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50 & 100 YEARS AGO

50 YEARS AGO

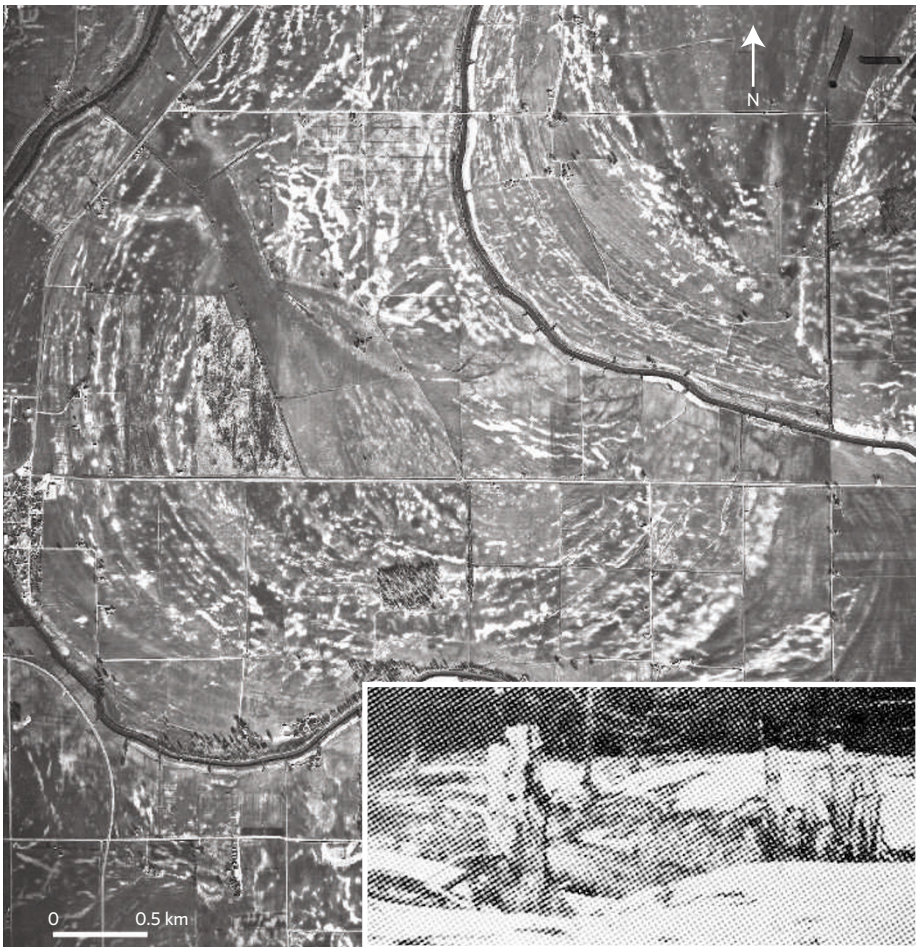
"Personal Factors in Accident Proneness." Dr. J. A. Smiley... has made full use of his position as medical adviser to an aircraft-manufacturing company to study the accident histories of 6,450 men, and to examine in detail 87 men classified as accident prone... His thesis may briefly be stated — accident-prone individuals are usually emotionally disturbed, with associated hypothalamic misfunction which, it is tentatively suggested, produces minor imbalance of adrenalin and acetylcholine with concomitant behaviour disturbance... [they] also show 'anxiety' sweating in interview, albumin in the urine specimens collected during medical examination, a seven-fold increase in peptic ulcer incidence and a more than four-fold increase in incidence of other medical symptoms... The problem remains, however, whether these men may adequately be described as accident prone... the main conclusion to be drawn is that proneness to report minor injury can be added to the list of other known clinical signs of emotional disturbance.

From *Nature* 25 June 1955.

100 YEARS AGO

Prof. E. Wiedemann, of Erlangen, sends us a short statement of observations described in his work on electric discharges... He agrees with Mr. Jervis-Smith as to the action of ozone, and advises persons who work for a long while with influence machines not to have these machines situated in the working room. "Ozone belongs to the poisonous gases, and is the more dangerous, since the injurious effects are not manifest at the time; on the contrary, breathing the gas produces at first a feeling of exhilaration, but afterwards it has a depressing effect on the nervous system... During my observations I have suffered somewhat severely from nervous disturbance (hyperesthesia of the feet) due to breathing ozone. These lasted for one or two years. Moreover, I always experience discomfort after performing experiments in my lectures on Tesla discharges."

From *Nature* 22 June 1905.



USDA

USGS

Figure 1 | Earthquake evidence. This aerial photograph, taken in 1964, shows light-coloured sand blows near the Little River in northeastern Arkansas. The inset is a ground view, taken about 100 years ago, of trees killed by the sand deposits. Some of the sand blows were produced by the New Madrid earthquakes of 1811–12; others were formed in prehistoric times. Smalley and colleagues' analyses[5] are consistent with the finding of fairly frequently repeated New Madrid events surmised from this geological record.

stations spanning the New Madrid region to ascertain the rate at which the seismic zone is deforming in response to tectonic forces[6]. Measurements were collected for several days in 1991, 1993 and 1997, the upshot being estimated relative motion across the seismic zone of 1.4 mm yr^{-1} with uncertainties of ±3 mm yr^{-1}. These motions were interpreted to be indistinguishable from zero, and therefore indicative of low rates of strain accumulation. Given that earthquake frequency is related to the build-up and release of strain energy, it was concluded that the New Madrid seismic zone produces either magnitude 8 earthquakes every 5,000–10,000 years or magnitude 7 earthquakes every 1,000 years[6]. This finding differed from that of the geological studies.

In the late 1990s, a network of permanent GPS stations was installed in the New Madrid region. The new network included many improvements; for example, stations were located close to and on both sides of major New Madrid faults, and strong H-beams were used that are less susceptible to non-tectonic movements than the 1-inch-diameter steel rods used in the previous network[5]. Because the new stations are permanent and collect data continuously, the repeated setting up of field stations, which introduced measurement errors in the previous studies, could be avoided.

Smalley *et al.*[5] have analysed four years of continuous measurements from the new network. They calculate relative motions across the seismic zone that are similar (1–2.7 mm yr^{-1}) to those measured during the 1990s but with much smaller uncertainties — at most 25% of those of the previous studies. Smalley *et al.* point out that in the earlier GPS data the tectonic signal was lost in the noise, and interpret their results to indicate high rates of strain in the New Madrid seismic zone.

They also find relative motions across the seismic zone that are consistent with expected fault movements as inferred from present-day seismicity[9] and recent fault studies[7]. For example, relative motion indicates that bedrock slips over itself along a major northwest-oriented fault, known as the Reelfoot thrust fault, that is inclined towards the southwest (see Fig. 2 on page 1089). The new findings are persuasive because they help to explain the geological observations of frequent New