# THE CONTROLLER

January 2015
Journal of Air Traffic Control


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# ACHIEVEMENTS AND CHALLENGES

**by Patrik Peters,**
**IFATCA President & CEO**

Welcome to this first edition of The Controller in 2015! Christmas and New Year are an opportune time to look back and reflect on what we have achieved over the past year, what has gone well, what hasn't, what could we each do better, and importantly, where should we be focusing our attention looking forward.

Since taking office as PCX at the last conference in Gran Canaria, I have been immensely proud of what the Federation has achieved in so many areas – structurally (workflow improvements, finance consolidation, approval & expense management), representational (with the fantastic work our reps do at ICAO, Eurocontrol, SESAR and so many other areas), and international collaboration (such as with ITF, IFALPA, ICAO etc.) I am also very proud of the persistent efforts in assisting member associations and individual controllers facing legal prosecutions. This is the area that also keeps me awake at night, and where we need to be ever vigilant.

In our IFATCA Manual we define Just Culture as "A culture in which front line operators or others are not punished for actions, omissions or decisions taken by them that are commensurate with their experience and training, but where gross negligence, willful violations and destructive acts are not tolerated." That is a very solid definition, but sadly it's very far from reality in many places, as we repeatedly see. In all regions of the Federation, our EVPs have, in cooperation with their associations, assisted controllers who were faced with legal action and prosecution. These colleagues executed their profession, stood up for their rights and/or reported safety concerns. No one is immune as we see this occurring globally and at all levels of social and economic development.

IFATCA has, and will continue, to do all it can to bring these situations to global attention and provide professional guidance to reach a "just" and fair outcome. This is not always easy, and regrettably, not always successful. Globally we must never step back from taking every opportunity to promote and encourage the true understanding and application of Just Culture. In Europe in particular, IFATCA in cooperation with Eurocontrol, has achieved a major milestone with the "Prosecution Expert/Just Culture" initiative. The expertise our members have developed has already been drawn upon to provide guidance in a number of instances.

There is a tremendous amount of work needed in every region, before we will be able to say that all controllers work in a true Just Culture environment. One of the main challenges will be to put concepts like 'duty of care' into the correct context and to carefully evaluate what it means for our procedures, systems and people. Even if all is 'just', we are subject to scrutiny under this 'duty of care'. If you can do something to prevent an event from occurring, you must act accordingly. This will undoubtedly influence our profession and may well require a complete rethink of how procedures and standards are written and disseminated to aviation professionals around the world.

Assistance to our member associations and colleagues in this and other areas remains an absolute priority for our Federation! Whenever controllers face unjust legal action, we will be there, and we will help.

On behalf of the Executive Board I sincerely thank you all for your participation, representation and continued professionalism. I am honoured to have the opportunity to lead such a dedicated global team of professionals. I wish you all, and your loved ones, a safe and prosperous 2015.

Our unity is our strength, and I look forward to building upon that global strength with you throughout the year. In 2014 we HAVE achieved a great deal. In 2015 we WILL achieve even more. I can't wait!

**pcx@ifatca.org**


# IFATCA PANEL 2015

23. April 2015

10:00 - 12:30
Hotel Kempinski Zografski
Sofia/Bulgaria

featuring speakers from
IATA, IFALPA, NATCA/USA &
IFATCA.

# THE ITALIAN SUPREME COURT OF CASSATION

## A Case Study on Aviation Accidents

**by Pietro Antonio Sirena, President of the 4th Penal Section of the Italian Supreme Court**

The penal cases concerning aviation represent an interesting part of the cases dealt with by the 4th Penal Section of the Italian Supreme Court. This section of the Italian Supreme Court deals with all cases of "negligence"; and while the body of jurisprudence on, for example, car crashes or the negligence of physicians is ample, that which concerns the aeronautic sector is luckily small. This demonstrates that airplanes are a secure means of transportation, and that air crashes are few when compared to the volume of air traffic and to the number of passengers carried.

A few months ago, I wrote a report concerning all the air crashes that happened in Italy, and which have been examined by the Italian Supreme Court. For this article however, I will only consider three of them: the disaster of Capoterra that occurred on September 14, 1979; the disaster of Linate, which happened on October 8, 2001; and the disaster of the mountain called "Sette Fratelli" (Seven Brothers), which took place on February 24, 2004.

The reason I chose the above three crashes is that in this series of accidents, criminal charges were filed: aviation disaster (articles 428 and 449 of the Italian penal code), along with multiple non-intentional homicide charges (article 589 of the same code). And some air traffic controllers, among others, were found guilty, and this created a misunderstanding and a mistrust between this category of professionals and the Judiciary.

To be frank, this misunderstanding/mistrust really originated with the decisions made concerning the two disasters of Capoterra and Mount Sette Fratelli, and this for reasons I will try to explain in this article, and which constitute the "core" of my report.

### A Just culture in aviation.

Before speaking about those disasters, I would like to say a few words about Just culture in aviation.

Obviously, investigating the causes of aviation accidents is of fundamental importance to improve flight safety and save lives. Yet ever since investigations into aircraft accidents were carried out systematically, and with the specific aim of using their results to improve flight safety, their use for any other purposes have been a point of concern: and this especially because the documents produced by such investigations can be used by Judges to determine any question of criminal and/or civil liability on the part of anyone involved in an accident.

But if such documents can be used to ascertain the criminal liability of people involved in an accident, they will not easily cooperate, and will not easily admit to having made errors that could lead to a conviction. This lack of cooperation would not, understandably, lead to a rapid and correct verification of the causes of aviation disasters.

*✈ Court President Sirena during a Just Culture Workshop in Amsterdam, November 2014*
Photo: Ed


Thus in many countries, including Italy, there are somewhat antagonistic interests between the administration of Justice and safety investigations, whose sole aim is to improve flight safety. Therefore, a balanced solution between these two rather opposite interests, to which I can relate as a judge and a pilot, needs to be found. This is important in order to achieve the following definition of a just culture: "a culture where front line operators are not punished for actions, omissions or decision taken by them that are commensurate with their experience and training, but where gross negligence, willful violations and destructive acts are not tolerated". Unfortunately, reaching such a just culture in Italy will be long and arduous.

### The Capoterra disaster

This disaster took place during the night of September 14, 1979, when a DC9 of the ATI Company, approaching the airport of Cagliari Elmas, crashed into mount Conca d'Oru, killing everyone on board. **link**

It was not the first airplane disaster that was not caused by some mechanical failure, but by a human error. In this case, it was the pilot's failure to determine the plane's vertical position during navigation. There had been the disaster of Superga (May 4, 1949 **link**), a hill close to the airport of Turin, in which the entire football team of the "Grande Torino" died; and the disaster of Montagnalonga (May 5, 1972 **link**) a mountain close to the airport of Palermo.

These disasters did not go to the Italian Supreme Court because the Tribunals and the Courts of Appeal found only the pilots guilty (though they had died in the accidents) and absolved everyone else who had been charged with "negligence". In the Montagnalonga case, the air traffic controllers actually were acquitted.

Following these acquittals, however, perhaps under the pressure of public opinion, there was a significant change in jurisprudence, a shift that began with the disaster of Capoterra. This disaster was indeed a game changer: in addition to the obvious culpability of the pilots, established by the Cagliari Courts, the Public Prosecutor of Cagliari started investigating the role played by air traffic control as provided by the Italian Air Force at the time. As a result an air traffic controller and officer of the Italian Air Force were impeached and found guilty by the Judges of first and second instance. And their sentences were later confirmed by the Italian Supreme

Court.

During the trials two opposite theories clashed. On one side, there was the theory of the judicial authorities, who assumed that the air traffic controller bore responsibility for the disaster for breaking section 2 of article 40 of the Italian penal code, which establishes that: "Not preventing an event that you have the legal obligation to prevent, is equivalent to cause it"; and for being in a "position of guarantee" towards the passengers of the airplane.

The air traffic controllers on the other hand argued that the judicial authorities enlarged and misrepresented their duties as provided in national and international guidelines and policy documents, and arguing that keeping a separation between an aircraft and obstacles fell under the exclusive competence of pilots.

Although it's beyond the scope of this article to explain the complex set of problems examined by the Cagliari Tribunal and Court of Appeal, I can say that the Court's decision to convict the air traffic controller contained a technical error. It confused visual flight with visual approach. This error led "insiders" to believe that the air traffic controller was made a "scapegoat" for the disaster. I must add that those judges failed to seize the opportunity to highlight a number of confusing safety regulations as stipulated by ICAO, which were at the root of the misunderstanding that led to the disaster.

But these problems did not escape the attention of the Italian Supreme Court, and in its ruling n. 5564 (April 12, 1985), the Supreme Court set out a series of fundamental principles of air traffic control.

The first of these principles that I would like to mention here concerns the air controller's "position of guarantee". The Court ruled that although Annex 11 of the ICAO does not list "preventing collisions with obstacles on the ground" among the duties of the air traffic controller", this does not exclude that an air controller be held responsible for an accident, together with the pilot, if his or her failure to comply with the regulations have contributed to the disaster.

The second principle concerns the duty of air traffic controllers to intervene, regardless of ICAO rules. The Court established that an air controller "is never relieved from his duty to provide all possible assistance to an aircraft in danger or distress".

Another principle established by the Supreme Court regards the air controllers' duty to inform pilots of any appreciable deviation from the given trajectory of their flight.

Finally, the last principle I would like to mention has to do with the relationship between pilots and air traffic controllers. For the Supreme Court ruled that their interaction is characterized by an ancillary and conditioned cooperation, whereby the latter is subordinate to the former; with the consequence that the air traffic controllers could be accused of "negligent complicity" in the disaster, having failed to correct the mistake(s) of a pilot, although being able to.

## The Linate Accident

A far more serious disaster, from whatever angle we look at it, took place at the Linate airport on October 8, 2001. At 8.10am, a Boeing MD 87 of the Scandinavian Airlines, taking off, crashed into a private Cessna 525 aircraft with German registration, which had strayed onto the runway in dense fog. **link**

In the collision, the Cessna broke in two and caught fire. The MD 87, having lost its right engine on impact, continued his run and crashed into a luggage building located near the end of the runway, at approximately 251 kilometers per hour. All 114 occupants of the two aircraft. Four airport employees died, while a number sustained various injuries. To date, it is still the the deadliest accident in Italian aviation history.

The expert to whom the Judicial Authorities entrusted the investigation of the accident, established that the primary causes of the disaster were: an error from the pilot of the Cessna aircraft who had taxied across the runway, "to this induced by a lacking training, by a non-standard phraseology, by misleading signage and by cartography that did not accurately depict the airport"; an error on the part of the air traffic controller operating the ground frequency, who, because of his unfamiliarity with the existing airport signage, didn't take notice of the incorrect location of the Cessna, and authorized the pilot to continue taxiing, (and this regardless of the fact that the pilot had communicated its location, and that the Cessna was taxiing on the wrong runway, and should not have been there); the lack of both a ground-movement-system and of an alarm system at the stop bar of the R6 intersection. These would have allowed the air controller to detect the presence of the Cessna on the taxiway R6, which intersects the main runway; the absence of "implementation" of the procedures contained in ICAO standards, concerning the limitations on ground handling procedures in low visibility conditions, and in the absence of a suitable stop bar and/or of a system to prevent unauthorized entry onto the runway.

The inquiry report described the situation of Linate airport at the time of that air crash as alarming. It stated that "the Milan Linate airport did not meet the security standards specified in ICAO Annex 14; this is of particular importance, given the fact that Linate is considered an important international airport".

At the end of the investigation, crimes of "aviation disaster" (articles 428 and 449 of the Italian penal code) and multiple unintentional homicides (article 589 of the same code) were hypothesized. In particular, different levels and forms of negligence were attributed - to subjects who were then at the top or had leadership roles within the service provider; to other occupants specific roles within ENAC, who had some competence in relation to the

### Position of Guarantee in Italian Penal Law

Article 40, paragraph 2, of the Italian Criminal Code states that "Not preventing an event that you have the legal obligation to prevent, is equivalent to causing it".

What determines the "obligation to prevent the event" is called "position of guarantee", and there are two types to consider: the position of control involving the control of potentially harmful sources of danger, such as dangerous machinery; and the position of protection, involving the protection of people or goods against injuries and damage, as in the case of a physician who is entrusted with the care of a patient

.

Obviously, in some cases, and among them that of the air traffic controllers, the problem resides in identifying the source and the content of the legal obligation pertaining to those persons.

In the Capoterra case specifically, the Courts ruled that by allowing the pilot of the DC9 to make a visual approach, the air controller failed to apply the safety rules for such a procedure. The court also blamed the air controller for failing to inform the pilots of the significant deviation of the aircraft from the flight path; timely inform the pilots that the aircraft was flying lower than allowed; inform the pilots that the aircraft was heading towards an obstacle.

management of air traffic in that airport; to other subjects with different roles within the SEA s.p.a. (the management company of airport services); and finally, to the air traffic controller, who had held the last radio contact with the Cessna aircraft.

The defense (with the obvious exception of the air traffic controller's lawyer) argued that no blame could be attributed to the organizational structure of the airport, since the disaster was not foreseeable, as it had been caused solely by errors from the Cessna pilots and the air traffic controller. Yet the Tribunal and the Appeal Court of Milan did not - rightly so – adhere to this view. They attributed the accident to the conspicuous deficiencies in the "airport system" and to the "impressive series of gaps" of the same airport, all duly mentioned in the inquiry report (and also in the report of the ANSV-National Agency for the Safety of Flight).


So many of the accused involved in this tragedy were convicted; and this occurred despite the decisions reached by the Tribunal as well as the Appeal Court of Milan were in contrast with each other, since the manager of the airport and the head of the ENAC's territorial district, convicted at first instance, were acquitted by the Appeal Court, and the Head of the Organizational Development Maintenance and Resources of SEA spa, acquitted by the Tribunal, was convicted in the second degree.

The Italian Supreme Court, in its sentence 19th February 2008, confirmed the decision of the Appeal Court of Milan, thus adhering to the view of the serious defects of the "airport system", but excluding that the Director of the airport had of a "position of guarantee" concerning regulation and supervision on the safety of aircraft movements inside the airport: and this in the absence, for the period after the entry into force of d.lgl. n. 250 of 1997, of a provision conferring to the same Director specific powers in the matter.

While dealing with this case, I need to discuss an issue that is related to the concept of Just culture. During the first-degree trial, the victims' relatives, who had brought a civil action against the accused, exhibited the report of the ANSV (National Agency for the Safety of Flight) on the causes of aviation accidents. The defense protested against this display, because it underlined the conspicuous deficiencies and gaps in the "airport's organizational structure".

The defense lawyers addressed certain objections to the Italian Supreme Court. They challenged the court over a series of technical flaws, one of which consisting in "acquiring a disc produced during the last phase of the trial of first instance, from the defense of the plaintiff, and lacking any label of attribution – being simply named report ANSV", and considering that "literally 40% of the text from the first-instance judgment is made by this anonymous script".

But the Italian Supreme Court did not accept such objections, observing that:

- the report was indeed from ANSV and could be attributed to the head of the agency, although other persons may have physically contributed to the report;
- it was acquired as a "document", according to article 234 of the Criminal Procedure Code, and it has certainly the nature and the content of such documents, in the part in which exhibits the factual circumstances, even if it put them in their own order ";
- the judges from the Tribunal and the Appeal Court had confirmed that the possible causes of the disaster, which the report presents, were not used as incriminating evidence against the accused "; and the same judges reiterated that "the report's findings could not be taken as evidence to determine the guilt of the accused", since "this document is but a convenient summary of the results already acquired, otherwise unquestionable and then, for truth, never questioned, such as:
- the exchanges P. Zacchetti and the pilots of the CESSNA were also reported in the judiciary report of M. Pica,
- the modalities of impact between the two aircraft,
- the consequences of the fall of the Boeing of the Scandinavian Airlines to the ground and then against the luggage hangar,
- the consequent deaths of all the persons transported in the Boeing and in the Cessna and of the four SEA employees working in the luggage hangar,
- as well as the obvious condition of the airport facilities (also reported in the judiciary report of M. Pica)".

As you can understand, it is very difficult to keep the results of an investigation made to improve safety procedures apart from their possible use in determining criminal liability.

## The Mount Sette Fratelli Crash

After the Linate disaster, another plane crash in Sardinia highlighted the issue of air traffic controllers' liability again. In the night of February 24th, 2004, a Cessna 550, inbound to Cagliari, was approved for "visual approach", and crashed against a rocky spur called Baccu Malu (Bad Gorge), on the Sette Fratelli mountain. All six occupants – three crew members and three members of a medical team transporting human organs – died **Link**.

Technical reports ordered by the Judicial Authorities ascertained, first of all, that the main cause of the disaster was the Cessna pilot's decision "to make a visual approach in a context in which there were no conditions for maintaining appropriate obstacle separation from the orography of the area and the absence of bright visual landmarks, that at night and in the observed conditions, prevented the perception of obstacles and the consequent possibility of separating the aircraft from them".

But if the pilot's error was deemed the primary cause of that air crash, the judicial authorities wondered why the air traffic controller let the aircraft descend to a dangerous, low altitude, without intervening. The general feeling was that this was a repeat of the Capoterra disaster, and that it had happened despite the clear message sent by the Italian Supreme Court when it placed air traffic controllers in the position of guarantee towards the occupants of the flights they direct.

Therefore, although the conclusions of the judicial experts, who literally wrote that the air traffic controller "did not demonstrate disparities with what is arranged and ordered: a) in the Annex 11 and in the document ICAO 4444 (concerning the application procedures of the control service, the information service and the alerting service), b) in the technical norm and c) in the rules in force of air traffic", the two air traffic controllers involved were first incriminated and later convicted.

The Judges of the Tribunal and of the Appeal Court of Cagliari believed, indeed, that the behavior of those air traffic controllers was "negligent" and a "contributing cause" to the disaster. In addition, these Judges did not agree with the solutions of the technical report, noting that the experts limited themselves to consider the specific requirements for a visual approach, published in AIP-Italian, part RAC 1-47. This formed the basis for the air traffic controllers' defense, which said that those persons were required only to separate aircraft from each other and not from natural obstacles. This did not consider two rules (41/8879 / AM.O and 41/8880 / AM.O), introduced in 1991 issued by the Italian General Direction for Civil Aviation, which set strict limitations on the visual approach at night.

But, the air traffic controllers contested (and still contest) that such legislation was applied to them, arguing that the two rules mentioned above had not been forwarded to them, but only to the management teams of airports and airlines.

It is not necessary to enter into the details of the dispute, which the Supreme Court resolved in a manner incongruent with the thesis of the air traffic controllers.

The Italian Supreme Court, in its ruling n. 6828 dated December 10, 2010, defined the role of air traffic controllers in a much broader way, going beyond the rather narrow view given by the Italian Navigation Code, and attributing them the role of "navigation police" that the reform of that Code had denied. The Supreme Court also dealt with the problem concerning the supposed duty of air traffic controllers to issue clearances on matters of safety, but also, at the requests of pilots, on the fluidity of air traffic, fuel savings, and such other matters; and it concluded that the ATC clearance "is not a due act, so that the act can be adopted only in the presence of the fundamental objective of the flight safety."

In that ruling, the Supreme Court also reiterated the distinction it had made in its previous ruling of 1985, concerning the disaster of Capoterra, between the service tasks and the institutional duties of an air traffic controller, further extending his position of guarantee to include the crew. It also made clear that the air traffic controller must respect the ICAO standards, and complement them, meaning that he or she must operate according to "criteria of prudence, care and diligence" and in respect of all the technical data pointed out to them.

The Judges of the Italian Supreme Court actually redefined the role of the air traffic controller: the position of guarantee towards the occupants of an aircraft places him above pilots, as a great many flight procedures require his authorization. It stresses the important role of the air traffic controller and the responsibilities that come with it.

In effect, the court considered the air traffic controllers had been negligent for not "comprehending the anomaly and the risks brought by the pilot's actions" and, consequently, gave a clearance without considering the minimum distance requirements between the aircraft and the runway. The Supreme Court's decision dealt a deathblow to the night visual approach procedure in Italy. Following this ruling, the ENAV and the Italian Air Force decided to suspend the use of this procedure at all Italian airports, even if in certain cases the night visual approach might still be considered safe and useful.

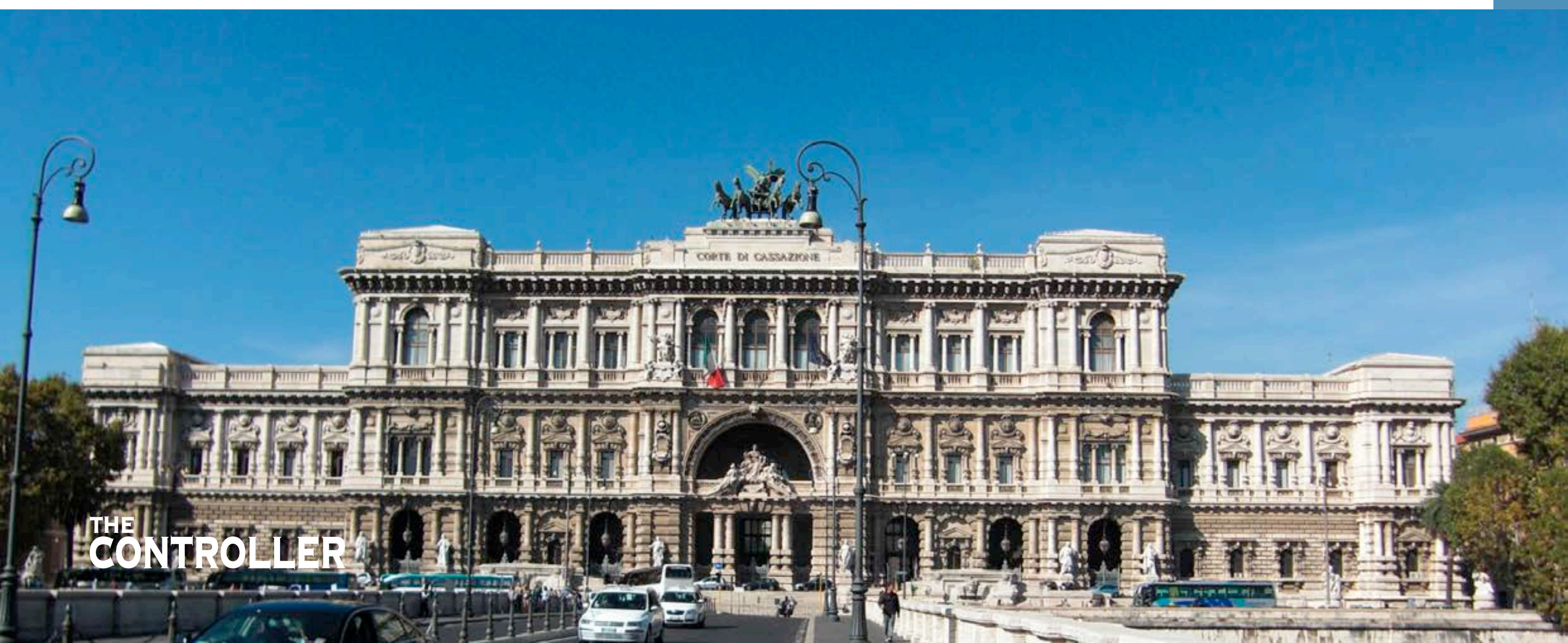
## Conclusion

I have examined three air crashes involving the responsibility of air traffic controllers. It remains for me to sum up the evolution of Italian case law on this matter, which this paper outlines.

As already mentioned, until the end of the 1970s, the responsibility for air disasters was attributed almost exclusively to pilots, while other operators (air traffic controllers, airport managers, mechanics, and so on), were almost never liable. With the 1979 disaster of Capoterra, however, this began to change, as responsibility was extended to those individuals. In the disasters we have examined, for example, the air traffic controllers were prosecuted.

The air traffic controllers denied any criminal responsibility in two of the disasters (Capoterra and mount Sette Fratelli). While they argued that it was not their duty to separate aircraft from fixed obstacles, the judiciary authorities decided otherwise. In the case of the Capoterra crash, the court ruled that it was their duty because they were in the position of guarantee towards passengers. In the case of the Mount Sette Fratelli case, the court also stated that it was the duty of the air controllers to separate aircraft from fixed obstacles because they are in the position of guarantee towards both passengers and crew.

I understand the reaction of the air traffic controllers and I realize, as a pilot, that if they had to warn all the pilots that their aircraft are heading towards a fixed obstacle, it would most certainly become very cumbersome and impede a smooth traffic flow. For example: when landing at Palermo Punta Raisi airport on runway 25, all aircraft coming from the north necessarily head towards mount Gallo. A couple of miles before reaching high ground, they turn right and initiate a "long final". The radar controller warning the pilots every single time, would be useless and senseless to warn the pilots that pursuing his route would lead to an impact with the ground.



However, in particular situations, such as the night visual approach, and at particular airports where difficult topography surround them, (e.g., Palermo Punta Raisi, Cagliari Elmas, Reggio Calabria, Florence and others), I believe that the obligation to inform pilots of the risk taken by making a night visual approach should be enforced; and I also believe that the jurisprudence of the Supreme Court we have examined is correct.

Let me add that - in any case – this jurisprudence should be applied with wisdom, keeping in mind the different circumstances that characterize each accident. Having said that, if I were an air traffic controller, I would not give clearance for a night visual approach in any of the airports I mentioned, unless it were absolutely necessary, to avoid storm cells for example.

The European Commission too, seems to have adopted a similar view as the reasoning made by the Italian judicial authorities. In effect, Annex Vb Reg. 1108/2009, Article 2, letter c), paragraph 4, states that "Air traffic control services and related processes shall provide for adequate separation between aircraft and, where appropriate, assist in protection from obstacles and other airborne hazards and shall ensure prompt and timely coordination with all relevant users and adjacent volumes of airspace".

Airplanes - I repeat – are the safest means of transport; and this is so because pilots and more generally those who are part of the world of aviation are true enthusiasts, who are dedicated and doing their job with a pleasure and a passion rarely seen in other professions. Our pilots and air traffic controllers, be they military or civilian, to whom we entrust our lives, are all highly skilled and capable people; and I think that we owe the small number of aviation accidents to their professionalism.

I hope that this love of flying and all things related to it, together with the help of modern avionics and advanced airport technologies, can make flying ever safer, so that the Judges who will replace me as President of the 4th penal section of the Italian Supreme Court will no longer have to work on aviation disasters.

# IMPLICATIONS FROM A CONTROLLER'S PERSPECTIVE

by Philip Marien, Editor

From a controller's perspective, and indeed from the perspective of a professional association such as IFATCA, Judge Sirena's text can only serve as a true eye opener. In the interest of every operational controller working today, it is however worthwhile exploring what such jurisprudence means for him or her.

Firstly, while the article explores accidents in Italy and from an Italian judicial point of view, it is important to remember that Italy is not an isolated state. It is a loyal member of the European Union, ICAO, ECAC, Eurocontrol, etc. The article clearly outlines that the Italian penal code is an overriding consideration for a judge in such cases. Unlike what most controllers would believe, ICAO standards and recommended practices do not take absolute precedence over national laws.

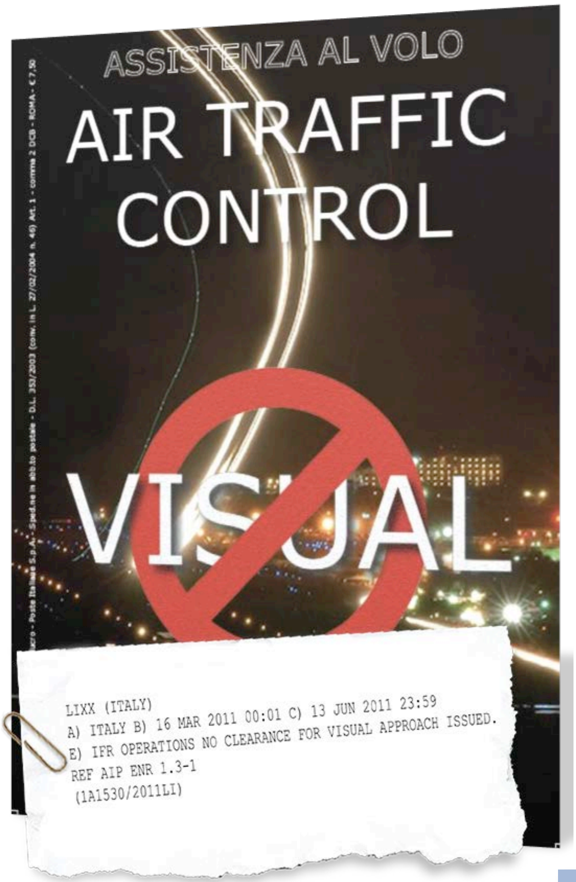
This probably complicates a just culture implementation: at service provider level (i.e. within their company or administration), controllers are taught and expected to adhere diligently to procedures and not to question them. He or she has to rely on the knowledge that these procedures have been reviewed for their safety and that all necessary mitigations to make them safe are in place.

Similarly, ICAO's standards and safety management systems are based on risk management and concepts like as low as reasonably practicable. Unfortunately, this implies that there is always a risk in everything a controller or a pilot does. It's very small, but if done often enough, there will be an undesirable outcome one day, when everything conspires to create an accident. This is even engrained in our procedures – for example in how separation standards are determined, through mathematical formulas and risk calculations. Some of it is contained in how a controller decides on what/how/when to say things. If something has happened 1000, 10.000 or 1.000.000 times, and it worked (read: didn't result in an accident), how can an individual expect/anticipate it will go wrong on attempt number 1.000.001? How does a service provider, or regulator let alone a controller, integrate jurisprudence, applicable in a very specific previous accident, into existing procedures? And in doing so, what risk is acceptable?

However, in cases where it really goes wrong, a hindsight-ruling tells them they were expected to have anticipated the risk and that they should have acted differently. This seems to create some interesting paradoxes and conflicts: what if a pilot requests to deviate around weather, but this brings him closer to high ground? Letting them fly into bad weather could cause a crash, but so might the deviation… Is it enough to warn the pilot about the possible risk, or is a more active intervention needed? How much action/information from the controller is 'enough' to consider having done everything to prevent something from happening?

With the information a controller has, it can be extremely hard to determine where and when an aircraft is in danger. When does turbulence become dangerous, is a rate of descent too high, or the way an aircraft intercepts the ILS too steep? It seems that the only conclusive way to determine this is through hindsight: the fact whether the aircraft crashes or not determines whether the controller 'did enough'.

A surprising observation therefore is that not more procedures/practices in Italy have been challenged or suspended by controllers, pilots or ANSPs (or at least not that I know of). It would seem unlikely that a visual approach at night would be the only one, which would fail a "position of guarantee" test. It seems that we must consider the implications for all current and future procedures that transfer a re-




sponsibility – even if only partially – from the ground to the cockpit. Even if ICAO specifies such a transfer is possible, the judiciary system, at least in the cases where it does go wrong, does not seem to accept this. This raises serious concerns for current technologies – TCAS to name one – but indeed for future ones, such as collaborative decision-making. The term that judge Sirena uses in this context, air navigation police, is significant in the sense that it would not seem possible to delegate certain responsibilities from the ground to the cockpit, or at least not without retaining a high degree of responsibility.

In addition, it would seem that it may be necessary to apply additional buffers and bigger margins to internationally accepted standards. It could also make air traffic control in even slightly sub-ideal conditions (low visibility, turbulence, thunderstorms, ….) impossible. I understand this is not the concern of the judges, but the government, who makes the laws, would have to be susceptible to the impact this would have (i.e. a completely broken and impractical air transport system). This could force them to re-assess the applicable legal framework and to 'learn' from these type of rulings, as has been done in Italy, where all visual approaches during night have been suspended by the regulator.

Another issue to consider: it may well go beyond the relationship between pilots and controllers. Increasingly, decisions on capacity, contingency, equipment and productivity are taken without consulting the controller on position. In many countries, controllers raising safety concerns or objections are treated with disdain and this type of pro-activity is actively discouraged. A last consideration: for good reasons, the judicial system of a country is quite rigid and change is generally very slow. It stands to reason that any notion of just culture to be incorporated into the laws and penal codes of a country will take years, if not decades. And that is even without considering the public opinion, including press, and politicians who are probably much less receptive, or even increasingly hostile in some cases, to such a notion.

It would seem that, just as judges are required to interpret the laws made by someone else, controllers are required to interpret the rules and regulations they are supposed to follow and cross-check every time they apply them so that the are not violating a higher principle.

My conclusion is that all aviation professionals, including IFATCA and its Member Associations, have a huge responsibility in continuing to work with legal authorities, States, the press and the general public to convince them that the only safe way ahead is to promote an open and responsible safety culture. Court cases and convictions will remain an important consideration in this for years to come. But as just culture matures, hopefully it will become a factor the judicial system takes into consideration when they consider the individual responsibility. ✈

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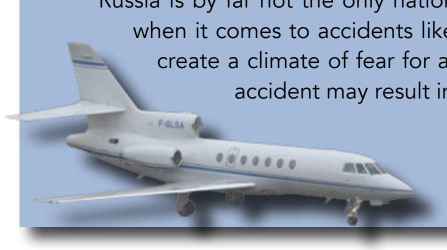
## VNUKOVO ACCIDENT

On October 20th 2014, a Dassault Falcon 50EX corporate jet crashed during take off from Moscow's Vnukovo Airport in Russia. Three crew members and the passenger, CEO of oil company Total, Christophe de Margerie, were killed. The aircraft collided with one of two snowplows operating at the time. For an unknown reason, it had entered the intersection of runways 06/24 and 01/19 when the Falcon 50 was cleared for takeoff from runway 06. The airplane lifted off the runway at speed of about 134 knots, but the right wing and right hand main landing gear impacted the snowplow. The airplane rolled inverted and came down 250 meters further on and a fire broke out.

The runway visual range (RVR) at the time of the accident was 350 m at the beginning of runway 06 and 1000 m half way down the runway. There was slight drizzle and mist.

The reaction of authorities and press was disappointing to say the least. Identities of the staff on duty were made public by an official of the investigations committee, as were insinuations of their various roles and responsibilities in the tragedy. Even as a preliminary investigation failed to identify any indication of gross negligence or intent, arrests were made and controllers and other staff members were interrogated like common criminals. As far as the general public is concerned, they've been as good as convicted without even a possibility of proper defense.
Despite commitments from Russia at international (ICAO) level on just culture, Russia is by far not the only nation in the world to forego good intentions when it comes to accidents like this. It is quite clear that such reactions create a climate of fear for aviation professionals that any incident or accident may result in a criminal prosecution. ✈



# INTERNATIONAL DAY OF THE CONTROLLER

October 20th 2014


## Mexico Issues Commemorative Stamp

On the occasion of the International Day of The Controller, the Mexican Postal Services brought out a commemorative stamp. A formal ceremony, in which the first stamp was postmarked was held on October 20th 2014. Venue for this was the Courtyard of the Post Office Palace in Mexico City. The General Director of the Mexican Postal Service, Ms. Yuriria Mascott; the Chief Clerk of the Department of Communications & Transport (SCT), Mr. Rodrigo Ramírez Reyes; the Director of the Civil Aeronautics General Direction, Mr. Alejandro Argudin Le Roy; and the Director General of Navigation Services in Mexican Airspace, Ing. Claudio Arellano Rodríguez, attended the ceremony.

Alejandro Argudin Le Roy stated that the issuance of the stamp confirmed the recognition of the Mexican people towards the Air Traffic Controllers.

Ms. Yuriria Macott congratulated the Controllers for the important work they perform that guarantees the safety of air travellers. She recognised this as a major contribution to economic development and prosperity as air freight enabled a fast and safe manner to trade goods.


*left to right: Mr. Alejandro Argudin Le Roy ,* Ing. Claudio Arellano Rodríguez, Ms. Yuriria Mascott, Mr. Rodrigo Ramírez Reyes presenting the commemorative stamp.

The President of the Colegio de Controladores de Tráfico Aéreo, Mr. Victor Cervantes Muñoz, attended the event. Also represented were air traffic controllers from different units in Mexico and airport officials and authorities.

The post stamp was put into circulation in the nearly 1,500 post offices in Mexico on October 31, 2014.

## Bulgarian Day in the Mountains

The Bulgarian controllers' association BULATCA, traditionally organizes a day out in the mountains to celebrate the Day of the Controller. This year they went to Bansko, a ski resort at the foot of the Pirin mountain range, some 150 Km south of Sofia. They invited all controllers who happened to be off-duty that day, as well as their retired colleagues, for a (very) good dinner and a good party afterwards.

*The venue, the company and the meal for the Bulgarian Day of The Controller*
Photo: DP

# PUSHED TO THEIR LIMITS

by Philippe Domogala, Deputy Editor
& IFATCA Conference Executive

## Bulgarian Controllers Confronted with Sudden Traffic Surge

Sofia ACC in Bulgaria is one of the air traffic control centres affected by the massive re-routings caused by the Ukrainian crisis. After Malaysian MH17 was shot down, traffic between Europe and the Asia was forced to fly further south. This came on top of the flights avoiding conflict zones like Syria and Iraq.

Traffic levels increased 30% from one day to the other. In August 2014, they handled some 73,000 aircraft, compared to 56,000 in 2013.

To make matters more complicated, this traffic is not evenly spread. There is a distinct peak around 03:00 local time, when the eastern sectors are subjected to a very high demand. This results in having to keep 2 sectors open in the Varna area overnight, instead of one previously. And that of course means that a lot of extra staff need to be scheduled for night shifts. Various other peaks occur throughout the day: "This summer, our busiest day was 3000 flights, whereas before, this used to be around 2000 only", says one controller.

So far, they've managed by taking anyone with a license – including managers, experts, instructors, etc – and roster them for operational duties rather than office duties. They've also cannibalised stand-by duties, which are normally for coping with sickness etc. And occasionally, they've had no other option but to increase the number of hours to be worked per day.

"We now work an irregular schedule, up to 20 days a month, with 6 to 7 hours on position per shift. On a good day, you can be the radar assistant for half that time, but on other days, you're on radar for 6 hours in one shift, with a lot more traffic than before", according to the controller we spoke to.

"We do not know how we will cope in the long term", says one supervisor. "The next summer is going to be hard."

What is even more frustrating is that outside bodies – mainly airlines and European performance 'experts' – look at this and don't realise the effort this takes. Their take on this is to say that since you we can cope with 30% more traffic today compared to before, there must have been "hidden capacity" before. Some go as far of accusing us of having been overstaffed and inefficient. They do not realize that controllers cannot work like this continuously: the workload and rostering will start to burn people out all too soon…

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✈ *Sofia ACC*
Photo: DP

✈ *The affected sectors in the eastern part of Bulgaria. The line of traffic to the north is avoiding the Ukraine.*
Photos: DP

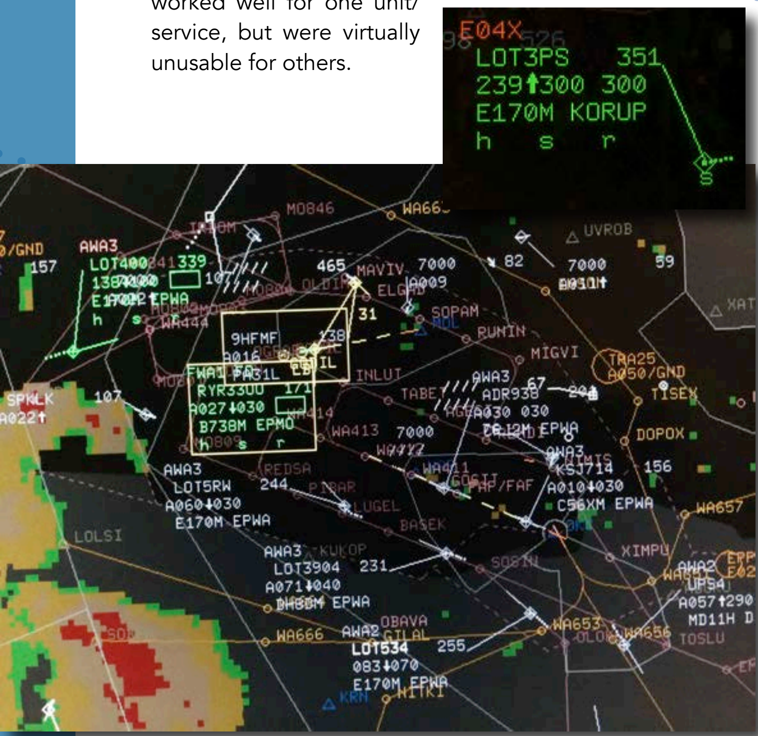
# COPING WITH THE NEW PEGASUS SYSTEM

## Polish Controllers Struggle with their New Equipment

**by the Polish Air Traffic Controllers Union, PANSA**

In November 2013, a new Air Traffic Management system was introduced in Poland. Derived from Indra's generic system concept, Pegasus 21 or P21 was conceived as a 'one size fits all' system: it would use the same Human/Machine Interface (HMI) for area, approach, tower and flight information services.

Unfortunately, as no simulator was available, many of its features were never tested using realistic traffic loads or scenarios. When the system went online, a lot of these features turned out to work differently from what was expected. In some cases, they did even exactly the opposite of what they were designed to do. Some features worked well for one unit/service, but were virtually unusable for others.




*The traffic display is more colourful than many Christmas decorations. The data label has a lot of information, which clutters the screen. The system decides which information can be dimmed to a lower brightness, but the algorithm deciding this often gets it wrong, thereby obscuring vital information for the controllers.*

Photo: PANSA

One of the main issues is how colours are used and how information is presented in the labels/data blocks. It appears for example very easy to miss situations close to sector boundaries, due to the so-called 'white label syndrome': these are flights which have a different colour to your own, but which affect your traffic anyway. Having become aware of this issue, controllers have learned the hard way they have to consider all aircraft in addition to their own – which renders the use of colours as good as useless. As you can imagine, the risk of severe cognitive overload is a very real one, especially during re-sectorisation and shift changes. If anything, it has made conflict detection more difficult than it was before.

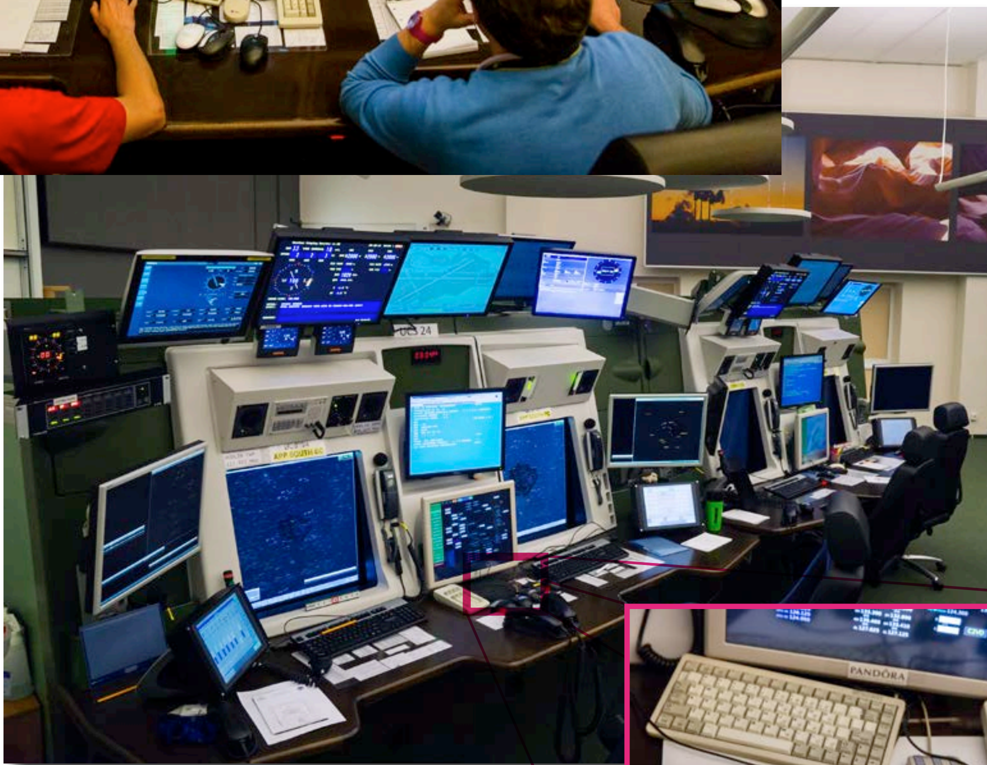
In busy traffic, controllers find the new system makes it much harder to build a mental picture of the traffic situation. This now takes much longer than before, mostly because of the complicated and even confusing way in which traffic is presented. One of the most anticipated new features, a separation prediction tool, works unreliably. This is probably linked to how radar information is fed to the new system: some older radars are not directly compatible with Pegasus and the data must be converted which seems to impact how reliable this data is. Because of this, and perhaps because we were never properly taught on how to use it – due to the missing simulator again – we still have to use 7Nm instead of the typical 5 Nm, which was one of the main selling points of the new system!

Further complicating things is that in class D airspace, where separation between IFR and VFRs is not provided by a radar unit, the short term conflict alert (STCA) constantly triggers. On the other hand, fine-tuning it around the busy Warsaw airport, in class C airspace, has proven impossible. Consequently, it is suppressed exactly where an effective safety net is needed.

An obvious question would be whether controllers had a say in the development or implementation of the system. We were involved: many controllers worked very hard on the 'Pegasus Project'. Some of our colleagues spent many months sitting long hours at their desks, in meeting rooms and even late night at home trying to come up with ideas, solutions and suggestions. As far as we are concerned, we did what we could to enable a smooth transition towards the new environment. But it should have been tested, corrected, re-tested, validated, and so on, until it worked as expected. Unfortunately, this never happened or at least not in such a way that problems were detected and solved before the operational implementation. One could say that controllers' wishes and ideas helped build a 'concept car', which, without a real test-drive was then simply put on the road. As we found out the hard way: no human factor analysis was ever done…

So where does that leave us? There's no easy answer, as the situation is not black or white. Some features in the new system are a huge improvement over what we had in the old one. It has made some of our tasks easier. This is offset by many missing features or ones that do not fulfil what they were intended to do. It means that working busy traffic is a struggle. Our control-


✈ *If you thought that Norway's Bodo Centre working positions had a lot of screens (see last issue), think again: Warshaw's new air traffic Control system has them beat. They've also gone for the record in the number of mice needed to operate all screens!*
Photos: PANSA




lers have reached their maximum capacity, which we would argue is often too much by the way, but we're actually handling less than what we were taking on using the old system. This is reflected in the amount of delay generated. Polish controllers are extremely devoted to provide the safest possible service, but this has become more and more demanding due to the flaws in our new system and the associated procedures. As the Union, we have repeatedly stated that the biggest problem within the ANSP may not be the technical system itself, but rather a serious lack of planning and foresight, and therefore in how things are managed. We would submit that neither change management nor safety management has been applied effectively. Despite several investigations and reports, no real changes or system upgrades have been implemented. The current philosophy seems to be: "What you can do quickly and easily - go ahead. Anything beyond that will have to wait". Soon, Warszawa FIR will face another big change – a vertical airspace split is planned for April 2015. We hope that we'll be able to convince those in charge to learn from the issues that arose in the P21 Project and that the similar mistakes can be avoided for this and other projects in the future. However, it is already very late. We'll make sure to provide an update if and when we know more… ✈

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# EUROPEAN REGIONAL MEETING

by Philippe Domogala, Deputy Editor & IFATCA Conference Executive

## 10 - 12 October 2014, Zadar, Croatia

This year's European Regional Meeting (ERM) was in Zadar, Croatia. Our Croatian Member Association, CROATCA, took over from their Ukrainian colleagues after the political situation in their country forced them to withdraw.

Some 130 delegates, representing 36 of the 44 European region member associations of IFATCA attended. In addition, representatives from ATCEUC, IFATSEA, SESAR and EUROCONTROL also attended. The meeting was chaired by Željko Oreški, IFATCA's Executive Vice President Europe.

During the round-table updates given by the attending associations, the meeting learned that many countries and/or service providers are in the process of upgrading their technical infrastructure and operational systems. Generally, such modernisations are positively welcomed, but in some cases the changeover appears rushed or even mismanaged.

With traffic levels recovering after a number of crisis years, staff shortages continue to be a worrying situation in many parts of Europe. Service providers appear slow in realising the urgent need to recruit and train new personnel. And a number of conflict zones have caused shifts in traffic patterns, thereby overloading neighbouring countries. Other areas of concern continue to be retirement age, pension benefits and the implementation of Just Culture.

### Seminar

The subject of this year's traditional IFATCA seminar was the performance plan set by the European Commission, the so-called Reference Period 2 (RP2). Main aim of this plan is to reduce air navigation service costs over the next 5 years, the period between 2015 and 2019.

Main speaker during the seminar was former IFATCA President Marc Baumgartner, who is a member of the Eurocontrol Performance Review Board (PRB). Philippe Domogala moderated the discussion. Through RP2, the European Commission imposes cost and delay targets on ANSPs. Nearly all ATC professionals, including unions, professional associations and even ANSP CEOs have condemned the approach taken by the PRB and the European Commission. Main point of criticism is that the targets use traffic predictions which in the past have proven unreliable at best: predicting what will happen in the aviation industry over the next 6 months is a huge challenge, let alone that anyone can reliably look 5 years into the future. Traffic demand is hugely dependent on variables such as crises/wars, fuel price, route charges and many others. In addition, it can be wildly differ from region to region, as airlines are increasingly looking at the cheapest routes, rather than the shortest ones. Since the cost recovery mechanism is not changing, these "cheapest" routes vary constantly. Most ANSPs are not able to deal with highly flexible and changing demand, given the time it takes to recruit and train control staff.

The meeting highlighted the serious concerns on the decision to impose a maximum en-route delay of half a minute per flight. This requirement adds an extreme burden to the existing, already strained air traffic services network in many areas.

### Centralised Services

Also discussed during the seminar was Eurocontrol's concept of Centralized Services (CS). The main speaker here was Jo Sultana, Director Network Manager at Eurocontrol. He told the meeting that Europe currently has 9 Functional Airspace Blocks (FABs), with 80 civil and military air traffic control centers. Each of them performs a lot of tasks and services individually. Centralising a number of these services could save 1,6 billion Euro over the next 15 years. After an analysis, Eurocontrol has identified an initial nine natural CS candidates, where it made most sense to implement these ideas on a pan-European basis, rather than on a regional or FAB basis, or at a local or national level.

We learned that the idea is welcomed but that it is also met with a lot of reservations. For example, a common radar tracker service faces security concerns: not every State is ready to trust a radar image that does not come from its own source; others are very reluctant to share military traf-

## Centralised Services

The Eurocontrol Member States have tasked the Agency to assess and demonstrate the operational, technical and financial feasibility of CS 2, 3 and 9 and with the development, set-up and demonstration of CS 1, 4, 5, 6, 7 and 8. Several of these services have been subdivided, so that there are in fact 18 packages for 9 services...

| | |
|---|---|
| CS1 | Flight plan and Airport Slot Consistency Service |
| CS2 | 4D trajectory Flight Profile calculation for Planning purposes |
| CS3 | European (radar) tracker service |
| CS4 | Advanced flexible use of airspace support |
| CS5 | ATM information management service |
| CS6-1 | Mode A transponder code duplication avoidance |
| CS6-2 | Mode S transponder code allocation |
| CS6-3 | Radio Frequencies service |
| CS6-4 | Messaging directory service |
| CS6-5 | IPS Repository (web based data bases) |
| CS6-6 | Security certificate service |
| CS6-7 | Operation and co-ordination of network security |
| CS7-1 | Data link, TCAS, RVSM, ADS-B Performance monitoring |
| CS7-2 | 1030/1090 MHz performance monitoring |
| CS7-3 | Satellite navigation (GPS) monitoring and prediction |
| CS8 | Pan European Services |
| CS9-1 | Data Communications infrastructure service |
| CS9-2 | Centralized operation of CPDLC, ADS-C |

More detailed information can be found on:
http://www.eurocontrol.int/centralised-services

fic with their neighbours. Others services need proof that they are in fact feasible, while others will require prototyping to prove their viability. Each centralized service will need to be approved separately by the European Commission. They will then be put out for tender, renewable every 5 years. Only a European consortium will be able to compete for such a contract. Eurocontrol will be overseeing the project and they've received over 300 declarations of interest so far. Given this eagerness, we're likely to see some of these becoming a reality in the coming years.

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Delegates from 36 Member Associations attended the 31st European Regional Meeting in Zadar, Croatia.

# AMERICAS REGIONAL MEETING

**by John Carr, IFATCA EVP Americas**

## 29-31 October 2014, Rodney Bay, St. Lucia

This was the 25th IFATCA America's Regional Meeting. The event was organized by our Member Association from St. Lucia, SLATCA at the beautiful Bay Gardens Beach Resort, in Rodney Bay, St. Lucia.

A total of 22 participants from 10 Member Associations attended the meeting. This included representatives from Bahamas, Barbados, Canada, Dominican Republic, Jamaica, Mexico, Trinidad & Tobago, United States, Haiti and of course the host association, St. Lucia.

In addition, some 20 observers also attended, including one from Martinique, currently a non-member association.

On the first day, Mr. Asa Joseph, ATCO from St. Lucia and Master of Ceremonies welcomed everyone to the conference. After singing the St. Lucian National Anthem, the meeting was addressed by Mr. Simeon Sealy, SLATCA President and Chairman of Organizing Committee; Mr. John Carr, IFATCA Executive Vice-President Americas; Mr. Patrik Peters, IFATCA President & CEO; Mr. Lambert Remy, Manager Air Traffic Services; Mr. Peter F. Jean, St. Lucia Air & Sea Ports Authority (SLASPA) Director of Airports; Hon. Alva R. Baptiste, Minister of External Affairs, International Trade and Civil Aviation; Hon. Philip J. Pierre, Deputy Prime Minister and Minister of Infrastructure, Port Services and Transport.

All the speakers highlighted the importance of Air Traffic Controllers in enhancing the safety of air transport. On the occasion Mr. Lambert Remy, Manager Air Traffic Services thanked IFATCA for allowing St. Lucia to host the second Americas Regional Meeting in the island's history. Mr. Remy was Chairman of the Organising committee who hosted the 1st ever ARM in 1990. As such he reflected on the importance of the conference and his hope that it would improve and highlight Air Traffic Control provision in the region.

Mrs. Maritha Gibbs, SLATCA trustee, delivered the vote of thanks. The Chairman of ATCOs' Branch of ITF, Mr. Paul Winstanley, presented on One World, One Profession - Working together for a stronger future.

Mr. John Carr, IFATCA Executive Vice-President Americas informed everyone about what had been happening in the region. He urged the various Member Associations (MA's) to send updated contact information to him. Mr. Patrik Peters, IFATCA President & CEO then presented on Critical Incident Stress Management. He highlighted what is understood as a Critical Incident, how such an event leads to stress in those that witness or experience such an event and how this stress needs to be managed. In particular, he highlighted the success many Member Associations and service providers have had by using a so-called peer model, in which colleagues are trained on how to help others cope with critical incidents.

Mr. Chris Stephenson of NATCA present-

ed on Unmanned Aircraft Systems (UAS). He gave a comprehensive overview on what these are, including their components, characteristics and limitations. He went on to elaborate on how these affect the National Airspace System in the USA and what the effect is/can be on air traffic safety.

The meeting then moved on to hear Member Associations presenting their reports during a closed working session. This was chaired by the IFATCA officials present: IFATCA PCX & CEO, IFATCA Deputy President (Mr. Scott Shallies ) and the Executive Vice President Americas.

The situation in the Dominican Republic was briefed by Mr. Josue Perez, who presented a touching activity report for their association ADCA. The main focus of the report was that a union busting program had been launched against them. Degradations, retaliation transfer, forced retirement of specialist, selective application of sanctions and rules, special working schedules assignments, promotions to unqualified ATCOs and many other unprofessional practices were put into place with the objective to promote resignations from the Dominican Air Traffic Controllers Association (ADCA).

On the third day of the meeting Mr. Chris Stephenson of NATCA presented on Professionalism in the workplace.
ATC Code was one of the major highlights of the presentation. This lists three principles that help define professional behavior:

- a professional Air Traffic Controller's performance and actions are a demonstration of their personal commitment to safety, excellence, and upholding his or her oath to the public trust, most specifically to the users of the [USA's] National Airspace System. They shall conduct themselves in a manner that instills trust and merits the confidence bestowed on them by the public they serve.

- a Professional Air Traffic Controller, through their own conduct and performance, should inspire, motivate, and provide examples of professionalism to others. The safety of the Airspace system is of the greatest importance and his or her performance should always demonstrate the highest standard of excellence.

- a Professional Air Traffic Controller accepts that his or her actions represent the conduct and character of all members of the profession. They shall act in a manner that brings honor and respect to the profession, establishes public trust, and sets a global standard for excellence.

Following Mr. Stephenson's report Mr. Patrik Peters, IFATCA President & CEO presented on Social Media. The briefing included using social media and the dangers of posting information online. ATCOs should avoid engaging in discussion by describing what you witnessed or what you were involved in at work– especially incidents/accidents, but also discussing company policies etc.

Mr. Scott Shallies, IFATCA Deputy President then presented on Just Culture.

Simeon Sealy thanked all the member delegates, participants, observers, members of Organising Committee, general members of SLATCA and all the sponsors for their physical and financial contributions without which it would be just not be possible to conclude the meeting with success.

Manager of Air Traffic Services, St. Lucia (MATS) Mr. Lambert Remy thanked SLATCA and organizing committee members for their performance in making the regional meeting a success. He also thanked all the participants and sponsors in making the regional meeting a grand success.

Executive Vice President America's (EVPAMA) Mr. John Carr in the concluding remarks said that it had been good to be in St. Lucia and he wished that more MA's could have attended. He hoped that the exchange of ideas through much discussion had certainly generated some valuable outcomes, which would certainly be helped in enhancing flight safety management in the region.

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*Head table during the closed session, left to right: IFATCA PCX & CEO Patrik Peters, EVP Americas John Carr and Deputy President Scott Shallies*

# AFRICA/MIDDLE-EAST REGIONAL MEETING

**by Eric Risdon, IFATCA EVP Professional**

## 26-28 November 2014, Lusaka, Zambia

The Guild of Air Traffic Controllers of Zambia, GATCOZ, led by its President Mr. George Katongo, did an excellent job of organizing this year's African & Middle-East Regional Meeting.

The Zambian Minister of Transport, Communication, Works and Supply, the honourable Yamfwa Mukanka, officially opened the meeting. The Director of General of Civil Aviation Authority of Zambia (CAA), Mr. Gabriel Lesa and the Managing Director of the National Airports Corporation Limited of Zambia, Mr. Robinson Mistala, also attended the opening.

The Honourable Minister Yamfwa stated that his government attaches great importance to the role Air Traffic Controllers play in ensuring safety in Air Navigation and as such, will work together with IFATCA to improve controller performance. He went on to highlight the major projects the Zambian government has engaged in to improve aviation safety in their airspace. These include the purchase of a new state of the art ATM system. This has to be excellent news to the Zambian controllers, as both facilities at Lusaka airport, namely the ACC/APP and TWR, will greatly profit from new equipment and training.

The theme for this meeting was "Safety, Performance and the Controller", which came up from the concern raised by many stakeholders over the ATC performance in the AFM region.


Ms. Keziah Ogutu, IFATCA EVP for the region, chaired the meeting and was supported by Mr. Duncan Auld, EVPT and Mr. Eric Risdon, EVPP. Despite the absence of some of the West African nations due to the Ebola outbreak, the meeting was very well attended with over 100 delegates from 19 Member Associations, 3 observer ATCO Associations and other aviation stakeholders such as the Zambian CAA, Airports, IATA, ASECNA, IFALPA, E.A. School of Aviation and the Zambian Air Force.

During the 3-day deliberations, the delegates would hear inspiring presentations on Just Culture, ATCO Performance, Civil/Military Cooperation, Pilot and ATCO challenges in the region, personal branding in ATC and matching capacity with demand.

A number of recommendations and conclusions closed the meeting and here are highlights of these:

1. MA's should continue to involve their ANSPs and States in dialogue on the issue of Just Culture and development of the Safety Management System (SMS), to avoid future misunderstandings.
2. There are too many uncontrolled parameters and undefined matrix that prevent practical ways of finding a true balance between best safety and best performance. MAs should engage their ANSP and work together to develop an acceptable performance matrix under which ATC performance should be measured.
3. Continuous cooperation and strong coordination should exist and/or be developed between ATC and the Military to ensure maximum utilization of the airspace and smooth operation of civil flights.
4. MAs should encourage a high level of professionalism amongst its membership in the discharge of their responsibilities to ensure minimal or no complaints from pilots.
5. Owing to the high level of runway excursions recorded in the region and in line with the 'Abuja Declaration' in which States promised to reduce this occurrence by 50% by the end of 2015, MAs are encouraged to do more through awareness/sensitization to reduce or alleviate ATC's role in this area.
6. IFATCA to encourage MAs to engage with ICAO, ACI, IATA and other aviation stakeholders in the formation of local runway safety teams as one of the means of implementing risks mitigating measures of Runway excursions/incursion.
7. IFATCA through the MAs should encourage States to incorporate JUST CULTURE in their regulatory framework.
8. In order to encourage voluntary reporting, ANSPs need to ensure implementation of an automatic and electronic data analysis tool (software) with anonymous and confidential reporting.
9. In order to enhance the proficiency levels in the region, ANSPs should avoid reducing the training period of Air Traffic Controllers in the hope of building capacity.
10. ICAO should ensure standardization of ATC training in the Region.
11. MAs should incorporate a code of conduct and professional ethics to promote good image for the ATC profession and professionals.

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# ASIA/PACIFIC REGIONAL MEETING

by Mike O'Neill, IFATCA EVP Asia/Pacific

## 9-11 November 2014, Bangkok, Thailand

The 2014 Asia Pacific Regional Meeting was extremely successful and attracted a record attendance of 110 participants. This was quite remarkable considering there was no IFATCA host for the meeting. Several people contributed a great deal to the successful outcome. Ben Mansumitchai, a member of the IFALPA ATS committee together with very generous support provided by Aerothai, Thailand's ANSP were quite instrumental in it's success.

Mr Anucha Kammong, the Executive Vice President of Aerothai officially opened the meeting with a very simple message on the importance of our profession being connected. Aerothai very generously hosted both IFALPA and IFATCA for an evening meal.

The meeting's theme was on Human Factors in Air Traffic Control. The keynote presentation was by Jeff Woods, study lead in the Optimisation of Airspace and Procedures in the Metroplex (OAPM), USA's FAA sponsored optimisation program. His attendance was generously provided for by NATCA, our American MA. Jeff's presentation was essentially a window to the future for this region with the research and development that has been necessary to optimise very complex airspace in the US system. His presentations and Q & A session provided an excellent exchange.
Chris Henry of the NOSS Collaborative provided an overview of the NOSS program for the uninitiated. Following this, a break down was presented of the program's outcomes in the Asia Pacific from those service providers that have participated. NOSS is effectively a proactive overall health check of service provision with the results directly relevant at all levels in the organisational structure.

Dr Noorilah of Malaysia gave a very methodical walk through of the processes they've undertaken in Human Factors in ATC Safety Investigations, from the Regulator's Perspective. One of the highlights of the meeting was an interactive joint session with IFALPA's Air Traffic Services committee. Several topics were addressed in an attempt to reduce workload on both controller and pilot as airspace complexity and traffic volumes increase. It provided a lively forum and it is hoped that some of these issues will be addressed by an initiative of this meeting.

The agenda left for the final day was a little daunting. The MA reports were very notable on two counts. Firstly the Iranian experience, following their more than doubling of traffic growth due to the sudden closure of Ukrainian airspace following the shoot down of MH17. Following this, there was an extraordinarily moving message from Joe D'Cruz of our Malaysian member association on the impact that has radiated through their membership following the loss of two aircraft from their national carrier this year. Australia in return initiated a message of condolence from the meeting, to be taken back to their membership.

Patrick Peters, the IFATCA President provided two presentations to the meeting on the use of Social Media and CISM. Together with his interaction on the meeting's mixed panel discussion with IFALPA, it was an excellent opportunity for those in the region to get to know him and also to see the dynamic impact he is having on our Federation. This was particularly important for those non-members Thailand, Cambodia and the Philippines who attended our meeting as observers. They could see first hand the professional and technical sharing that is such an important facet of IFATCA and that it is currently experiencing a healthy evolution.

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# BRIDGING THE GAP

## NAV CANADA Benefits from Controller Experience in System Developments

by Chris Kempffer,
System Integration-Surface Surveillance (NAV CANADA) and CATCA Member

It was quite interesting to read an earlier article in the April 2014 edition of Controller titled "Put a Controller in your team: The role of controllers in systems development". It examined the development process of air traffic management systems, and more specifically looked at the benefits of including the input of operational air traffic controllers throughout the process. The article points out that the feedback of controllers in the earliest stages of a system's production is critical in order to increase end-user acceptance, and reduce the risks associated with change.

At NAV CANADA, putting a controller in our development team is a priority for us. So much so that the company has dedicated an entire section to our operations team simply to coordinate operational requirements, design, development, and life cycle support with our Engineering division.

This section, titled System Integration, Operational Systems Requirements, is staffed with licenced controllers and flight service specialists from all front line disciplines. They bring to the position their long-term experience in using air traffic management tools, and their valuable knowledge of, simply, what works and what doesn't when using these tools operationally.

Robert Ballantyne and his wife Andrea Ballantyne are both Operational Systems Requirements Specialists at NAV CANADA, currently working on enhancing the Canadian Automated Air Traffic Management System (CAATS) – the back-bone system used by NAV CANADA terminal and enroute RADAR controllers across the country to monitor flights, detect conflicts, and process and distribute flight data and information. CAATS eliminates many manual processes - such as the need to verbally "hand off" aircraft - and improves safety by increasing the time controllers have available to focus on separating aircraft.

Robert explains that, "Being a controller with some sort of an engineering background, certainly assists in recognizing exactly how the system behaviours should be built or modified. There are so many intricacies to air traffic management that you just simply cannot have a frame-of-reference unless you're versed in air traffic control."

Controller working position
credit: © NAV CANADA

Both Robert and Andrea bring extensive experience to the job. Robert spent eight years as an enroute controller at the Vancouver Area Control Centre. Andrea started off her career as an engineer at Vancouver Airport, and later spent two years as a Tower Controller in Buttonville, Ontario and three years in the NOTAM office.

During their transition to their new positions, they were given training that was rigorous, encompassing continuous hands-on system testing, adaptation and modification. Much of the learning is accomplished through mentoring by other specialists and the systems engineers, so that the specialist will be able to converse in both "Engineering" and "ATC". This bridges the communications gap that often affects a successful deployment and acceptance by operations.

By the end of the training, Operational Systems Requirements Specialists become well oriented to the engineering and development of systems, and are tasked with deliverables and duties that support and strengthen engineering initiatives. Their experience as operational controllers becomes a great asset to the engineering process.
The value in this collaboration is most apparent during system deployment, as the process is accelerated and systems are built with fewer hitches. Once installed, systems are adopted by controllers with confidence, as they know that it has been built with the extensive input of one of their own.

The hard work and efforts of Robert, Andrea and their engineering colleagues in delivering systems such as CAATS, has not gone unnoticed. The impact that these systems have had on the safety and efficiency of both our own and our customers' operations is considerable.

OPS Room in Canadian ACC
credit: © NAV CANADA

With the fast and efficient delivery of CAATS features – such as Controller-Pilot Data Link Communications (CPDLC), which supports text-based communications between pilots and controllers, and Medium Term Conflict Detection (MTCD) which alerts controllers of potential conflict based on projected flight paths – NAV CANADA has been incrementally improving the air traffic management environment for those coordinating the 12 million aircraft movements that occur every year through the second largest airspace in the world.

Without a controller on our team a lot could be lost. It would be more difficult to for us to build a system with the confidence that it is usable. And checks for usability would not happen until the very end, at which point adjustments could be costly and time consuming. System flaws can also often go unannounced, as controllers don't have time to point them out and simply resort to finding workarounds and other methods of getting the job done.

Furthermore, without Operational Systems Requirements Specialists, it would be difficult to react once systems flaws are encountered. "If a system goes in and there's a flaw, and controllers don't have anyone they can turn to, to say 'we've got a problem,' then they will get this feeling of not wanting to accept anything else because they're not sure what else it's going to do. We have to be able to answer the problem" Robert explains.

"We certainly feel well positioned to have a sound understanding of the effects and repercussions of implementing change, and we have the confidence to make those decisions, and, in the end, our team can offer better support"

The success of NAV CANADA's technology systems can be attributed in large part to mixing controller and engineers on the same team. Doing so is proactive and beneficial in many respects, and is the reason why NAV CANADA is regarded as one of the best and most advanced ANSPs in the world.

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# SPACE WEATHER

*This article first appeared in ATC Magazine, the publication of our Spanish Member Association.*

*Thanks to Ignacio Baca for his help with the translation.*

## How Is Aviation Affected By Our Closest Star?

by Immaculate Vidal Silvestre, Valencia ACC
PhD in Astrophysics

**Although it is obvious that solar phenomena are as old as the sun itself, our technological advances are making us, paradoxically, increasingly vulnerable to them. Should the aviation industry be concerned about such events? Every day, thousands of aircraft fly and none of them seem to be affected by the divine rays of Apollo, god of the sun. But there is in fact reason for concern and this is already being addressed.**

Most of us think of the Sun as a stable and permanent presence in our solar system. Older than the Earth, the Sun is the source of life, and if there's anything we can be pretty sure of it is that it will rise again tomorrow at dawn and will do so in the east. However, the Sun has its own temperament: its structure and behavior is different every day, with small variations that make their effects on the Earth vary over time.

This variation is not new. It has always been there: auroras for example are only visible on some nights, while not on others. What has changed in the last century, especially in the last fifty years, is the vulnerability of our technology to solar emissions. There have already been cases of erroneous signals, temporary malfunctions and permanent damage to electronic equipment due to disturbances in the sun.

On March 20, 2013, EASA organized a workshop on the subject called "Space Weather - Effects on Aviation - Building a proportionate response in Europe". A yearly conference on the subject is also held in April in Boulder, Colorado USA. The NOAA (National Oceanic and Atmospheric Administration, USA) posts daily updates on space weather phenomena including recommendations for users, such as the FAA in case potentially dangerous phenomena are observed. These can be found online at **http://www.swpc.noaa.gov/forecast.html**

The phenomena addressed in these bulletins include items such as sunspots, solar flares, X-rays, solar wind, coronal mass ejections, geomagnetic storms and increased solar flux of high-energy protons. These factors can influence the reliability and accuracy of GPS systems, HF communications, potential damage to satellites, increased levels of harmful radiation during flight at high levels, or even blackouts caused by damage to the power grid.

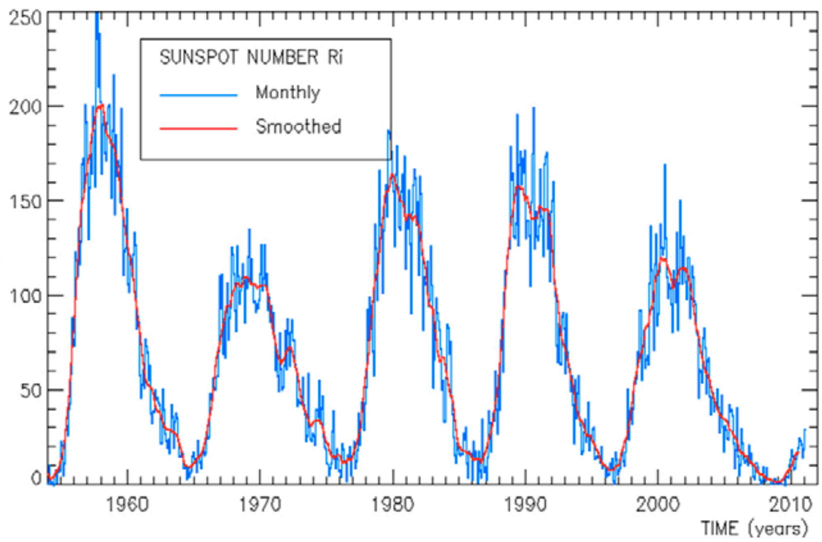
### What is space weather?

Space weather is the state of particles and electromagnetic fields that are in the space surrounding the Earth, beyond the atmosphere, at a given time. Given that the space around the Earth is almost empty and emissions from the Moon, the closest celestial body, are negligible, the greatest influence on space weather will be the Sun. To a lesser extent, there's also an influence of cosmic X-ray radiation, though this is relatively constant. This means it can be considered as background noise that our atmosphere is already accustomed to, as is our technology.

### What actually happens inside the Sun?

Simply put, our Sun is a ball of very hot gas that emits light. A more elaborate description would say that it is a ball of plasma (highly energetic, ionized gas) which is held together by gravity and which radiates energy into space. This energy is produced by thermonuclear fusion reactions inside. In this process, two or more atomic nuclei collide at a very high speed and join to form a new, heavier atomic nucleus. During this process, some of the matter of the fusing nuclei is converted to photons (energy). This process, which we have not been able yet to produce in a non-explosive way, is not to be confused with the fission that occurs in nuclear power plants, which splits an atomic nucleus in two.

We only see the light of the outermost part of the Sun, the photosphere. Beyond that there are the chromosphere and solar corona. These are less dense and visible only if the innermost layers are eclipsed. Like all objects in the solar system, the Sun rotates. Its axis has a maximum inclination of about seven degrees to the plane in which the Earth orbits. We also know that the Sun's rotation is faster at the equator than at the poles: at the equator, it takes




✈ *The number of sunspots is linked to the 11-year cycle associated with the polar reversal of the Sun.*

Image: Solar Influences Data Analysis Center Belgium

about 26 days to complete one rotation, while near the poles this is more than 30 days. This differential rotation generates the magnetic field of the sun.

This solar magnetic field is not stable: its basic shape is comparable to the magnetic field of the Earth. This means it resembles a simple bar magnet, aligned with the axis of rotation of the sun. However, superimposed on this basic, dipole field, there are a number of much more complex and very intense local fields that vary with time. Places on the photosphere where the magnetic field of the sun is especially strong are called active regions and frequently lead to sunspots: slightly cooler/darker areas. In addition, the magnetic field reverses polarity at regular and short intervals; thus the magnetic north pole is in the geographic South pole (for lack of a better word) every 11 years and back again at the geographic North Pole 22 years later. This is known as the solar cycle and it has an effect on the number of solar spots observed on the photosphere. For us on Earth, there's virtually no impact whether the north pole is located in the North or South, so we refer to a solar cycle as 11 years in terms of maximum activity.

In summary, we can say the Sun is a fairly turbulent place with a cycle of 11 years for activity levels, governed by a complex magnetic field.

## Solar Activity

The best-known manifestations of solar activity are sunspots. These correspond to concentrations of intense magnetic field lines on the Sun's surface. When this occurs violently, it creates flares of very hot matter, which look like very large white flames. If these are intense enough, they affect the outer layers and the corona. Due to the intensity of the explosion and the lower gravitational force at the outer layers, a Coronal Mass Ejection, or CME can occur. Having said this, a CME is not always associated with solar flares and vice-versa: an ejection can occur without an associated solar flare.

Given the enormous amounts of energy released, such a CME can reach all the way to Earth and far beyond. They come in two waves. The first is in the form of electromagnetic radiation, which travels at the speed of light. Within about 8 minutes, this X-ray and intense UV radiation reaches the Earth. The second wave travels at 400-500 km/s and takes two to four days to reach Earth. This so-called solar wind is composed of ionized particles, mainly protons and high-energy electrons. It actually consists of the same material as the sun: 95% ionized hydrogen (protons and electrons), with the remainder consisting almost entirely of ionized helium (alpha particles & electrons). The solar wind is sometimes described as the outermost layer of the Sun that extends into the entire Solar System. The CME bursts increase the energy and speed of the solar wind.

It's important to note that these phenomena of intense solar activity do not occur symmetrically throughout the solar surface, but are concentrate around active regions. They are therefore also directional.

As mentioned earlier, the Earth's magnetic field, called magnetosphere, deflects the regular solar wind, thereby protecting us from its effects. When higher energy particles reach us however, this produces what is referred to as a geomagnetic storm. The fluctuations in solar wind due to a CME cause disturbances in the Earth's magnetic field, affecting both the field strength and its geometry.

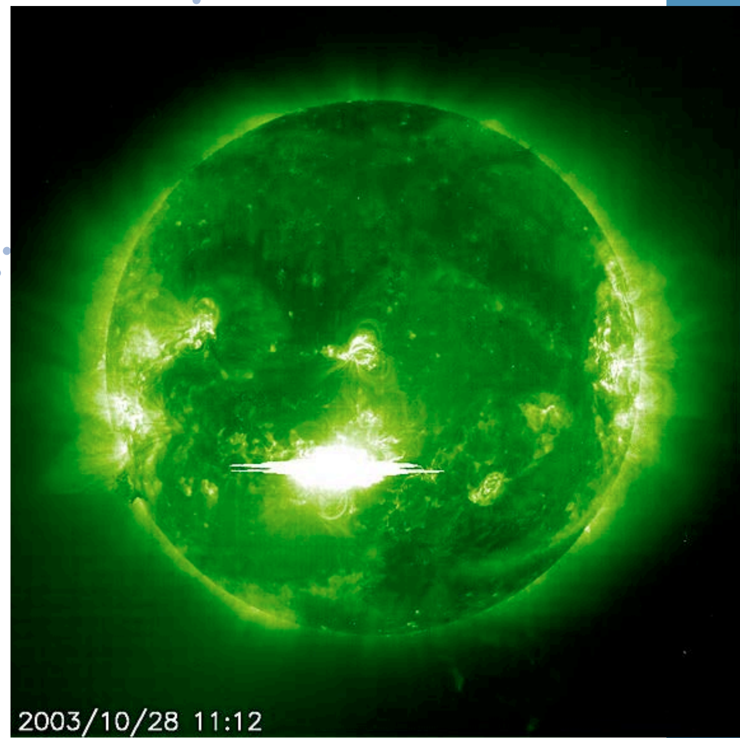
On the other hand, the structure of the ionosphere – a thin layer of Earth's atmosphere that begins at about 80 km altitude, which is composed of ions and free electrons – is affected more significantly and its properties change. NOAA has a department dedicated to forecasting space weather (Space Weather Prediction Center - http://www.swpc.noaa.gov). They classify hazardous phenomena into three groups on a scale of 1 to 5, with 5 being the most intense phenomenon (see the table).

The magnetosphere is weakest at the poles. It is here that particles slip past the Earth's magnetic field. Usually, this is of little more consequence than resulting in a beautiful aurora. Or is it?

## Historical incidents

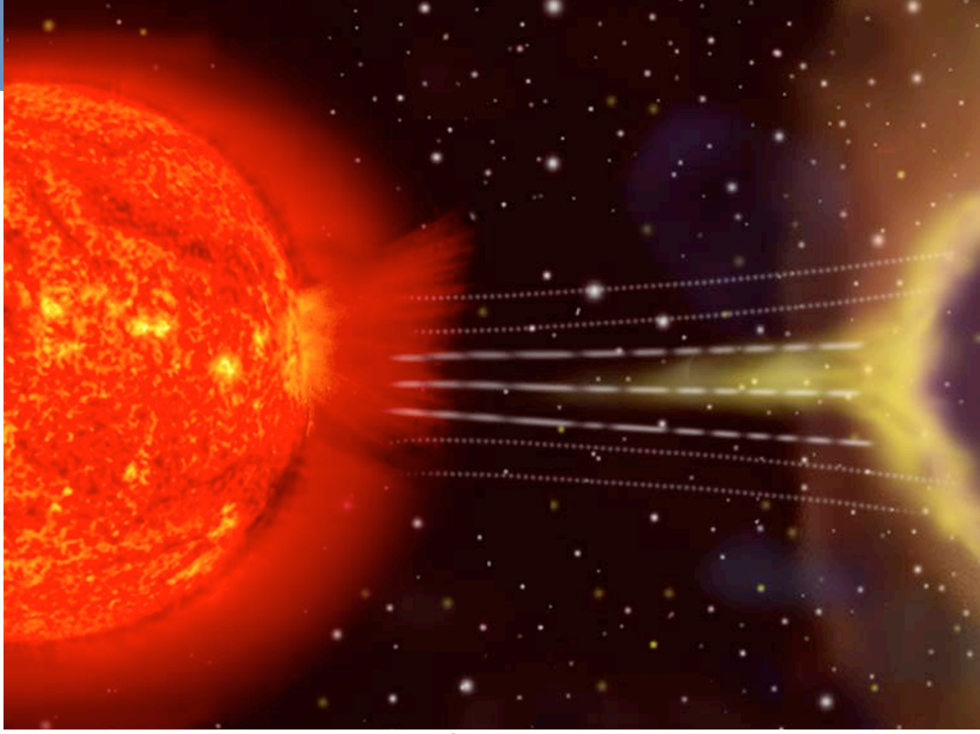
In the late summer of 1859, an intense solar storm caused serious problems for the still developing telegraph communication medium. From August 28th, auroras could be observed as far south as the Caribbean. The peak intensity was recorded on 1st and 2nd September, causing telegraph systems to fail across Europe and North America. The event was documented by Richard Carrington, an English amateur astronomer, who made thorough observations of the number of sunspots and solar flares; and Balfour Stewart, a Scottish physicist who made magnetometer measurements. Through these records and the observed events, the solar storm of 1859 is considered the most powerful solar storm in recorded history. It has become known as the "Carrington Event".

In March 1989, a geomagnetic storm caused a ninety-second outage of power grids in Quebec, Canada. Millions of people were without electricity for nearly ten hours. The outage occurred because of a geo-magnetically induced stream of charged particles in Earth's atmosphere, which resulted in surges on power networks. Not much later, in 1994, two Canadian communications satellites were knocked out by a solar storm, when energized electrons damaged their sensitive electronics. It resulted in telephone, radio and television outages. In this case the incident was due to electrons from solar wind affecting some vulnerable electronic components inside the satellites.




Late October 2003, a series of geomagnetic storms – the Halloween storms – caused by more than 17 flares and several CMEs were observed. One of the most intense geomagnetic storms was that of October 29, which reached Earth only 17 hours after it was detected by the LASCO coronagraph aboard the satellite SOHO (Solar and Heliospheric Observatory, ESA-NASA). The big difference with the previous events was that NOAA SWPC had issued numerous predictions about what was to come, allowing different industries to prepare for the disruptions.

The astronauts on board the International Space had to stay inside the more shielded parts of the Russian Orbital Segment to protect themselves against the increased radiation levels. After the announcement by the SWPC, large utility companies reduced system load, disconnected components and monitored voltage levels. There was some damage, but the only reported blackout was in Sweden.



Numerous satellite anomalies were observed, with both components malfunctioning and deviations in the orbits due to increased flow of energised protons and electrons. It is estimated that 59% of space science missions were affected in some way. GPS accuracy was significantly degraded affecting land and ocean surveys. In aviation, the then recently implemented Wide Area Augmentation System (WAAS) in the USA, used for improving system precision for approaches, was affected, as were the Polar routes.

Since the end of the Cold War, airlines increasingly make use of intercontinental routes via the Polar Regions, as they are shorter and therefore save fuel and time. During a geomagnetic storm, levels of radiation over the poles are above the maximum recommended levels. In October 2003, almost all companies adapted their routes and flew at lower levels. Radiation warnings were issued for latitudes above 35 degrees north and south. It was advised that estimated a 4000 ft drop, from FL400 to FL360, would result resulted in a 30% decrease in radiation. And NOTAMs warned of possible problems to communicate via HF frequencies, since it interferes or inhibits HF communication (3-30MHZ): at these and lower frequencies, radio waves bounce off the ionosphere allowing them to travel further beyond the line of sight limit that affects higher frequencies. This is the reason why HF is used in long-range communication. Shorter wavelengths including VHF (30-300 MHz) pass through the ionosphere and they do not reach any station that is not within the line of sight of the transmitter. They have the the advantage of not being affected by the activity in the ionosphere, but the increased presence of ions and electrons, as well as increased solar radiation, also does interfere with radio transmissions, including those on VHF. One side effect is that it may increase the maximum range of these transmissions for example.

As for satellite navigation, RNAV has definitely introduced large benefits from an air navigation point of view, enabling new and direct routes for example. In practice, for en-route, the RNAV system is only partially dependent on signals from Global Navigation Satellite Systems such as GPS, Galileo, GLONASS ... During approach however, where there are less radio navigation aids, the onboard systems are very dependent on GNSS. They are however not accurate enough to guide an aircraft to a runway that's only 50 meters wide. To overcome this, an algorithm to increase the accuracy of GNSS was developed. This calculates corrections based on measurements of ground reference stations located in the vicinity. These are used to create a set of adjustments, which is made available via satellite to all users. An aircraft can then determine its position with sufficient accuracy to enable a safe precision approach.

The correction system for GPS in North America is called the Wide Area Augmentation System (WAAS) and was brought online in April 2003. In Europe, a similar system for the Galileo satellite constellation, is called EGNOS. While the Galileo satellites are not all in orbit yet, EGNOS has been operational since 2009.

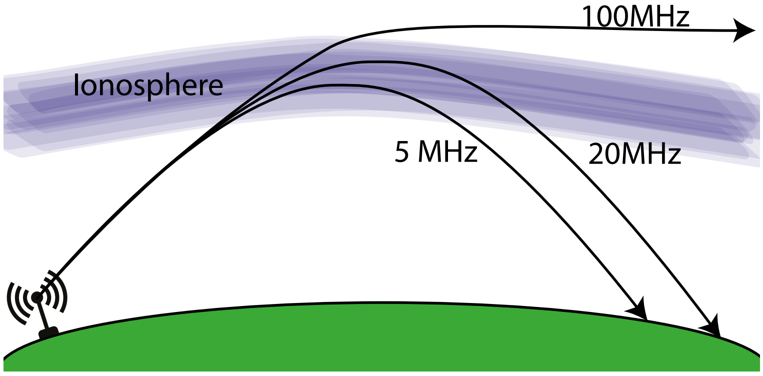
For 15 hours on October 29th 2003, and another 11 hours the next day, satellite signals were disrupted by disturbances in the ionosphere in such a way that the tolerances defined by the FAA for WAAS were exceeded and could not be used.

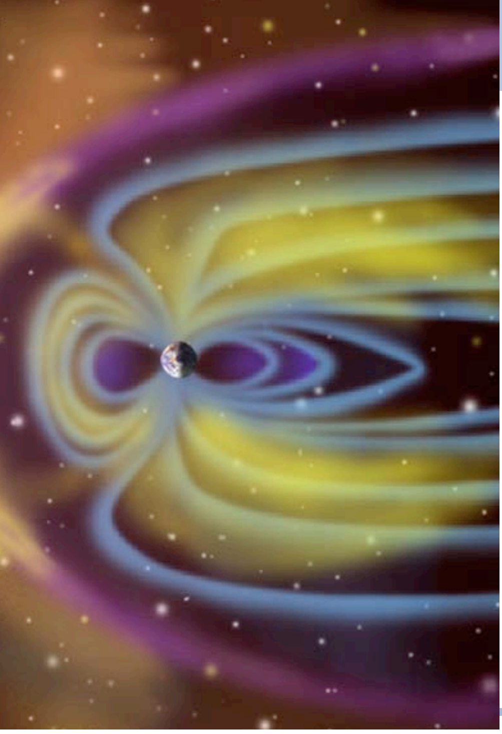
In July 2012, a much more intense and energetic event was reported: successive flares and coronal mass ejections, two of them on July 23rd, less than thirty minutes apart. As luck would have it, they missed the Earth: if it had happened a week or two earlier, the Earth would have been directly in its path. The event was detected by NASA's STEREO-A and STEREO-B satellites, which orbit the sun. They measured the ionized plasma expansion by some 3,000 km/s, well above speeds observed in 2003. STEREO-A was directly in the path of one plasma eruption, which provided scientists with valuable data to improve existing models. Such models and simulations of the magnetosphere are important for making predictions more accurate: for comparable CME impacting the Earth, its effects depend on the state of the Earth's magnetic field and on the angle at which the magnetic field is hit by the plasma ejected from the sun.

Statistical analysis shows that some of the largest plasma ejections, including the 1859 "Carrington Event" did not occur in years of solar maximum.

*Damage to a Salem, NJ, USA Transformer caused by a 1989 geomagnetic storm.*
Photo: PSE&G

*HF transmissions are reflected by the ionosphere*





# NOAA SPACE WEATHER SCALES

## Geomagnetic Storms

| Scale | Description | Effect | Average Frequency (1 cycle = 11 years) |
|---|---|---|---|
| G 5 | Extreme | **Power systems:** Widespread voltage control problems and protective system problems can occur, some grid systems may experience complete collapse or blackouts. Transformers may experience damage.<br>**Spacecraft operations:** May experience extensive surface charging, problems with orientation, uplink/downlink and tracking satellites.<br>**Other systems:** Pipeline currents can reach hundreds of amps, HF (high frequency) radio propagation may be impossible in many areas for one to two days, satellite navigation may be degraded for days, low-frequency radio navigation can be out for hours, and aurora has been seen as low as Florida and southern Texas (typically 40° geomagnetic lat.). | 4 per cycle (4 days per cycle) |
| G 4 | Severe | **Power systems:** Possible widespread voltage control problems and some protective systems will mistakenly trip out key assets from the grid.<br>**Spacecraft operations:** May experience surface charging and tracking problems, corrections may be needed for orientation problems.<br>**Other systems:** Induced pipeline currents affect preventive measures, HF radio propagation sporadic, satellite navigation degraded for hours, low-frequency radio navigation disrupted, and aurora has been seen as low as Alabama and northern California (typically 45° geomagnetic lat.). | 100 per cycle (60 days per cycle) |
| G 3 | Strong | **Power systems:** Voltage corrections may be required, false alarms triggered on some protection devices.<br>**Spacecraft operations:** Surface charging may occur on satellite components, drag may increase on low-Earth-orbit satellites, and corrections may be needed for orientation problems.<br>**Other systems:** Intermittent satellite navigation and low-frequency radio navigation problems may occur, HF radio may be intermittent, and aurora has been seen as low as Illinois and Oregon (typically 50° geomagnetic lat.). | 200 per cycle (130 days per cycle) |
| G 2 | Moderate | **Power systems:** High-latitude power systems may experience voltage alarms, long-duration storms may cause transformer damage.<br>**Spacecraft operations:** Corrective actions to orientation may be required by ground control; possible changes in drag affect orbit predictions.<br>**Other systems:** HF radio propagation can fade at higher latitudes, and aurora has been seen as low as New York and Idaho (typically 55° geomagnetic lat.). | 600 per cycle (360 days per cycle) |
| G 1 | Minor | **Power systems:** Weak power grid fluctuations can occur.<br>**Spacecraft operations:** Minor impact on satellite operations possible.<br>**Other systems:** Migratory animals are affected at this and higher levels; aurora is commonly visible at high latitudes (northern Michigan and Maine). | 1700 per cycle (900 days per cycle) |

## Solar Storms

| Scale | Description | Effect | Average Frequency (1 cycle = 11 years) |
|---|---|---|---|
| S 5 | Extreme | **Biological:** Unavoidable high radiation hazard to astronauts on EVA (extra-vehicular activity); passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk.<br>**Satellite operations:** Satellites may be rendered useless, memory impacts can cause loss of control, may cause serious noise in image data, star-trackers may be unable to locate sources; permanent damage to solar panels possible.<br>**Other systems:** Complete blackout of HF (high frequency) communications possible through the polar regions, and position errors make navigation operations extremely difficult. | Fewer than 1 per cycle |
| S 4 | Severe | **Biological:** Unavoidable radiation hazard to astronauts on EVA; passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk.<br>**Satellite operations:** May experience memory device problems and noise on imaging systems; star-tracker problems may cause orientation problems, and solar panel efficiency can be degraded.<br>**Other systems:** Blackout of HF radio communications through the polar regions and increased navigation errors over several days are likely. | 3 per cycle |
| S 3 | Strong | **Biological:** Radiation hazard avoidance recommended for astronauts on EVA; passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk.<br>**Satellite operations:** Single-event upsets, noise in imaging systems, and slight reduction of efficiency in solar panel are likely.<br>**Other systems:** Degraded HF radio propagation through the polar regions and navigation position errors likely. | 10 per cycle |
| S 2 | Moderate | **Biological:** Passengers and crew in high-flying aircraft at high latitudes may be exposed to elevated radiation risk.<br>**Satellite operations:** Infrequent single-event upsets possible.<br>**Other systems:** Small effects on HF propagation through the polar regions and navigation at polar cap locations possibly affected. | 25 per cycle |
| S 1 | Minor | **Biological:** None.<br>**Satellite operations:** None.<br>**Other systems:** Minor impacts on HF radio in the polar regions. | 50 per cycle |

## Radio Blackouts

| Scale | Description | Effect | Average Frequency (1 cycle = 11 years) |
|---|---|---|---|
| R 5 | Extreme | **HF Radio:** Complete HF (high frequency) radio blackout on the entire sunlit side of the Earth lasting for a number of hours. This results in no HF radio contact with mariners and en route aviators in this sector.<br>**Navigation:** Low-frequency navigation signals used by maritime and general aviation systems experience outages on the sunlit side of the Earth for many hours, causing loss in positioning. Increased satellite navigation errors in positioning for several hours on the sunlit side of Earth, which may spread into the night side. | Less than 1 per cycle |
| R 4 | Severe | **HF Radio:** HF radio communication blackout on most of the sunlit side of Earth for one to two hours. HF radio contact lost during this time.<br>**Navigation:** Outages of low-frequency navigation signals cause increased error in positioning for one to two hours. Minor disruptions of satellite navigation possible on the sunlit side of Earth. | 8 per cycle (8 days per cycle) |
| R 3 | Strong | **HF Radio:** Wide area blackout of HF radio communication, loss of radio contact for about an hour on sunlit side of Earth.<br>**Navigation:** Low-frequency navigation signals degraded for about an hour. | 175 per cycle (140 days per cycle) |
| R 2 | Moderate | **HF Radio:** Limited blackout of HF radio communication on sunlit side, loss of radio contact for tens of minutes.<br>**Navigation:** Degradation of low-frequency navigation signals for tens of minutes. | 350 per cycle (300 days per cycle) |
| R 1 | Minor | **HF Radio:** Weak or minor degradation of HF radio communication on sunlit side, occasional loss of radio contact.<br>**Navigation:** Low-frequency navigation signals degraded for brief intervals. | 2000 per cycle (950 days per cycle) |

## Impact on Aviation

In summary, when solar activity intensifies, this can produce a wide range of effects. These include:

- degradation or interruption of HF communications, which use ionosphere reflections. Increased VHF interference.
- degradation or interruption of satellite communications. For example those used for Automatic Dependent Surveillance.
- increased levels of airborne radiation, especially at high levels in polar regions. These would require using lower levels or re-routings.
- position or timing errors in satellite navigation systems and the various augmentation systems such as WAAS in the USA and EGNOS in Europe.
- failure of computer systems. The shrinking size of electronic components makes them more vulnerable to the interaction of charged particles. These faults are known as single event upsets.
- possible impact of power outages on ground based infrastructure.

## Conclusion

Solar activity affects aviation. We have already had sufficient prior experience to know that early detection and prediction are essential. The first step in risk management is to know how often this can occur. In terms of extreme solar activity, it can be said that despite an eleven-year solar cycle, dangerous phenomena can occur at any time. However, assessing the real impact on Earth is very dependent on the Earth's position relative to the Sun and many other parameters.

One thing that all the experts agree on is that the evolution of technology leads to increased vulnerability. In 2003, only approaches to Minnesota were affected but presently, an additional 3,000 airports in the USA, including the busiest in the world could see their precision approaches affected. Innovation such as this is good but we must be aware of the risks it brings and focus our efforts on getting accurate predictions at least in the order of hours in advance. CMEs that may cause geomagnetic storms are only detectable by instruments operating outside the earth's atmosphere. There are currently two such devices: LASCO onboard the Solar and Heliospheric Observatory (SOHO), which is near the end of its life expectancy; and the two STEREO satellites launched in 2006. These observations/predictions also have to reach the end-users in time. For Europe's air traffic control, the EUROCONTROL Network Operation Center Manager is kept informed and space weather warning bulletins are issued whenever deemed appropriate by posting them on the NOP web portal.

After the Icelandic volcano eruption, the importance of preparation and pre-planning for such disruptions became obvious. Knowledge and awareness can definitely be improved on the Air Traffic Services side. I hope that I have at least stirred some curiosity about the topic, and that in turn, it helps to convince those responsible higher up to create contingency plans.

# NOWHERE TO HIDE

## Developments in Satellite Surveillance for Aircraft

### by Ignacio Baca, IFATCA Technical and Operations Committee

The last IFATCA Conference in Gran Canaria generated quite a bit of interest from local and even national (Spanish) press. As such, a number of IFATCA representatives, myself included, talked to journalists. After answering their questions about IFATCA and its activities, there usually followed some questions on the technical side. Most common amongst those was one question: referring to a paper about satellite surveillance presented in the Conference, they wanted to know whether such systems could help prevent aircraft disappearing, such as Malaysia Airlines flight MH370?

This disappearance created a demand from the general public and numerous politicians to have a way to continously track aircraft. As such, it will probably will boost the concept of Satellite ADS-B. The idea is simple: to automatically transmit the aircraft position, as derived from the onboard navigation system, to a ground station. While this is exactly what the well known ADS-B system currently does, it is of no use in remote areas where the aircraft is out of range of any ground station. This of course includes vast stretches of oceanic airspace.

## ADS

Automatic Dependent Surveillance (ADS) is a system very easy to understand: an aircraft properly equipped can calculate its own position with a high degree of accuracy and then send it via datalink to a ground station. The system comes in two varieties: ADS-C (Contract) is used to facilitate the application of procedural separation and is indeed used in remote areas. The aircraft send their positions to ground according to a so called contract, every 25 minutes for example. These automatic reports can substitute the verbal pilot reports needed for procedural control. ADS-B (Broadcast) on the other hand, sends reports almost continuously (up to twice a second). These can therefore be used to provide radar-like surveillance.

Like radar, ADS-B is limited to aircraft in line of sight of the ground receiver making it unusable in remote areas. But if we add satellite communications to ADS-B however, the lack of coverage ceases to be a problem, at least in theory. The concept to provide such a system is currently being explored by Aireon LLC, a joint venture consortium created by Nav Canada, Iridium, Enav, the Irish Aviation Authority and Naviair.

## Challenges

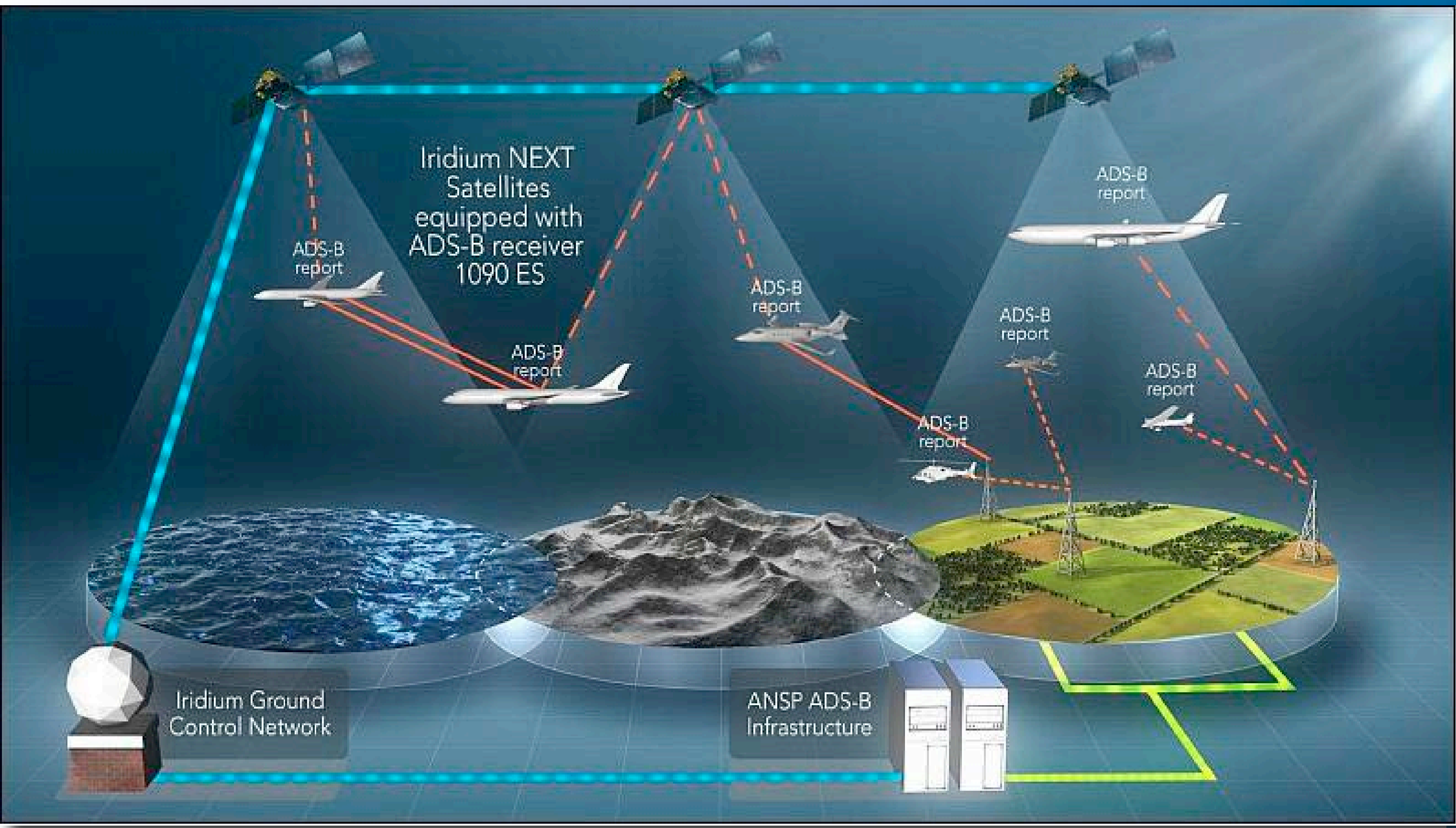
The concept is simple but its developing and implementing appears to be tricky and technologically challenging. To start with there is an economical issue for the users: considering that a message via satellite typically costs at least one dollar minimum, a conventional ADS-B sending 2 messages per second would be charged at least US$7,200 per hour. To overcome this, the Aireon system specification foresees a refresh time of 15 seconds thus making the system much more affordable, bringing the hourly cost in the same scenario down to US$240. The question is whether an update rate of 15 seconds is sufficient to use the system as a surveillance tool however. Nav Canada and Aireon are evaluating this by artificially degrading some existing ADS-B coverage to analyse the consequences.

The latency of the reports may also result in a potential issue. The concept of latency refers to how old is the position information when it is presented to the controllers. Aireon expects a latency around one or two seconds, similar that of a non-satellite ADS-B system like the one currently in place in Australia, which rejects any report older than three seconds.

Another purely technical issue may be the lack of coverage. Aireon intends to use the Iridium NEXT constellation of 66 satellites that will be rolled out from 2015 and intends to be fully deployed by 2019. A failure in one of the satellites however could result in a loss of coverage that would create a "dark area" moving across the earth.

Another problem to be solved is the question of procedures. According to ICAO PANS-ATM the provision of ATS surveillance services requires direct communications between pilot and controller. Aireon expects that CPDLC (Controller-Pilot Data Link Communications) may be used as the sole means to comply with the requirement and provide an horizontal separation minimum of 15 NM. Note that PANS-ATM currently only prescribes 2.5, 3 or 5 NM horizontal separation standards for use under surveillance. Aireon claims that the application of a separation larger than 5 NM should not be viewed as a new minimum but an application by the controller of a larger separation than specified in PANS-ATM depending on the way of communication in use.

*An Iridium NEXT Satellite*
Illustration: © Iridium Communications Inc.




According to ICAO Doc 9689, which deals with Required Communication Performance (RCP), under RCP 120 a horizontal separation minimum of 15 NM may be applied. This suggests that Aireon's goal of 15 NM is achievable. After considering all of the above, the technical issues seem challenging but not impossible to solve. But how about the operational implications for controllers?

## Mixed Mode Operations

A recurring discussion in IFATCA's Technical and Operations Committee (TOC) every time a new technology or procedure is discussed, is the issue of Mixed Mode Operations. In a perfect world, all aircraft are always equally equipped and treated. In reality however, it usually takes many years to retrofit all airframes and controllers have to deal with a mix of equipped and non-equipped aircraft. Obviously, this can easily lead to mistakes and creates the need to keep track of the capabilities of each aircraft thus increasing the workload. As a consequence, IFACTA has a very clear policy against Mixed Mode Operations stating the need to reduce existing cases and to avoid the introduction of new ones. It also recognises that mixed operations are sometimes unavoidable and recommends to perform an assessment to ensure that controller workload is not increased beyond an acceptable level.

Even if we don't consider the Mixed Mode problem and assume that all technical issues are solved it is still unclear whether a satellite surveillance would be practical or not. A good example to study is Australia which has extensive experience in the use of ADS-B surveillance in remote sectors. The Australian experience shows that in those large sectors (more than 2,000 NM across) the application of separation equivalent to that used by radar is impractical because the position symbols on the screen are too close. ICAO PANS requires that the edges of the position indicators do not touch or overlap, irrespective of the separation minimum. This results in the minima applied in Australia for this kind of ADS-B surveilled sectors is the same to that used procedural control. On the other hand, while studies by Aireon predicts significant fuel savings in the North Atlantic due to the use of a 15 NM minimum, the use of RNP of the In-Trail Procedure (ITP) also aims to a more efficient use of airspace and reduction of the required minima without the need of any surveillance system.

Considering all this, the question is: is it reasonable to develop and implement a satellite ADS-B system? It seems that operationally and economically, it is doubtful that the system brings great benefit. On the other hand, there's the pressure to keep track of the aircraft at all times in case something goes wrong. A surveillance system with global coverage such as the Aireon solution, would certainly help in those cases.

## Policy

After the TOC presentation, IFATCA adopted a new policy in Gran Canaria. It was desirable to express IFATCA support to the efforts to develop new surveillance technology. To make the policy as solid as possible, the transition from system-based to performance-based requirements that are technology-independent, as mentioned in the ICAO Global Air Navigation Plan, was taken in account and included. The final wording of the policy, which is now part of the Technical and Professional Manual, is as follows:

**IFATCA supports the development of new surveillance technology that is designed to meet required surveillance performance standards, which allow for the application of technology-independent separation minima.** ✈

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# AVIATION DURING WORLD WAR I

## Part Two: Strategic Bombing

**by Philip Marien, Editor**

As we saw in the last issue, at the outbreak of World War I, military commanders believed the main interest in using aircraft in military campaigns was for reconnaissance. This however didn't stop the various military sides to conduct experiments early on in the war, which lead to other uses, including strategic bombing.

### Italy

Perhaps surprisingly, before the outbreak of WWI, the Italians had carried out the first aerial bombing raid using a fixed-wing aircraft: in November 1911, during the Italo-Turkish War, and a mere 8 years after the Wright Brothers' first flight, Giulio Gavotti hand-dropped bombs on Turkish positions in the Libyan desert. The dropping of bombs from balloons had been outlawed by the Hague Convention of 1899, but Italy argued that this ban did not extend to aircraft.

*Italian Caproni Bomber.*

Italy possessed heavy bombers before its entry into the war such as the multi-engine Caproni Ca.1. These were later joined by Ansaldo SVA aircraft. But there was some reluctance to use them: many of the obvious targets had a high number of Italian residents, were in territories Italy had plans to annexe after the war or were simply out of reach. As a result, the bombers were only sparsely used.

### France

It was France that formed the first strategic bombing unit in history, aptly named Group de Bombardment No. 1 (GB1), in September 1914. Like the Italians, the French were reluctant to bomb targets on their own soil, even if occupied by the Germans: a number of French cities were within range of German retaliation. Instead, GB1 went on to bomb targets far behind the front, concentrating on the German supply network and troop concentrations. The French favoured light bombers, often modifying reconnaissance craft for the purpose. By far the most successful one, the 1917 Breguet 14, remained in production until 1926.

*French Breguet 14 bomber.*

### German Empire

Rather than using aircraft, the Germans possessed six operational airships, while their Imperial navy had one. When their passage through Belgium was met with much more resistance than they had counted on, the army's Zeppelins took to bombing Liège and Antwerp, despite the fact that at this stage no specially designed aerial bombs existed and that it was in fact prohibited by an international convention. But their initial experience was not encouraging - they lost three airships in the first months of the war to anti aircraft fire.

The German Admiralty was more enthusiastic: their airship fleet was mainly patrolling the North Sea and was thereby less targeted by enemy fire. By early 1915, they were confident enough to press the Kaiser for permission to bomb England. Fearing for his relatives in the British royal family(!), permission was only reluctantly granted on the condition that London be spared... On the 19th of January 1915, the first Zeppelin raid against Britain killed two and injured sixteen.

From then on, there was an average of about two aerial raids on Britain per month. After a series of raids by French bombers on German cities, the Kaiser no longer opposed bombing London and on the 31st of May 1915 the first raid against the capital killed seven and injured thirty five. Though the German Admiralty was very enthusiastic about the effects of the raids, their effect was more on the psychology and morale of Britons than doing any substantial damage. Navigation was very primitive, partly because the British quickly learned to use blackouts very effectively. Bombing accuracy was poor at best: only an estimated 10% of the bombs dropped from Zeppelins actually hit their target.

*Crater in Paris after a Zeppelin bombing raid.*

Bombing Paris proved to be even more difficult: from the nearest Zeppelin base at Metz to Paris meant flying more than 300 km across enemy territory. While London was further away, there was little or no chance of encountering enemy fire.


✈ German Riesenflugzeug Siemens-Schuckert VIII.


✈ British Handley-Page O400

Though Britain initially struggled to fight off the Zeppelins, by 1916 the Royal Flying Corps had armed their planes with a mixture of explosive and incendiary bullets. The explosive bullets could pierce the Zeppelin's tough outer skin and the inner hydrogen gasbags. The incendiary bullets could set those leaks on fire, and once on fire a Zeppelin was doomed.

The solution was to fly the airships as high as possible. Reaching altitudes of 20,000 feet, they could stay above the enemy aircraft. But in order to reach these heights, defensive armaments were reduced, as was the strength of the frame. In addition, the extreme cold and thin air affected both the engines and the crews, making navigation and bomb aiming even harder.

Of the 125 Zeppelins deployed by the Germans, 53 were destroyed and a further 24 were too damaged to be operational. Around 40% of their crews perished, the highest of any German service branch. The cost of constructing the airship fleet was approximately five times the cost of the damage they inflicted…

German high command began losing faith in the airships and began looking towards the new Gotha and Giant bombers to attack Britain.

From 1916 onwards, Grossflugzeeuge and Riesenflugzeuge, German for "big" and "giant" aircraft) carried out bombing raids over the UK. While the smaller ones were production models, most of the giant, multi-engine aircraft were one-off designs that became increasingly bigger with every iteration. The largest built, the Siemens-Schuckert R.VIII had a wingspan of 48.0 m, wider than a Boeing B-29 Superfortress and bigger than any German WWII aircraft. They were built by several manufacturers, including AEG, DFW, Linke-Hofmann Siemens-Schuckert and Zeppelin-Staaken.

## Britain

Given the psychological impact of the bombing raids on Britain, it is no surprise that the initial strategic bombing efforts of the Royal Naval Air Service (RNAS) and later the Royal Flying Corps (RFC) concentrated on German airship bases in Cologne, Düsseldorf, Friederichhafen, Ludwigshafen, Cruxhafen and Tondern.

Being limited in range, the British quickly deployed seaplanes, which were lowered from tenders nearer to the targets: on Christmas Day 1914 they bombed a zeppelin base at Cuxhafen. Towards the end of the war, they were the first to launch bomber aircraft from a ship during the Tondern Raid.

Right up to the end of the war, the RNAS took to strategic bombing in a bigger way than the RFC, who were focused on supporting the infantry actions of the Western Front. The RNAS first attacked German submarines at their bases and then targetted the origins of the submarines by attacking the steelworks.

In April 1918, the RNAS and the RFC were merged to form the world's first independent Air Force. As part of this newly created branch of the military, they set up the Independent Force, an expanded bombing group used to strike against German railways, aerodromes and industrial centres without co-ordination with the Army or Navy. The 9 squadrons flew de Havilland DH4s, DH9s and DH.9As; Handley Page 0/400s; and Royal Aircraft Factory FE2bs. Towards the last few months of the war, bomber squadrons suffered increasing losses and could not operate without fighter escorts. At the end of the war, the RAF took ownwership of the Handley Page V/1500, a four-engined bomber that could reach Berlin, but it were never used. In October 1918, the Independent Air Force was re-designated the Inter-Allied Independent Air Force. This force comprised British, French, Italian and American squadrons and operated under the command of the French Marshall Foch, supreme commander of the Allied Forces. Shortly after the end of the war, it was disbanded and the British component was re-absorbed into the RAF.

## Russia

At the outbreak of the war, the Russian Empire was the only force to operate a long-range heavy bomber: the Sikorsky Ilya Muromets. These had been designed as a civil transport that could carry 16 passengers in a heated cabin. Sikorksy had even foreseen in-flight access to the four engines. Converted to a bomber, it could carry 1,100 lbs of bombs, and remain in the air for up five hours with a reduced bomb load. Four aircraft were based near Warsaw from the end of 1914 and the principal targets were supply depots, troop concentrations and transportation networks. When Russia left the war, in March 1918, around seventy Ilya Muromets had been built. In total, these had flown over 350 missions along the entire Eastern Front.

Besides being unusually large for its time (making German fighter pilots badly misjudging the distance to it), it was an extremely tough aircraft: a number were so badly damaged by enemy fire, they had to be scrapped, but not until after making it back to base. It still holds a unique record for any bomber in any conflict: the number of Ilya Murometz lost to enemy fire was less than the number of enemy aircraft they shot down!


✈ Sikorsky Ilya Muromets

Even though strategic bombers had the greatest impact on military and non-military targets, World War I aviation is best remembered through its dogfighting pilots. These aces risked life and limb to escort reconnaissance or bombing flights or tried to prevent bombing raids by attacking the aircraft. More on that in the next issue. ✈

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All photos: Public Domain via wikimedia

# CHARLIE'S COLUMN

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### We have information....aaawwww!

CYSB 171800Z
13010KT 2SM -SN BR BKN005 OVC013
M02/M03 A2946 RMK SF6ST2
CLOUD TO THE NORTH LOOKS LIKE A PUPPY SLP996

## That's a fine car, mate!

Australia is a country full of very resourceful people. One of them pushed this to the limits, when he bought an old Beechcraft aircraft, took the wings off and began driving through town as if it was a car. The minor issue that the fuel tanks were normally in the wings, was solved by putting a jerry can full of fuel on the passenger seat with a simple hose running to the engine compartment.

Unfortunately for him, a number of fellow road users, mostly pedestrians, called the local police. They were not too impressed by the propeller, which they found was a bit too dangerous. Police didn't have too much trouble finding the driver and his unusual vehicle: he had it nicely parked outside a local pub.

In his statement, the owner said he had just bought the aircraft on the other side of town and was driving it home, stopping for a drink on the way. Asked for some paperwork, he was only able to produce a driver's license… The aircraft was impounded, though police was struggling to find an actual Road Traffic Act violation and said they were trying to find an article in the Criminal Code to charge the man with.


## Personal space is overrated!

An intriguing Airbus press release landed on Charlie's desk recently: Cebu Pacific airlines, based in the Philippines, purchased a few Airbus A330s "to offer direct services from Manila to markets in Australia, the Middle East, and parts of Europe, as well as to the US. The airline will configure the aircraft in single class layout, seating just over 400 passengers." (source airbus)

Their website indeed reveals that the aircraft will carry 436 passengers in a mostly 3-3-3 configuration. Another website, seatmaestro.com, shows just how cozy this will be. It's almost twice as many people compared to what Lufthansa puts in its own A330s, admittedly in 2 classes. Still, having flown on A330s in economy, I can tell you my knees are still sore from the seat in front. Quite how this will work on Cebu with tall and/or large Westerners remains to be seen.

## Russian Hospitality

**Pilot**: Radar, this is Aeroflot 123 out of 240 climbing to FL370

**Controller**: Identified AFL123 climb FL370, be advised severe turbulence is reported up to FL380

**Pilot**: Climbing FL370, AFL123

***Few minutes pass, the aircraft reaches FL370, but the mode C indication jumps up and down.***

**Controller**: AFL123, do you experience any turbulence?

**Pilot**: Affirm AFL123

**Controller**: How strong?

**Pilot**: Severe, AFL123

**Controller**: AFL123 do you request level change?

**Pilot**: Negative AFL123

**Controller**: AFL123, are you a cargo flight?

**Pilot**: Negative AFL123, we are carrying German soldiers.

# Next Generation Aviation Professionals - what is the Task Force doing?

# ICAO Workshop

## NGAP & Competence based training

by Nicole Barrette, Technical Specialist ICAO and
Ashley Lauryssen, Training Strategies Manager EUROCONTROL

Kempinski Zografski Hotel
IFATCA Conference
Room Sofia 1 & 2
Thursday 23. April 2015
13:30 - 15:00