Study of long term changes in the lower ionospheric parameter using the ionospheric D-region radio waves absorption are carried out using the data collected over Indian low latitude station i.e., Udaipur (Geo.Lat. 24.6° N, Geo. Long. 73.7° E) using A-1 Pulse HF Radio wave reflection method during year from 1972 to 1984. The monthly values of the ionospheric radio waves absorption data series for 12 years are generated for particular solar zenith angle as well as for fixed solar radio fluxes (solar activity) from adopting the appropriate regression analysis. The computed monthly absorption data at fixed solar zenith angles and at constant solar activity level are plotted with years for each month separately from year 1972 to 1984. The radio waves absorption in the ionospheric D-region is found to be decreased about 9 dB per decade in equinoxes months and about 4 dB per decade in winter months. In order to interpret the present finding, similar analysis from the measurement of sodium atmospheric airglow at 5890Å collected over mid latitude Japanese station Kiso and measurement of concentration of Atmospheric Carbon Dioxide data for the low latitude are also presented in the present papers. The observed decrease of radio waves absorption in the ionospheric – D-region is found to be associated with corresponding decrease of airglow intensity or reduction of mesospheric temperature and also enhancement of most positive radiative active and atmospheric trace gases like Carbon Dioxide.

1. Introduction:

Since the beginning of the year 1990’s, the extensive studies have been started on the long term trends and changes in several atmospheric parameters of several region of the earth’s atmosphere and solar geomagnetic parameters specifically over mid and high latitude stations. Basic observed in long term trend results like warming of earth’s surface, troposphere and stratosphere but in contrary, the cooling
Study of long term changes in several lower and upper atmospheric parameters over the different parts of the earth’s globe has attracted the lot of attention in recent decades due to its great importance and possible links with current scientific environmental issues of global climate changes. Extensive atmospheric modeling and experimental finding show that the increasing concentration of atmospheric green house gases due to both anthropogenic and natural activities cause a cooling of the lower and upper ionosphere and warming of troposphere. Serafimov and Serafimova suggested the measurements of HF radio waves absorption in the ionosphere would be the most sensitive indicators of possible climate changes in the ionosphere or possible anthropogenic influences on the mesosphere and lower thermosphere or ionospheric D-region. As HF radio waves absorptions basically depends upon electron density and electron-neutral collision frequency, which, in turns, is a function of neutral temperature and neutral density.