# A Novel Method To Analyze Ionospheric Measurements made by a Non-uniformly Contaminated Langmuir Probe On-board a Sounding Rocket

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Langmuir probe onboard a sounding rocket is one of the most widely used technique to make in-situ measurements of the temperature and density of the ionosphere. The design simplicity of this technique is offset by the challenge of accurately deriving density and temperature from the current measurements. One such problem which is frequently seen on lot of space flights is the problem of surface non-uniformity, resulting from in-flight contamination. In this paper, we derive a first principle based current collection theory to describe current collection under non-uniform surface conditions. We describe the applicability and necessity of this theory by using data from a contaminated Langmuir probe onboard a NASA sounding rocket named, `Investigation of Mid Latitude Ionospheric Irregularities Associated with Terrestrial Weather Systems', abbreviated as 'STORMS'.

This sounding rocket mission, in-addition to surface contamination, experienced several other complications like spacecraft wake effects, spacecraft coning. We demonstrate how we can successfully derive density and temperatures from the contaminated probe in-spite of the various above mentioned in-flight complications.

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