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Development of a High Speed Camera Network to Monitor and Study Lightning (Project RAMMER)

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Saraiva, A. V.; Pinto, O.; Santos, H. H.; Saba, M. M.

This work proposes the development and applications of a network of high speed cameras for observation and study of lightning flashes. Four high-speed cameras are being acquired to be part of the RAMMER network. They are capable to record high resolution videos up to 1632 x 1200 pixels at 1000 frames per second. A robust system is being assembled to ensure the safe operation of the cameras in adverse weather conditions and enable the recording of a large number of lightning flashes per storm, larger than the values reported to date. As the amount of physical memory to record only 1 second of data is something like 3 - 4 GBytes, there is no way to make long recordings of thunderstorms, so a triggering system was conceived to address this problem and do the recordings of 2 seconds of data automatically for each lightning flash. The triggering system is an optical/electromagnetic system that is being tested since September/2010 and the whole system is under testing yet. This lightning information from the video recordings will be correlated with data from the sensors of the Brazilian Lightning Detection Network (BrasilDAT), from a network of electric field fast antennas, slow electric field antennas and Field-Mills, as well as with data from the LMA (Lightning Mapping Array) to be installed in 2011 in the cities of Sao Paulo and Sao Jose dos Campos. The following objectives are envisaged: a) make the first three-dimensional reconstructions of the lightning channel with high speed cameras and verify its dependence on the physical conditions associated with each storm; b) to observe almost all CG lightning flashes of a single storm cloud in order to compare the physical characteristics of the CG lightning flashes for different storms and their dependence on physical conditions associated with each storm; c) evaluate the performance of the new sensors of BrasilDAT network in different localities and simultaneously. The schematics of the sensors will be shown here, with statistics of the first results of of the triggering system accuracy, pictures and the first lightning recordings of the observation sites. The main objectives will be also discussed in more details.

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