify to expediency of usage of propane - butane in fuel grade for audio-signal generators.
The efficiency of a method makes approximately 70 %.

The noise problem: The noise is new danger from environment.
The noise hinders strain-relief crystallization, dream, dialogue, also to activity, therefore can lower a quality of life and damage to health. It is necessary to mark, that the WHO / World health organization/ now prolongs researches on influencing a noise on a human body. It is necessary to mark, million of the people live in constant acoustic discomfort, because of the proximity to the places of residence of transportation facilities - automobile, rail-way, aircraft. Strong acoustic influencing have also means of military engineering.
The measurements on definition of a noise are conducted at explosions on devices RFT-000/17 and RFT- 000/28. The measurements are conducted as in a building, where is located acoustic anti-hail of a cannon, and outside of a building. The greatest noise effect on regime Lin and C In a building in case of an acethylene bottle made 130 db, and case a propane - butane of a fraction is 164 db. In escaping the acoustic end on 0,5 m in impulse mode the sound strength makes 174дб, and in a mode Lin and C - 168. In case of acetylenes are 149 db and 139 db accordingly.

Estimation of efficiency anti-hail activities:

Essential variability of repeatability and intensity of hails phenomena in space and time during a season, and also their annual variability, make an estimation of efficiency of simulated interference to extremely problem. It can be executed only on the basis of the analysis and confrontation of the perennial data.
In this case at an estimation of those or diverse methods of simulated effect on hail processes are planned an experiment with a randomization of simulated interference. It allows to receive two independent series of observations, in which one the clouds subjected and which are not subjected to effect, selected are assorted on the basis of definite and identical to both series of yardsticks.
The value of efficiency is calculated under the formula most often used in global practice of active effects for such estimations:

$$E = (1 - Si/S_0)\ 100\ \%,$$

Where are:
Si – the area of damage by hail of agricultural cultures in the season of realization of anti hail activities, reduced to a unit area.
S_0 - will use or perennial mean area of damage by hail in terrains, defended from hail prior to the beginning activities on hail safety, or area of damage by hailstones in monitoring terrains for the compared season, also reduced to a unit area.
The selection of monitoring terrain implements pursuant to the requirements: identical with terrains, defended from hail physical - geographical and climatic features of terrains comparable hail dangers, including on the areas hail beating.

4. Conclusion

On fulfilment of the present investigation it is detected following for usage influence against hail means on environment:

- The most effective way of strife against hail is the method, though a noise level little bit high as contrasted to acethylene analog. -
- Considerable effect on health of the person because of contamination by movable sources
- Though in the article the given problem is not discussed, however it is necessary to take into account:
- a/ low efficiency of verification of quality monitoring systems of air
- b/ the old equipment low technological level of are resulting in to considerable emissions.

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