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Global Atmospheric Models for Cosmic Ray Detectors

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A good knowledge of atmospheric parameters is necessary for the reconstruction of air showers, especially with the fluorescence technique. The Global Data Assimilation System (GDAS) provides altitude-dependent profiles of temperature, pressure, humidity and several other state variables. Every three hours, a new data set is available for the entire globe. These GDAS data are now used in the standard air shower reconstruction for the Pierre Auger Observatory. The validity of the data was verified through comparisons with monthly models that were averaged from on-site meteorological radio soundings and weather station measurements obtained at the Observatory in Malargüe. Comparisons of reconstructions using the GDAS data and the monthly models are also presented. Since GDAS is a global model, the data can potentially be used for other cosmic and gamma ray detectors and several studies were already done or are underway for several locations worldwide.

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