

heat, and a misty horizon, are always the forerunners of this phenomenon. The fallacy of this popular opinion is not only refuted by my own experience, but likewise by the observations of all those who have lived many years in districts where, as in Cumana, Quito, Peru, and Chili, the earth is frequently and violently agitated. I have felt earthquakes in clear air and a fresh east wind, as well as in rain and thunder storms. The regularity of the horary changes in the declination of the magnetic needle and in the atmospheric pressure remained undisturbed between the tropics on the days when earthquakes occurred.\* These facts agree with the observations made by Adolph Erman (in the temperate zone, on the 8th of March, 1829) on the occasion of an earthquake at Irkutsk, near the Lake of Baikal. During the violent earthquake of Cumana, on the 4th of November, 1799, I found the declination and the intensity of the magnetic force alike unchanged, but, to my surprise, the inclination of the needle was diminished about 48'.† There was no ground to suspect an error in the calculation, and yet, in the many other earthquakes which I have experienced on the elevated plateaux of Quito and Lima, the inclination as well as the other elements of terrestrial magnetism remained always unchanged. Although, in general, the processes at work within the interior of the earth may not be announced by any meteorological phenomena or any special appearance of the sky, it is, on the contrary, not improbable, as we shall soon see, that in cases of violent earthquakes some effect may be imparted to the atmosphere, in consequence of which they can not always act in a purely dynamic manner.

at the periods of the equinoxes. It is singular that Pliny, at the end of his fanciful theory of earthquakes, names the entire frightful phenomenon a subterranean storm; not so much in consequence of the rolling sound which frequently accompanies the shock, as because the elastic forces, concussive by their tension, accumulate in the interior of the earth when they are absent in the atmosphere! "Ventos in causa esse non dubium reor. Neque enim unquam intremiscunt terræ, nisi sopito mari, coeloque adeo tranquillo, ut volatus avium non pendeant, subtracto omni spiritu qui vehit; nec unquam nisi post ventos conditos, scilicet in venas et cavernas ejus occulto afflatu. Neque aliud est in terra tremor, quam in nube tonitruum; nec hiatus aliud quam cum fulmen erumpit, incluso spiritu luctante et ad libertatem exire nitente." (Plin., ii., 79.) The germs of almost every thing that has been observed or imagined on the causes of earthquakes, up to the present day, may be found in Seneca, *Nat. Quæst.*, vi., 4-31.

\* I have given proof that the course of the horary variations of the barometer is not affected before or after earthquakes, in my *Relat. Hist.*, t. i., p. 311 and 513.

† Humboldt, *Relat. Hist.*, t. i., p. 515-517.