BSRN as reference

revealing biases in CERES, ISCCP, SRB data and CMIP3 modeling

Stefan Kinne and Ehrhard Raschke

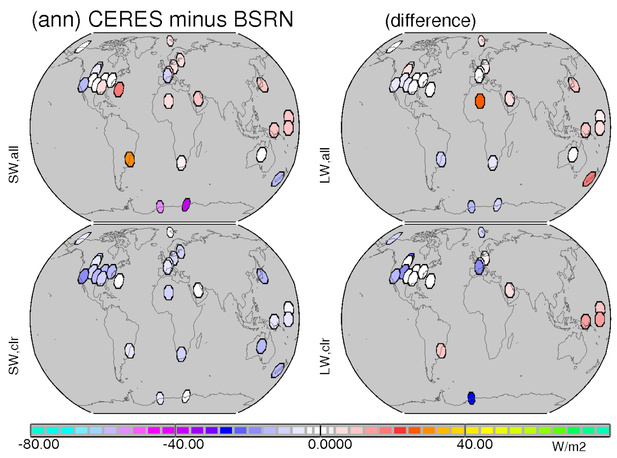
Questions

How well are aerosol treated ? (examine bias for shortwave (SW) clear-sky fluxes at the surface , **SW-dn_clr**)
Are cloud radiative effects well represented ? (compare SW all-sky **SW-dn** and clear-sky, **SW-dn_clr** bias)
Is the Greenhouse effect treated correctly ? A(examine gthe LW re-radiation to the surface **SW-dn (_clr)**)

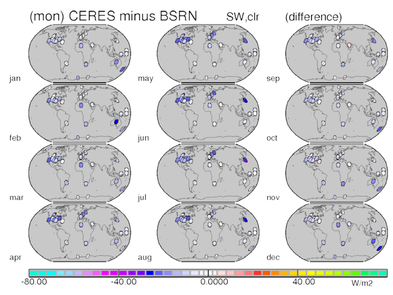
Tested Data-Sets

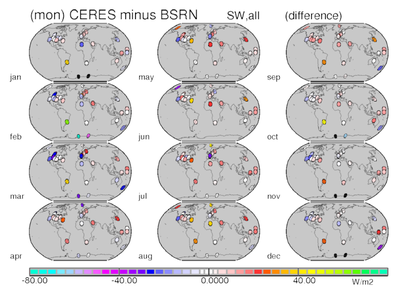
(satellite) observations:	CERES, ISCCP and SRB	**SW-dn, SW-dn_clr, LW-dn, LW-dn_clr**	(2000-2003 period)
climate modeling:	CMIP3 / IPCC4 ensemble	**SW-dn, SW-dn_clr, LW-dn, LW-dn_clr**	(1980-1999 period)

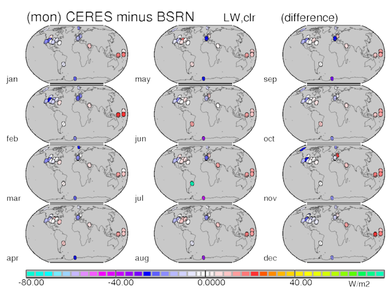
Differences to BSRN (displayed biases by color : too small too large)

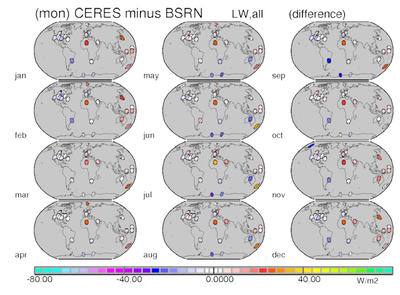


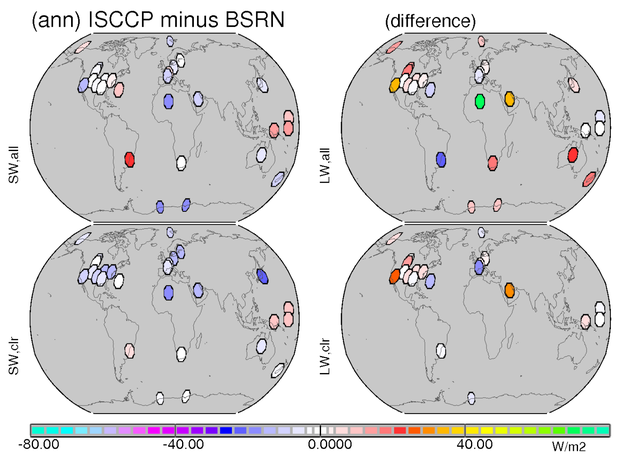
CERES …aerosol attenuation is to strong but cloud effect are way to weak (high bias for solar all-sky)., trace-gas greenhouse too high in the tropics



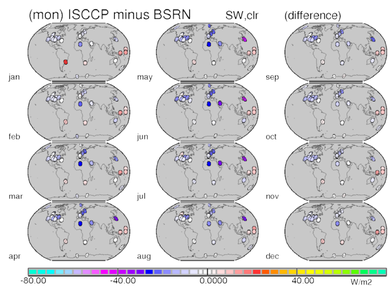


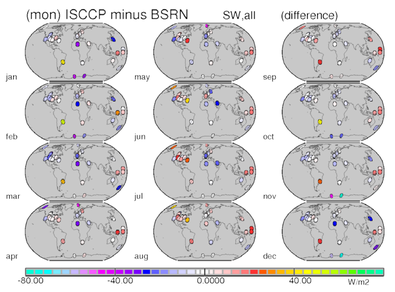


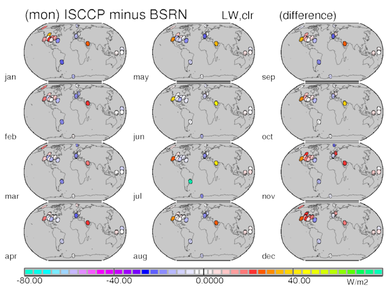


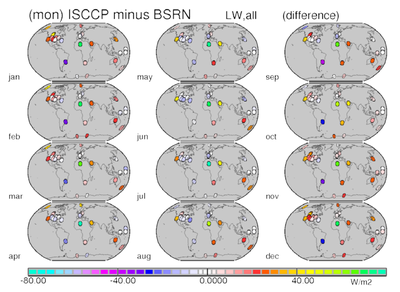


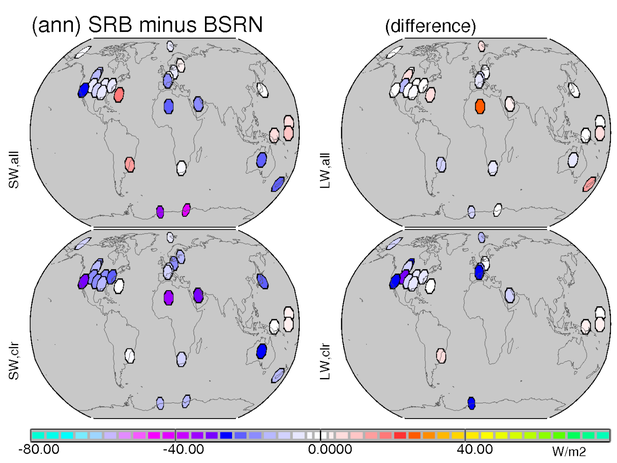
ISCCP …aerosol attenuation is too strong for NH pollution but too small for trop. biomass, cloud effects are relatively small, GH is too strong near deserts



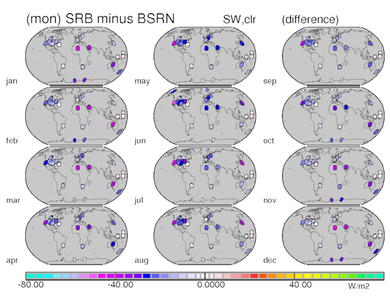


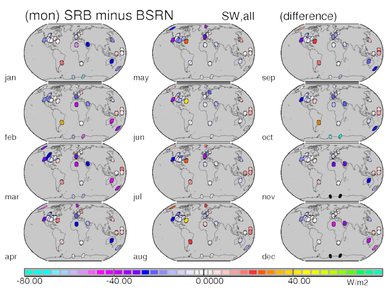


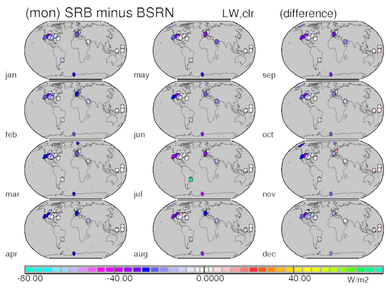


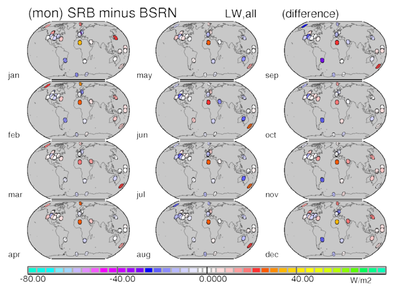


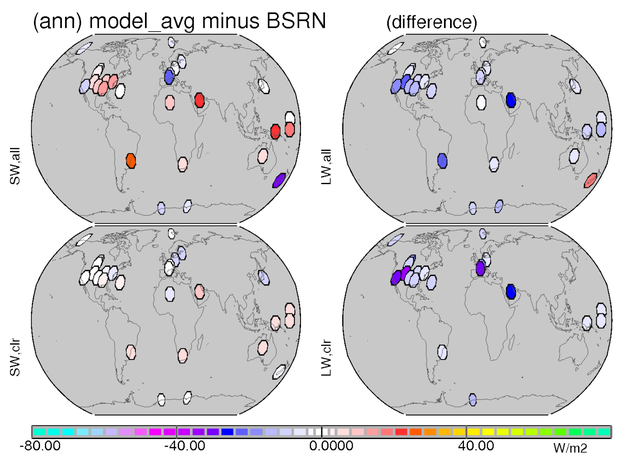
SRB …aerosol attenuation is too strong biy partially offset weaker cloud effects, the relatively weak trace gas GH is balanced by a stronger cloud GH



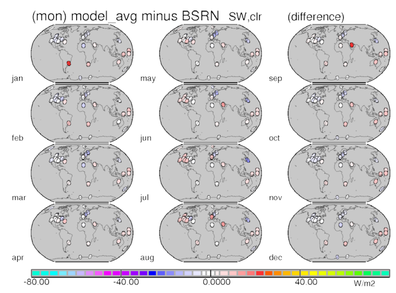


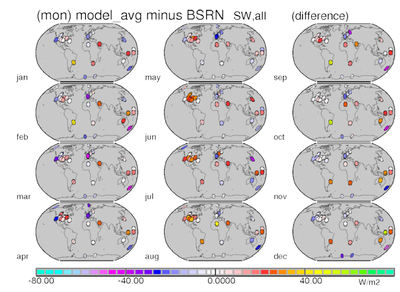


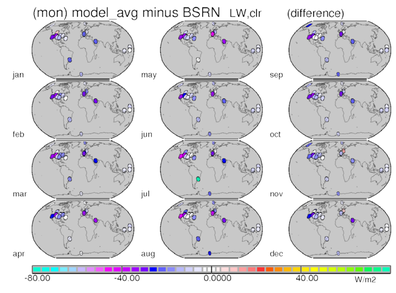


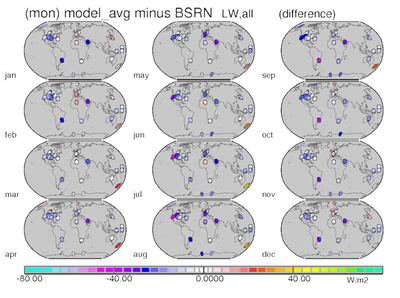


modeling …aerosol is captured well, clouds effects are relatively weak (except for EU,NZ), the trace-gas greenhouse effect is too weak









Take home messages

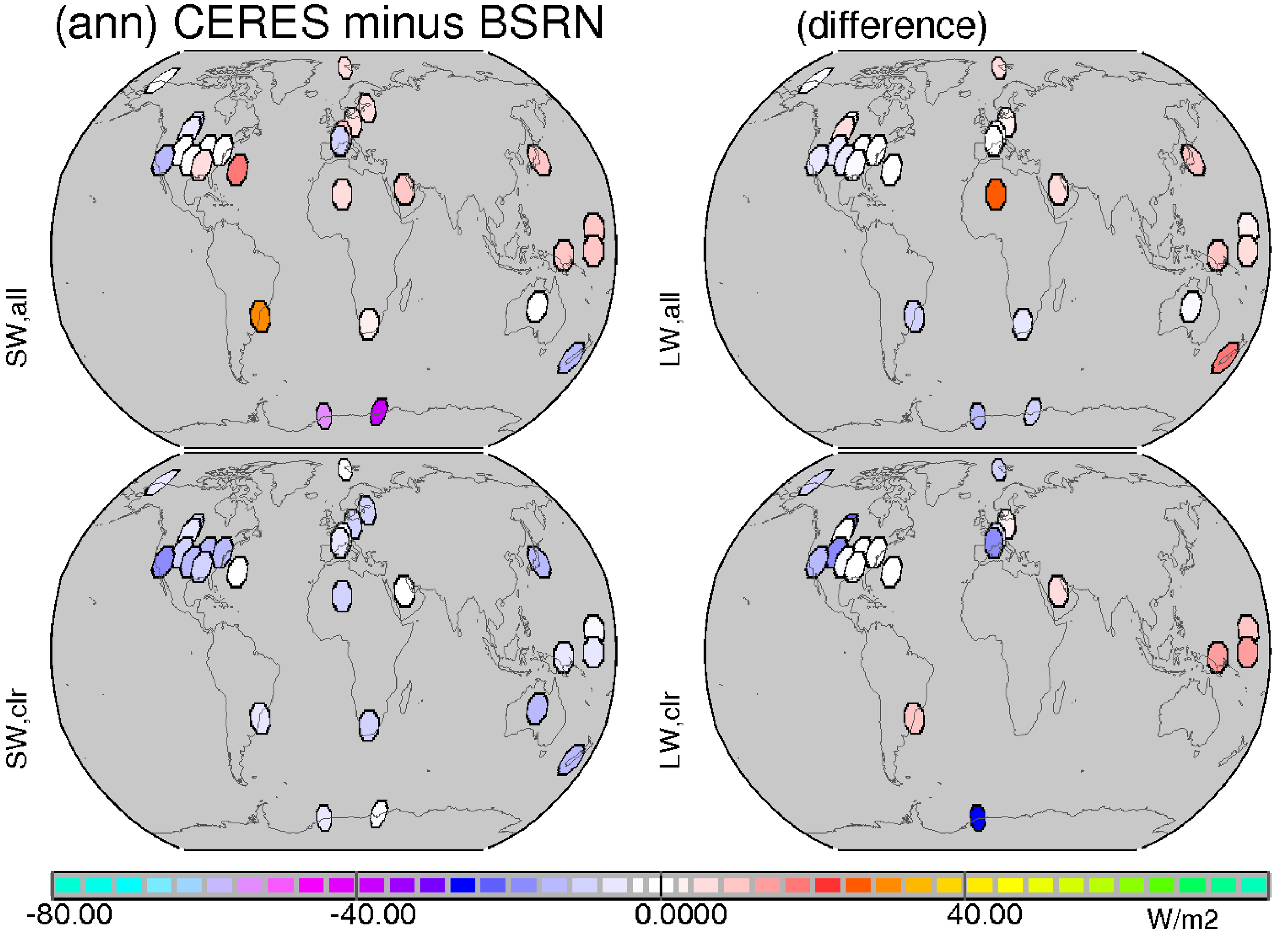
the aerosol solar radiative effect is usually overestimated in satellite data-sets
the cloud radiative effect is relatively weak in modeling and satellite data-sets, especially for CERES data
the Greenhouse effect is relatively strong also due to missing dust LW effect – except for/in ISCCP
the spatial reference data coverage (regionally representative? tested?) remains poor - especially over oceans

Max-Planck-Institut für Meteorologie

Universität Hamburg
DER FORSCHUNG | DER LEHRE | DER BILDUNG

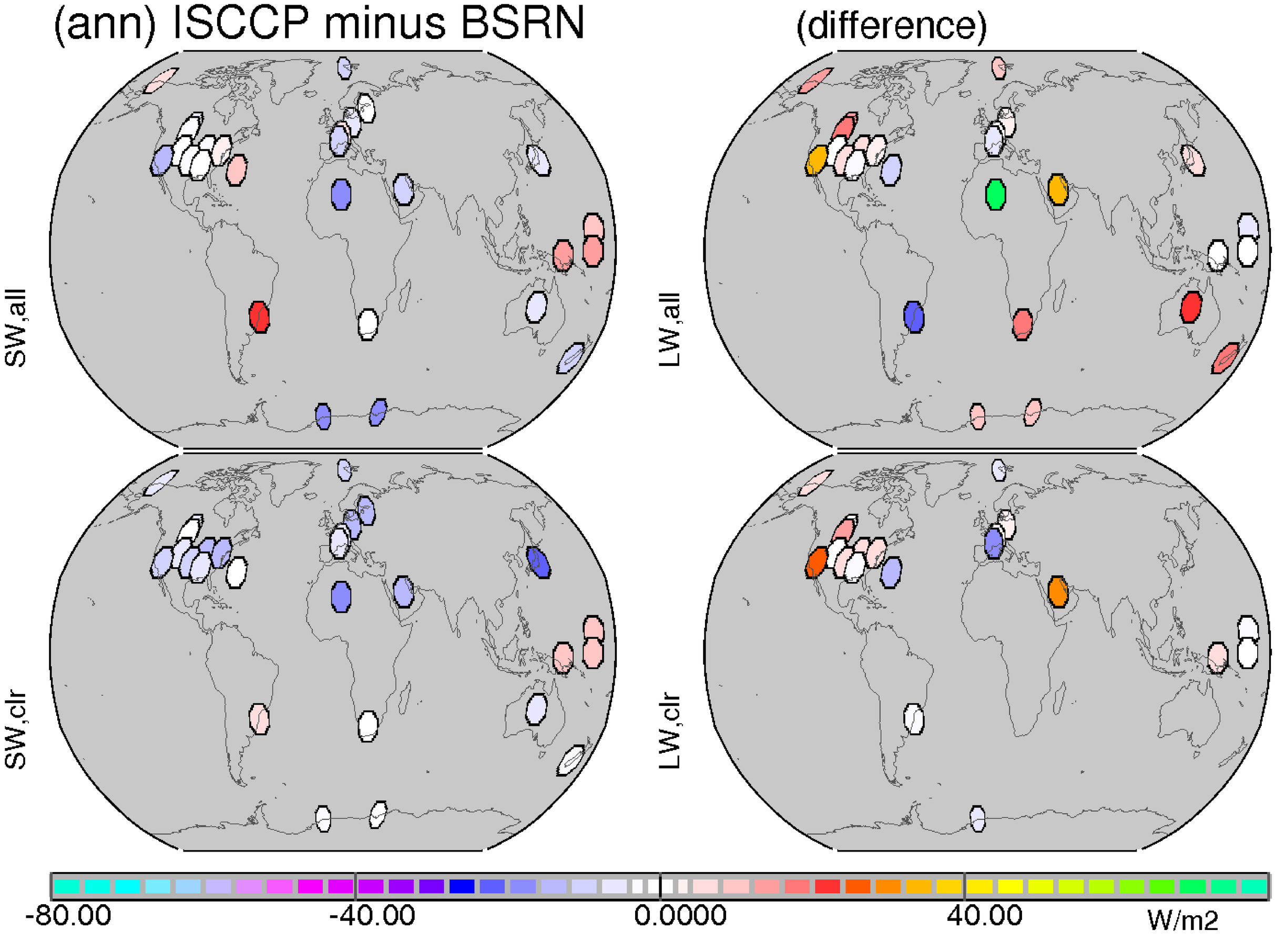
annual CERES biases

underestimates **overestimates**



annual ISCCP biases

underestimates **overestimates**



annual SRB biases

underestimates **overestimates**