

909. and organisation from a Canadian perspective." Forensic science international 264 (2016): 7-14.

4. aWasim Haidar, Wilfred Blessing, Prashant Johri, Surendra Pal Singh, Sutherlin Subitha. MEEapp: An Effectual Application for Mobile based Student Centered Learning System // 4th International Conference on Computing Communication and Automation (ICCCA). – Greater Noida, India, 2018.

5. Hsiao-Chien Tseng, Chieh-Feng Chiang, Jun-Ming Su, Jui-Long Hung and Brett E. Shelton. Building an Online Adaptive Learning and Recommendation Platform // SETE 2016: Emerging Technologies for Education. – 2017. – 428-432.

6. Dalal Abdullah Al Johany, Reda Mohamed Salama, Mostafa Saleh. ASSA: Adaptive E-Learning Smart Students Assessment Model // International Journal of Advanced Computer Science and Applications. – 2018. – 9(7). – 128-136.

7. The Knewton Platform. (2014). Retrieved from <http://www.knewton.com/assets-v2/downloads/knewton-intro-2014.pdf>

8. Henderson, J. "Smart Sparrow targets Next Generation Learning after securing first Round of Funding". NewSouth Innovations.

9. "Smart Sparrow - Adaptive eLearning Platform". Smart Sparrow. Retrieved March 23, 2013.

10. Simonite, T. (2012). MIT technology review. Retrieved from <http://www.technologyreview.com/news/506366/questions-surround-software-that-adapts-to-students/>

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## АУА-РАЙЫНЫҢ АВИАЦИЯҒА ӘСЕРІ ЖӘНЕ ОНЫҢ САЛДАРЫ

### ВЛИЯНИЕ ПОГОДЫ НА АВИАЦИЮ И ЕЕ ПОСЛЕДСТВИЯ

#### THE AFFECTS OF THE WEATHER ON AVIATION AND ITS CONSEQUENCES

**Аңдатпа.** Бұл мақаланың басты мақсаты - ауа райының ұшу қауіпсіздігіне қалай әсер ететінін, одан кейін оның салдары қандай болатындығын және ауа райының авиацияға қалай әсер ететінін анықтау. Автор тірі мысалдарды келтіре отырып, метеорологиялық құбылыстың себептері мен салдарын кеңінен ашады. Автор ауа-райының әрқайсымыздың өміріміздегі рөліне және авиация саласында қандай рөл атқаратындығына ерекше назар аударады.

**Түйін сөздер:** авиация, ауа-райы, әсерлері, салдары, метеорология, ұшу қауіпсіздігі.

**Аннотация.** Цель этой статьи - узнать о том, как погода влияет на безопасность полета, какие последствия оно имеет после нее, и вообще о том, как погода влияет на авиацию. Автор широко раскрывает причины и последствия этого метеорологического явления, приводя живые примеры. Автор обращает особое внимание на роль погоды в жизни каждого из нас и конечно же какую роль оно играет в сфере авиации.

**Ключевые слова:** авиация, погода, аффекты, последствия, метеорология, безопасность полетов.

**Abstract.** The purpose of this article is to learn about how the weather affects flight safety, what consequences it has after it, and generally about how the weather affects aviation. The author widely reveals the causes and consequences of this meteorological phenomenon, citing living examples. The author pays special attention to the role of weather in the life of each of us and, of course, what role will it play in the field of aviation.

**Keywords:** aviation, weather, affects, consequences, meteorological, flight safety.

Weather is a powerful factor affecting flights. And she is very changeable. Everyone understands that flight safety: from aircraft designers to crew members. Currently, numerous instruments can relatively safely take off and land even in extreme conditions. The ship has ceased to mean true flexibility. Annually, several such cases are recorded when they do without catastrophic consequences. And all of them are always focused on ensuring maximum passenger safety. From this point of view, and with fog. Every weather phenomenon has a degree that can be dealt with. The likelihood that the weather can occur due to weather, it will be canceled. Passenger safety comes first. Even if it will bring huge losses. The weather can be different. This is known to those who teach pilots. Those who design airplanes. Those who build them. Those who check and repair them. Those who certify them. And, of course, those who fly them. In modern aviation there is no place for chance. Result: today, with the help of additional auxiliary electronic systems, the aircraft can safely take off and land at almost zero visibility, snow, rain, blizzard and fog. Even lightning strikes are not a critical hazard to an aircraft. Each year, there are several cases where the aircraft has no consequences. Some weather factors. First of all, this is icing, strong lateral wind when landing. To eliminate the first factor, a special anti-icing treatment of the aircraft before departure is used, and to ensure a safe landing, the maximum allowable standards of crosswind speed are established. How does the weather affect aviation? For example, aircraft must undergo anti-icing treatment with a special fluid before the explosion. Aircraft lose their aerodynamic properties, controllability. Plane crash rises at times. Therefore, without such a procedure in the cold season, not a single aircraft is lifted into the sky. If the crosswind is too strong, strong turbulence appears in the aircraft above the ground. And in such conditions, take-off and landing are strictly prohibited. The same is with other weather events, because all of them had already happened before. The boundaries that cannot be crossed are clearly established, as well as the procedure in each specific situation. These rules are strictly observed, no one will put experiments on passengers. Rather, they will delay the flight for a couple of hours or send the aircraft to another airfield. So the reason for this widespread fear of flying lies in our heads, but not in objective conditions. After all, how does it usually happen? Before the flight, especially the first, we do not really know what to expect. And the unknown scares the most. Yes, and to manage the situation, in which case, passengers especially can't. So such a person begins to wind himself up, afraid of the slightest interference; most often worry precisely because of the weather. Therefore, many even a slight rain or wind is perceived as a sign of impending disaster. The real danger is only those weather conditions that significantly impede takeoff and landing or significantly affect the flight performance of the aircraft, airfield. The following weather phenomena can be significant in aviation.

#### **Fog**

When too much moisture accumulates in the air and the fog becomes thick, visibility sometimes decreases to zero. Therefore, when it is less than the minimum, take-off and landing at the airport are prohibited.

#### **Ice**

When the temperature drops sharply after rain or thaw, ice appears. In the cold season, this phenomenon is quite common; most often falls on the evening and morning hours. With it, the coefficient of adhesion is significantly reduced, which makes the aircraft practically uncontrollable. In addition, due to icing of the antenna-feeder devices, the performance of beacon systems is usually degraded.

### **Thunderstorms**

As already mentioned, hitting a plane with lightning does not at all mean certain death. Nevertheless, thunderstorms are still one of the most dangerous natural elements, for aviation, primarily due to the fact that they are accompanied by strong turbulence, which is almost impossible to cope with. Thunderstorm flights are affected in three main ways. First, aircraft crews need to bypass their foci. Accordingly, the route of movement is violated, the flight duration, fuel consumption, etc. are changing. Secondly, lightning discharges in the air cause interference in the operation of various devices, which means there are failures in communication and navigation. And thirdly, with severe thunderstorms, an active hydro meteorological effect can be used. In this case, the clouds are dispersed by introducing special reagents into them: special missiles, scattered from aircraft, etc. Of course, this also affects the normal activity of air traffic.

### **Hail**

Precipitation is known to be liquid and solid. The city is precisely the most serious and dangerous weather phenomenon that affects flight safety. It can cause serious damage to ground structures, because pieces of ice fly with a fairly high speed and force. What can we say about a flying airplane! Almost every hole here is no longer an annoying nuisance, but a very real chance of dying.

### **Dusty (sand) storms**

During dusty or sandstorms, a so strong wind rises that it raises dust, sand, particles of earth and the like. Of course, this greatly impairs visibility; the larger the wind, the lower it is. Sometimes such dust curtains can reach several meters in height. Landing and take-off of the aircraft in such conditions is impossible.

### **Blizzards**

A blizzard can be considered an analog of a dust storm. Only in this case snow rises into the air. Sometimes they can be combined, then the wind raises dust and dry snow. But a blizzard is an inconvenience when flying not only because it significantly reduces visibility. She also sweeps the runway with snow, and this creates additional inconvenience, because it takes time, effort and money to clear the airfield.

### **Wind**

The direction and strength of the wind most affect the duration of the flight. The tailwind pushes the aircraft forward, which helps to reduce the duration of the flight, increasing its speed, while the headwind has the opposite effect and slows the speed of the aircraft.

### **Snow and frost**

The main problem in cold weather is the movement of an airplane on the ground. Aircraft are designed to operate at extremely low ambient temperatures (after all, at an altitude of 10,000 m it can reach  $-60^{\circ}\text{C}$  or even  $-80^{\circ}\text{C}$ ). Thus, the main factors that should be taken into account during snowfalls or frosts are the condition of the runway and the icing of the aircraft on the ground.

### **The sun**

The aircraft can withstand heat and sun (up to  $53^{\circ}\text{C}$ , depending on the type of aircraft), but high temperatures can affect its effectiveness. Since hot air is less dense than cold, it reduces the power of the engines and the bearing force of the wings, which necessitates the use of a longer runway, while the rate of climb and payload are reduced. To compensate for this, pilots have to increase power. Thus, if high temperatures rarely prevent an airplane from taking off, they should be considered in the flight plan. At the same time, safety experts believe that weather is rarely the only factor leading to disaster.

Strong storms and hurricanes can significantly damage the wings of a small plane, but, as a rule, both pilots and controllers do everything possible to avoid getting into them. Crews try not to get closer to the storm zones closer than 16 km. Weather radars installed in the bow of modern airliners make it easy to identify storm zones and change course to avoid getting into dangerous weather conditions. For example: Gloria Kuleza of the US Federal Aviation Administration claims that weather conditions are a decisive factor in 23% of all air crashes, regardless of the scale of the

accident. And in the case when the plane crashes inside or near the storm zone, there is always the opportunity to find out how bad weather triggered the crash. For example, although it is still not completely clear why the Air Algerie flight 5017 crashed in the Sahara in July 2014, many experts believe that the bad weather caused the death of 118 people on board. Another plane crash, in which the weather could play a tragic role, is considered the disappearance of Air France over the Atlantic in 2009. The plane fell into the turbulence zone, due to which there was a sharp drop in lift (the so-called stall effect). Moreover, as the investigation established, the pilot did not undergo the necessary training to cope with this non-standard situation. Icing of the wings and tail can also lead to an accident, but all pilots know how to avoid this. In addition, the wings of modern aircraft are equipped with static electricity arresters, which are able to safely dissipate an electric charge, for example, from lightning. According to current estimates, every civilian aircraft is struck by lightning at least once a year. Heavy rain or wet snow can trigger a flame outage: a malfunction of the jet engine due to flame attenuation in the combustion chamber. As a rule, in this case, pilots can restore engine operation, but not with a 100% guarantee. The flameout in both engines occurred on a Garuda Indonesia Airways aircraft in 2002. The reason was tropical rain, which hit the airliner. The pilot failed to restore the engines, but he managed to plan the plane and put him on the river. It is extremely rare for aircraft accidents to occur due to the fact that pilots cannot cope with the effects of bad weather at high altitude. According to the International Civil Aviation Organization (ICAO), more than half of the accidents were caused by violation of safety rules for flights in the area of the runway. The weather can be different, and all links in the safety chain are aware of this. This is known to those who teach pilots. Those who design airplanes. Those who build them. Those who check and repair them. Those who certify them. And, of course, those who fly them. In modern aviation there is no place for chance.

### References

1. Sudovtsev V.A. Scientific and technical information and translation. Handbook of the English language. – M.: Higher School, 1989. p.232.
2. Kiyak T.R. Linguistic aspects of terminology. – Kiev: UMKVO, 1989. p. 321.
3. Golovin B. N. Linguistic terms and linguistic ideas. – M.: Questions of Linguistics, No. 3, 1976. p.256.