The November 11, 2018 long-period-monotonic big earthquake occuring near Mayotte island off East Africa and seismic activity observed by the Iranian broadband seismic stations

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The 11 November 2018 Mayotte event (SEQ) was first introduced in the media by Maya Wei-Haas (2018) on National Geographic Magazine as a strange earthquake of which seismic waves were recorded by instruments around the world, but unusually nobody felt them. The Mayotte event in the absence of body waves caused long-duration, long-period surface waves traveling around the globe. Cesca et al. (2020) by analyzing regional and global seismic and deformation data suggested drainage of a deep magma reservoir. Tono Research Institute of Earthquake Science recorded the data with the broadband seismometer (STS-1) and gravimeter (gPhone) installed in Mizunami, Japan (Murakami et al., 2019). The records by Iranian broadband stations clearly showed the longperiod seismic signals around 10 (UTC) on November 11, 2018 (Figure 1). We studied records by 26 stations distributed throughout the country. The stations are operated by National Center of Broadband Seismic Network of Iran, International Institute of Earthquake Engineering and Seismology (IIEES). Since the frequency content of Fourier amplitude spectra appeared the signal of the surface waves as a peak around 0.06 Hz, we applied a bandpass filter of 0.05-0.07 Hz to the waveform data. To separate Rayleigh from love in surface waves, the filtered horizontal components were rotated to the radial and transverse components based on an assumed epicenter location at the latitude of 12.7S and longitude of 45.4E degrees. The stations considered as an array and the investigation was carried out in two ways. First, the position of each station was taken as the reference point of the array coordinate, and arrival delay times at the other stations relative to the reference were calculated. The phase velocity and the back-azimuth of each station were estimated through the least-square regression method. The estimated back azimuths were within 13 degrees from the back azimuths from the assumed epicenter. The average phase velocity for Rayleigh and Love phases are calculated as 2.97 and 3.31 km/sec, respectively. Second, we applied semblance analysis to six stations with the shortest spacing distances. However, the distance between the adjacent stations relative to the signal wavelength was not enough short to prevent spatial aliasing. Nevertheless, the interesting was that the semblance results were different for radial and transverse components. We calculated surface-wave magnitude (Ms) for the event and a number of recorded earthquakes occurring in the Mayotte area from May 13 to June 1, 2018. Linear regression was used to define relationships between the calculated Ms and the USGS body-wave magnitude (mb) and the local magnitude by BRGM catalog (Bertil et al. , 2019), and the moment magnitude (Mw) from the CMT solutions of HRVD and USGS.

Keywords: Mayotte island, very-long-period monotonic signal, Iranian broadband seismic stations

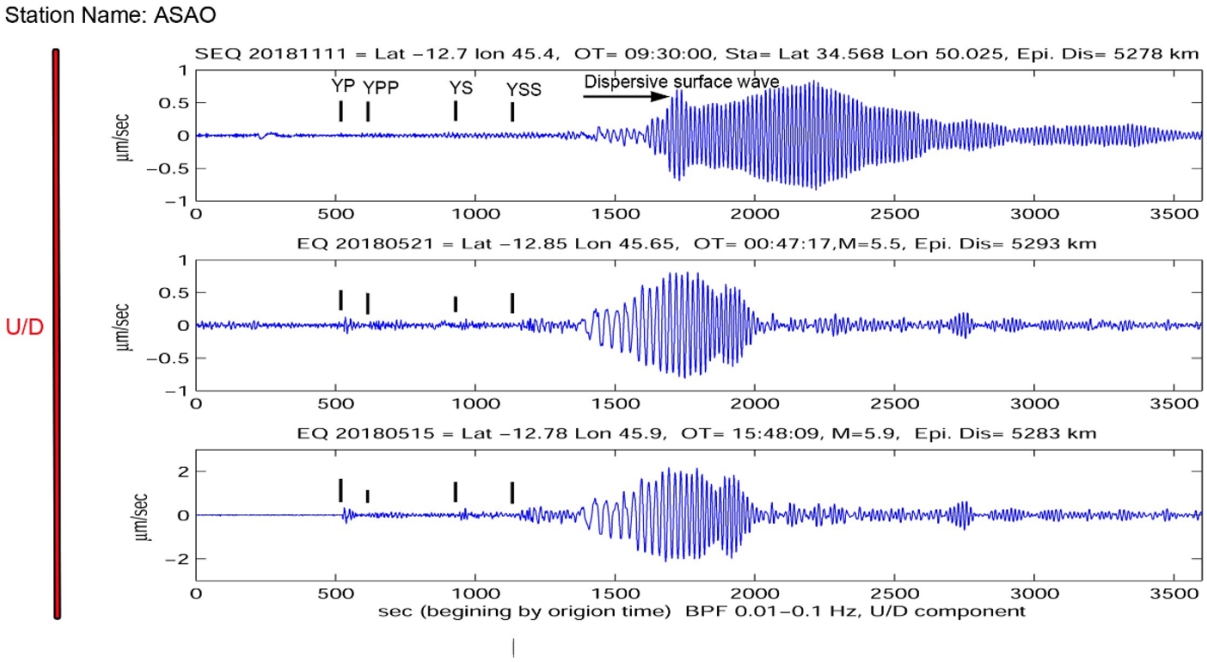

Figure 1. Comparison of the seismic waveforms of SEQ and two regular earthquakes, May-21 and May-15, 2018 observed by ASAO station in Iran. The seismic waves are filtered in the band 0.01 to 0.1 Hz. ↵

