Geophysical Research Abstracts
Vol. 17, EGU2015-5839, 2015
EGU General Assembly 2015

Lightning x-rays inside thunderclouds, in-flight measurements on-board an A350

Alexander van Deursen (1), Pavlo Kochkin (1), Alte de Boer (2), Michiel Bardet (2), and Jean-François Boissin (3)

(1) Eindhoven University of Technology, Electrical Engineering, Eindhoven, Netherlands (a.p.j.v.deursen@tue.nl), (2) Dutch National Aerospace Laboratory, Amsterdam, the Netherlands, (3) Airbus, Toulouse, France

Thunderstorms emit bursts of energetic radiation. Moreover, lightning stepped leader produces x-ray pulses. The phenomena, their interrelation and impact on Earth's atmosphere and near space are not fully understood yet.
The In-flight Lightning Strike Damage Assessment System ILDAS was developed in an EU FP6 project (http://ildas.nlr.nl/) to provide information on threat that lightning poses to aircraft. It is intended to localize the lightning attachment points in order to reduce maintenance time and to build statics on lightning current. The system consists of 2 E-field sensors and a varying number of H-field sensors. It has recently been enhanced by two LaBr3 scintillation detectors inside the aircraft. The scintillation detectors are sensitive to x- and gamma-rays above 30 keV. The entire system is installed on-board of an A-350 aircraft and digitizes data with 100Msamples/sec rate when triggered by lightning. A continuously monitoring channel counts the number of occurrences that the x-ray signal exceeds a set of trigger levels. In the beginning of 2014 the aircraft flew through thunderstorm cells collecting the data from the sensors. The x-rays generated by the lightning flash are measured in synchronization better than 40 ns with the lightning current information during a period of 1 second around the strike. The continuous channel stores x-ray information with very limited time and amplitude resolution during the whole flight. That channel would allow x-rays from cosmic ray background, TGFs and continuous gamma-ray glow of thundercloud outside the 1 s time window.
In the EGU2014 we presented the ILDAS system and showed that the x-ray detection works as intended. Fast x-ray bursts have been detected during stepped/dart stepped leaders and during interception of lightning. Data analysis of continuous channel recordings will be presented as well.