Westward Propagation, intensification and Reflection of Lakshadweep Low and Its Variability in Propagation along the Indian Equatorial Wave Guide

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The westward propagation of Lakshadweep low (LL) from its region of genesis at the Lakshadweep Sea to the western boundary of the southern Arabian Sea and its eastward propagation along the Indian equatorial wave guide are examined. LL forms in the Lakshadweep Sea with its core at 8^{o}N/77^{o}E. Previous reports shows that the LL propagates westwards as it is from its region of genesis and dies out at the mid of Southern Arabian Sea. But from the analyses of Sea surface height (SSH), (1998-2005) anomalies and the subsurface potential temperature data (GODAS, reanalysis data 1998-2005) shows that the propagation of LL occurs in four sections. (1) The low propagates westwards along 8^{o}N latitude during the end of July up to 74^{o}E where it forms as a circular low in SSH during the end of August. This propagation is attributed to the westward propagating Rossby waves propagated from the coastally trapped Kelvin waves. (2), it shows a northward propagation with a small westward inclination and forms as a circular low at the location 9^{o}N/72^{o}E. (3), it propagates southwest ward along 70^{o}E longitude and forms as a circular low at 6^{o}N/67^{o}E. This southwest ward propagation is attributed to the equator ward flowing WICC during the region. Then it propagates westward approximately along 5^{o}N with a small southward inclination. The core of LL shifts from 6^{o}N to 5^{o}N when it reaches the location of annihilation 60^{o}E by the mid of December. Since its westward propagation in October, LL intensifies till to the mid of December and shows a weakening trend in intensity as well as in spatial spread. The mechanism for the intensification is examined. During its propagation multiple eddies forms along the southern Arabian Sea. From the analysis it is seen that cyclonic current shear created due to the northward gradient of the eastward flowing Wyrkti jet along the periphery of equator and the winter monsoon current seems to influence the intensification of LL and also to the multiple eddy formation. These multiple eddies with the progress of time merges with the core of LL and thereby increases the spatial spread and also plays a role in the intensification of LL. The cyclonic shear and SSH shows high correlation (-0.6 to -0.875) from September to December. Though the surface feature of LL dies out at ~60^{o}E the subsurface extension of the LL continues its propagation till the western coast of Arabian Sea. The subsurface portion of the eddy reflects back from the eastern coast of Somalia to the equatorial wave guide and propagates eastward as internal Kelvin waves with a speed of 0.28m/s on average and arrives at the eastern boundary of the Indian Ocean by March; where it propagates along the periphery of the Bay of Bengal as coastally trapped Kelvin waves. From surface to bottom the waves are seen to be propagated where the gradient of potential density stratification is maximum. From the analysis it is seen that the velocity of propagation shoots up (1.25m/s) when the wave crosses 65^{o}E longitude. This is attributed to the high density stratification occurring after 65^{o}E longitude due to the influx of low saline water from the Bay of Bengal. During IOD years the waves are not seen propagated across the wave guide.

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