Western migration of seismic oscillations with a period of 130 min after large earthquakes

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The structure of the pulsations with a period of 130 min is studied in greater detail from the records at dozens of IRIS broadband seismic stations located in the different regions of the world. The microseisms in the interval of the periods of about the seconds and the semidiurnal and diurnal oscillations were suppressed by Gaussian filters. The analysis of the records revealed wave trains with a period of $\sim$ 130 min caused by the earthquakes in Sumatra (December 26, 20014, M = 9.1), Chile (February 27, 2010, M = 8.8), and Tohoku, Japan (March 11, 2011, M = 9.0). Let us formulate the main properties of the studied oscillation trains known to date. At the stations located at an angular distance of 180° (in the opposite hemispheres), the oscillations appear simultaneously but have opposite polarities. This distinguishes them, e.g., from the radial mode 0S0 of the free oscillations of the Earth. At the same time, they emerge with a time shift in the records at the stations that are shifted in longitude. The velocity of the westward shift is 2.5° per hour. As a result, when the oscillations have the maximal amplitude at a certain time instant at a certain station, the oscillations at the station that is shifted by 90° in longitude are absent at this time and are most manifest 36 h (1.5 days) later. The oscillation trains are earlier recorded at the stations that are close to the epicenter and antipode of the epicenter of the earthquake. The amplitude of the oscillations in the wave trains is estimated at a few mm. With the increase in the distance of the station from the epicenter − epicenter's antipode axis, the trains are less pronounced. The wave trains presumably reflect the emergence of an area of the free postseismic flexural oscillations of the lithosphere. Let us approximate the structure of the pulsations by the model of decaying sine function. The vertical channel of the seismograph records the pulsation component normal to the Earth's surface, and, in the first approximation, the amplitude of the oscillations recorded by the station varies as the cosine of the angle (in longitude) between the station and the pulsation area which drifts westwards. The amplitude is maximal when the station is located above the area of the pulsations. The area of the emerged pulsations in the form of decaying sine function rotates with the Earth but delays relative to the Earth's surface rotation by 2.5° per hour due to the decelerating effect of the internal friction. As a result, seismic stations successively move closer to and farther from the location of the pulsation area, which is reflected in the migration of the oscillation trains.