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Aerobraking - An activity on the border betweeen science and engineering

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Aeorbraking is a technique whereby an orbiting spacecraft is slowed down by the drag of a planetary atmosphere against the surfaces of a spacecraft. It has been applied only few times in the past in order to lower the orbit around a planet, notably on Mars and on Venus. A properly designed aerobraking campaign can save significant amounts of fuel that otherwise would have to be used to achieve an equivalent orbit change, and so can enable missions that would not be possible with conventional orbit modification by thrusters. During the passage through the upper atmosphere very valuable data on the local density can be collected through the use of standard AOCS accelerometers and gyros. From these data local temperature and pressure can be derived. Variations can be studied at small scales and over a large range of altitudes. Such data are difficult or impossible to collect with remote means. Venus Express has now entered its last year of operations, limited by its available fuel, and in June-July this year a tree weeks long campaign of aerobraking will be performed. This presentation will cover the fundamentals of aerobraking and the expected science products from this campaign.