



BrO and NO₂ measurements during the MANTRA 2004 campaign: comparisons with co-located ACE and ENVISAT satellite measurements

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Validation of satellite measurements is an important and challenging exercise. In the case of NO₂ and BrO, this activity is particularly difficult given that both species have a significant diurnal variability and that the independent measurements to be used for the validation activity are often not co-located in time with the satellite measurements. Models can be used to reconcile the timing of the measurements, but the small number of available measurements remains a major problem for many validation activities. Most frequently, information about the vertical distribution of the species in question is required and although this information can be obtained from balloon measurements, balloon flights are rather rare and normally do not span all the desired seasons and locations. Ground-based measurements are more regular but although they may contain information about the vertical distribution of the species in question, this is usually at low vertical resolution. Therefore, opportunities when co-located ground-based and balloon measurements are available become particularly useful for validation activities: the balloon-based profile can be used to assess the ground-based retrieval at the

same time as the satellite profiles. In addition, the ground-based measurements may span many days, thereby enhancing the likelihood of co-locations with the satellite observations. In this paper we present comparisons of NO_2 and BrO vertical distributions measured from a balloon-borne SAOZ instrument, from ground-based zenith-sky spectrometers, and from two satellites: ACE and ENVISAT. The balloon and ground-based measurements were taken from mid-latitude during summer as part of the MANTRA 2004 campaign.