Title:	Tropospheric Ozone Assessment Report: Database and metrics data of global surface ozone observations
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Abstract:	In support of the first Tropospheric Ozone Assessment Report (TOAR) a relational database of global surface ozone observations has been developed and populated with hourly measurement data and enhanced metadata. A comprehensive suite of ozone data products including standard statistics, health and vegetation impact metrics, and trend information, are made available through a common data portal and a web interface. These data form the basis of the TOAR analyses focusing on human health, vegetation, and climate relevant ozone issues, which are part of this special feature. Cooperation among many data centers and individual researchers worldwide made it possible to build the world's largest collection of in-situ hourly surface ozone data covering the period from 1970 to 2015. By combining the data from almost 10,000 measurement sites around the world with global metadata information, new analyses of surface ozone have become possible, such as the first globally consistent characterisations of measurement sites as either urban or rural/remote. Exploitation of these global metadata allows for new insights into the global distribution, and seasonal and long-term changes of tropospheric ozone and they enable TOAR to perform the first, globally consistent analysis of present-day ozone concentrations and recent ozone changes with relevance to health, agriculture, and climate. Considerable effort was made to harmonize and synthesize data formats and metadata information from various networks and individual data submissions. Extensive quality control was applied to identify questionable and erroneous data, including changes in apparent instrument offsets or calibrations. Such data were excluded from TOAR data products. Limitations of a posteriori data quality assurance are discussed. As a result of the work presented here, global coverage of surface ozone data for scientific analysis has been significantly extended. Yet, large gaps remain in the surface observation network both in terms of regions without monitoring, and in terms of regions that have monitoring programs but no public access to the data archive. Therefore future improvements to the database will require not only improved data harmonization, but also expanded data sharing and increased monitoring in data-sparse regions.
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