Design and development of a miniature metrology suite for future Planetary balloon missions

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The metrology of any planetary body gives a wide range of information about the planets dynamics, habitability and various important atmospheric parameters. Measurement of metrology includes parameters such as temperature, pressure, ambient light and trace gases, for example, these measurements of these important parameters for modelling the cloud dynamics and atmospheric processes prevailing at Venus.

Instrumentation for planetary missions are always challenging due to mass and power constraints. We are developing a miniaturised metrology suite capable of measuring temperature, pressure, and ambient light, all integrated in a small package. This suite can detect ambient temperatures in the wide range of -250^0C to 250^0C. The pressure sensor operates over the range of 300 to 1100 mbar. The ambient light measurements can be carried out for various sky intensities from night to bright day light owing to its high dynamic range. The suite is a single board computer comprising of the sensors, their signal conditioning, processing electronics and communication, all together in a miniaturised single package. The sensor selection, electronics design, and mechanical housing all were made keeping in mind the miniaturization aspect of the instrument. The design aspects of the suite and its evaluation results will be presented.