

EARTH OBSERVATION SYMPOSIUM (B1)  
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MODEL AND SIMULATION OF HIGH ALTITUDE SOUNDING BALLOONS: DYNAMICS,  
STRESS-STRAIN AND THERMAL ANALYSIS

**Abstract**

Dynamic models describing the ascent and descent of sounding balloons and their payloads as well as experimental results of an actual flight that occurred over the State of Guanajuato in Mexico are presented. The first model describes the overall aerodynamics of the flight including a fined description of the interaction of the balloon with the atmosphere. A second model focusing on mechanical aspects of the balloon intends to predict the maximum reached altitude before bursting. The behavior of the balloon walls during flight and the time at burst were obtained from a detailed stress and strain analysis. The results are compared against those derived from a classic approach applied to hyperelastic materials. The basic model depends on the balloon radius at take-off and the initial quantity of lifting gas.