CORRESPONDENCE

Comment on "Deaths by Lightning in Mexico (1979–2011): Threat or Vulnerability?"

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We wish to thank G. B. Raga et al., the authors of "Deaths by lightning in Mexico (1979–2011): Threat or vulnerability?" (Raga et al. 2014), for their careful, detailed work on lightning casualties in Mexico. This type of work is very valuable, but it is quite rare in most parts of the world, and more studies of this kind are needed.

We think that it is important to point out, however, that the lightning climatology presented in Fig. 5 of Raga et al. (2014) is inconsistent with other lightning climatologies over the same region. In their Fig. 5, relatively little lightning density is shown over the Sierra Madre Occidental over the states of Durango, Sinaloa, and Sonora, and even less is shown extending into the U.S. states of Arizona and New Mexico. Additionally, relatively little is shown over the Yucatan peninsula. By contrast, the lightning density is relatively high along the Pacific coast near Mazatlán, and particularly just offshore all the way from Jalisco down to Guatemala. These results may be contrasted with lightning climatologies taken from two low Earth-orbiting satellites, the Optical Transient Detector (OTD) and Lightning Imaging Sensor (LIS) (Christian et al. 2003; Cecil et al. 2014), as well as the ground-based global lightning dataset GLD360 (Said et al. 2013, their Figs. 4a and 5a). These satellite- and ground-based climatologies show that the overall lightning maximum resides over land and extends well northward into Sonora and the U.S. states of Arizona and New Mexico. In our view, the climatology presented in Fig. 5 of Raga et al. (2014) exhibits what appears to be a possible combination of a nighttime bias in detection efficiency coupled with the general oceanic bias in high-current lightning strokes surrounding the Gulf of Mexico and the Pacific coast of Mexico and Central America (Said et al. 2013). Ground-based VLF networks tend to have higher detection efficiency at night due to the more favorable ionospheric propagation characteristics, as described in Jacobson et al. (2006) and Abarca et al. (2010). The latter study investigated the combination of diurnal effects in detection efficiency, the diurnal cycle of high-current lightning events, and the relative influence of oceanic areas within their analysis region, and generally concluded that a combination of effects was at work and that further research on the issue was required.

The detailed analysis in this paper is focused around the Estado de México, and we certainly have no reason to doubt the overall conclusion that the vulnerability of the population is the primary factor explaining the distribution of lightning casualties in that region. It is interesting, however, that Oaxaca is found to be an area of relatively lower lightning density in Fig. 5 of Raga et al. (2014), whereas it appears to be an area of high lightning incidence in the other climatologies cited above.

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