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Global radiation maps by satellite climatologies. Exploring their diversity, including impacts attributed to clouds and ancillary data.

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The monitoring of decadal change for solar and infrared broadband radiation maps at the top of the atmosphere (ToA) and at the Earth's surface is a desirable tool to assess the overall impact of atmospheric change on climate. Satellite data going back to 1984 have been combined and interpreted to provide such decadal maps as part of the ISCCP and SRB projects. In addition, for the last ten years also maps linked to broadband radiation measurements by the CERES sensor have become available. Samples of time series and seasonal and monthly data of multi-annual averages are compared among the three data-sets. While there is reasonable agreement at the top of the atmosphere, there is increased diversity at the surface, as it requires accurate knowledge about atmospheric and environmental properties. Differences are largely driven by the assumed cloud properties. For instance, CERES clouds seem to cool the atmosphere, while ISCCP and SRB tend to heat the atmosphere. However, not only assumed cloud-properties but also ancillary data (e.g. aerosol, surface properties) need to be revisited, especially in the context of the planned ISCCP reprocessing.