

A statistical evaluation on the cosmic radiation doses on aircrews flying over South America and Caribbean regions

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Introduction

There are substantial researches on the cosmic radiation doses received by aircrew on their typical flight workload. Most part of these studies was made by measurements onboard aircrafts of some specific companies in established routes. A recurrent question from countries over South America and Caribbean regions is related on the significance of doses accumulated by aircrews over this region and if those magnitude justifies a specific radiation protection procedure.

Methods

The evaluation was made by statistical analysis using CARI-6 aircrew radiation dose code and the data are derived from comprehensive records of registered flights performed in the South America and Caribbean airspace between 29,000 and 41,000 feet, performed from March 7 to 20, 2009. The analysis of this sample was composed of 80,548 route calculations totalizing 53,163 hours of real flights, by means of calculation of each track performed by aircrafts between aeronautic navigation waypoints.

Results

The analysis identifies that the typical group of flight crew operating over this region receives mean dose rates ranging from 2.65 $\mu\text{Sv/h}$ to 2.95 $\mu\text{Sv/h}$ depending on the solar cycle. This distribution, integrated over typical workload from Brazilian aircrews results on annual doses ranging from 1.45 mSv to 1.67 mSv.

Conclusions

The results demonstrate that the typical aircrew flying over this region exceeds the annual radiation limit for public (1 mSv). The statistical analysis also shows that this is the case of more than 96% of the aircrew flying with this flight routine and workload. The presented results can be used by local authorities of countries over this region as a basis to evaluate the convenience on adoption the recommendation from ICRP Publication 132 regarding radiation protection recommendations for aircrews.