

ABSTRACT

The subject of this thesis is an experimental and theoretical investigation of ionospheric irregularities responsible for the scintillation of satellite signals in the vicinity of Jamaica. The experimental investigation involved a phenomenological study of the irregularity parameters, by the use of the spaced receiver method of Kent and Koster (1966), and a study of scintillation activity during near sunspot maximum periods (1967/8,1970). The results of the latter study were compared with those of a study by Chin (1967) during a near sunspot minimum period (1964/6) to determine the extent of the solar cycle control of scintillation activity. The theoretical investigation involved a comparison between observations and various theories explaining the origin of irregularities causing scintillation. It was found that one theory, that of a plasma instability mechanism proposed by Reid (1968) and modified qualitatively by the author, can explain most of the properties of the irregularities in the vicinity of Jamaica. In particular this theory explains the magnetic field line connection between F-region scintillation and ionospheric conditions causing spread E which appears to exist in the vicinity of Jamaica.