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Infrasound from lightning: 8 years of measurements in Ivory Coast

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It is well established that more than 2,000 thunderstorms occur continuously around the world and that about 45 lightning flashes are produced per second over the globe. More than two thirds (42) of the infrasound stations of the International Monitoring System (IMS) of the CTBTO (Comprehensive nuclear Test Ban Treaty Organisation) are now certified and measure routinely signals due particularly to natural activity (e.g., airflow over mountains, aurora, microbaroms, surf, volcanoes, severe weather including lightning flashes, ...). Some of the IMS stations are located where worldwide lightning detection networks (e.g. WWLLN) have a weak detection capability although lightning activity is high (e.g. Africa, South America). These infrasound stations are well placed to study lightning flash activity and its disparity, which is a good proxy for global warming.
Progress in infrasound array data processing over the past ten years makes such lightning studies possible. For example, Farges and Blanc (2010) show clearly that it is possible to measure lightning infrasound from thunderstorms within a range of distances from the infrasound station. Infrasound from lightning can be detected when the thunderstorm is within about 75 km from the station. The motion of the squall zone is very well measured inside this zone. Up to 25 % of lightning flashes can be detected with this technique, giving better results, locally, than worldwide lightning detection networks.
An IMS infrasound station has been installed in Ivory Coast for 8 years. The optical space-based instrument OTD measured a rate of 10-20 flashes/km^2/year in that country and showed strong seasonal variations (Christian et al., 2003). Ivory Coast is therefore a good place to study infrasound data associated with lightning activity and its temporal variation. First statistical results will be presented in this paper.