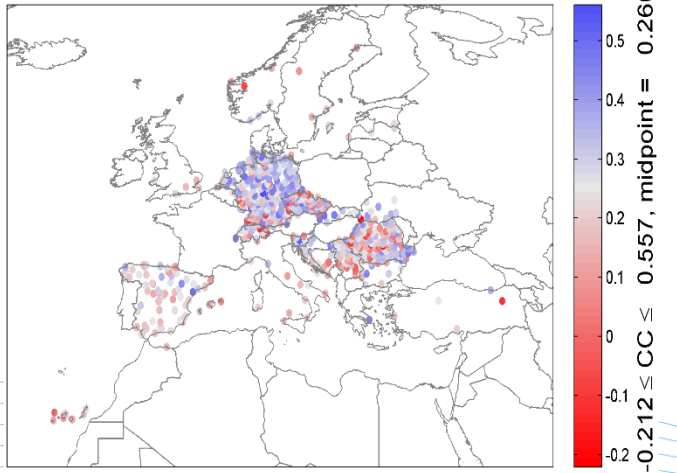


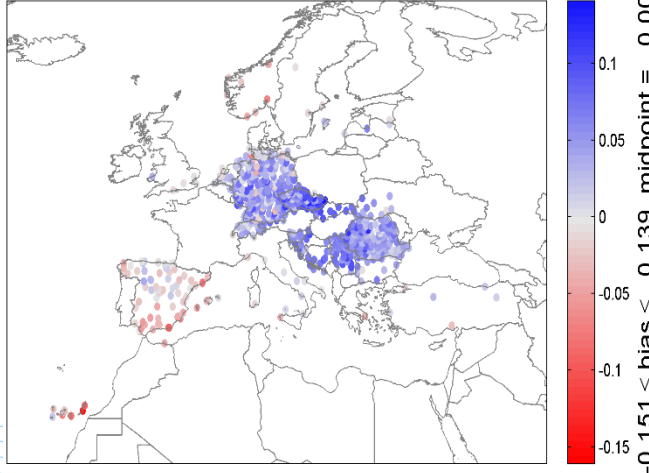


Sunshine-duration AOD vs ECHAM over Europe: brightening period (1985-2014)

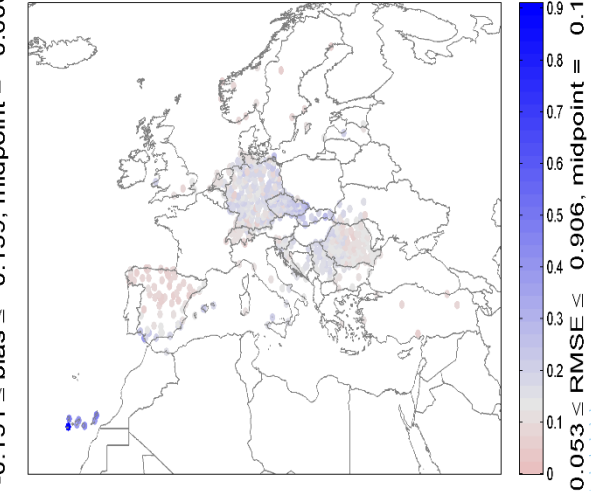
AOD at 750 nm: Corr. Coef.; 772 stations; [1985-2014]



AOD at 750 nm: Bias; 772 stations; [1985-2014]



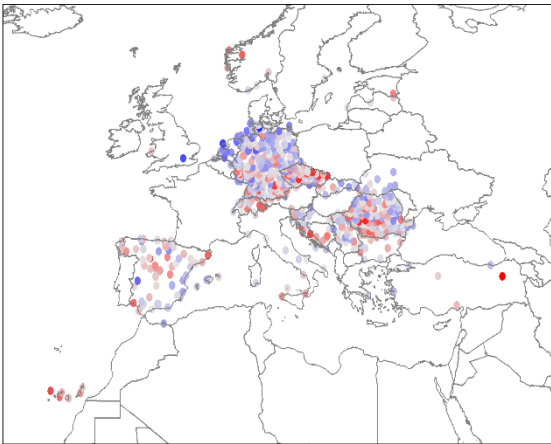
AOD at 750 nm: RMSE; 772 stations; [1985-2014]



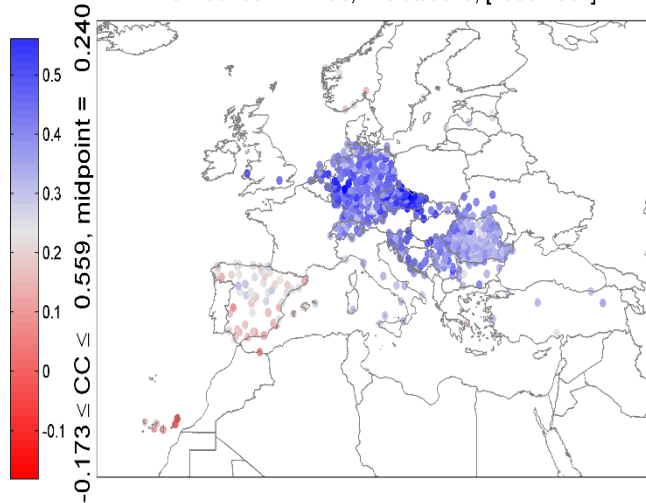
- Reasonable agreement between ECHAM simulations and SD-AOD retrievals
- Regional differences between Middle and Southern Europe probably due to dust emissions
- AOD in Middle Europe is mainly driven by SO₄ and water whereas in the Southern Europe also dust, sea salt and BC have a clear impact

Sunshine-duration AOD vs ECHAM over Europe: dimming period (1955-1984)

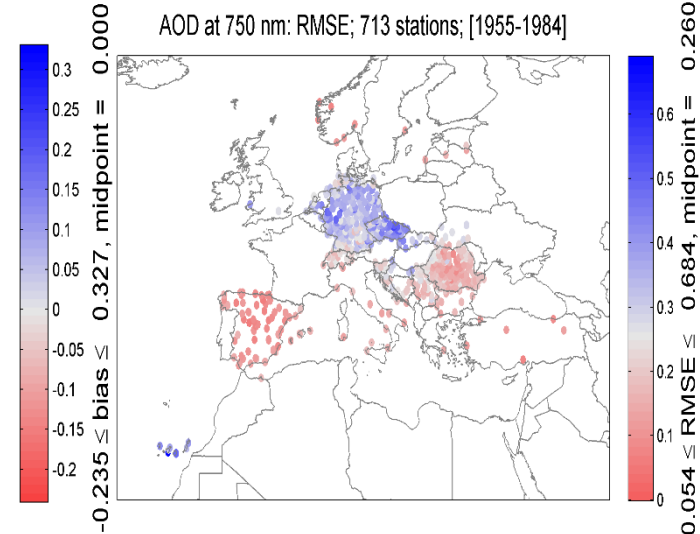
AOD at 750 nm: Corr. Coef.; 713 stations; [1955-1984]



AOD at 750 nm: Bias; 713 stations; [1955-1984]



AOD at 750 nm: RMSE; 713 stations; [1955-1984]

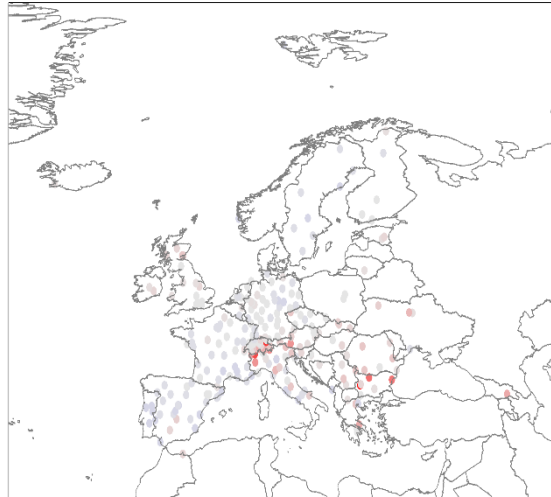


- The performances depends on the time period

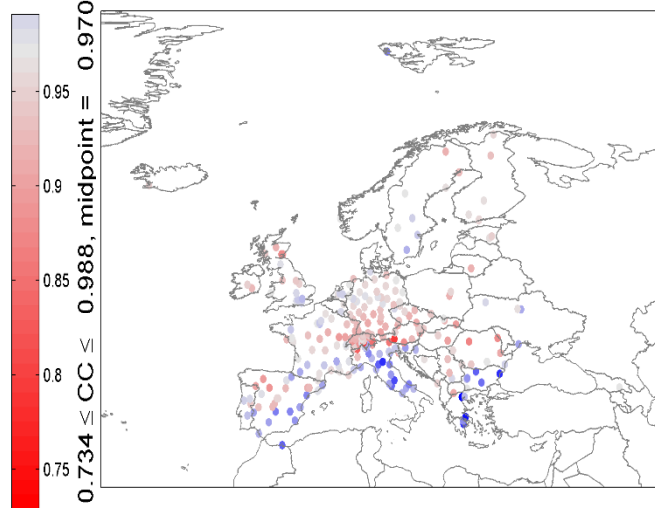


GEBA vs ECHAM irradiances over Europe: brightening period (1985-2014)

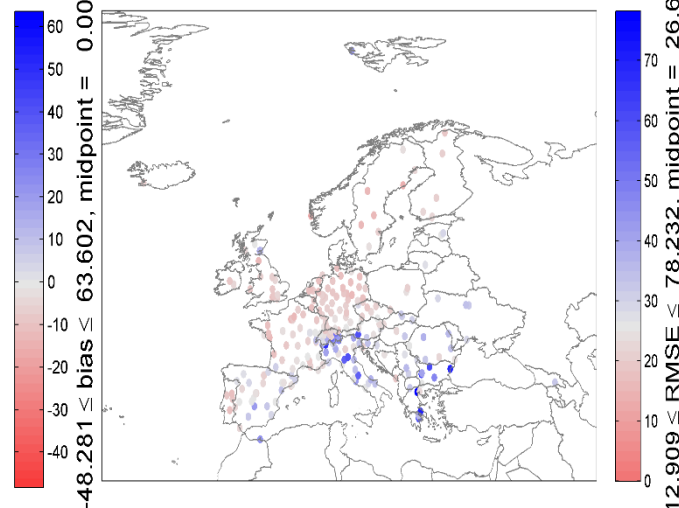
Monthly-mean ($W m^{-2}$): Corr. Coef.; 276 stations; [1985-2014]



Monthly-mean ($W m^{-2}$): Bias; 276 stations; [1985-2014]



Monthly-mean ($W m^{-2}$): RMSE; 276 stations; [1985-2014]

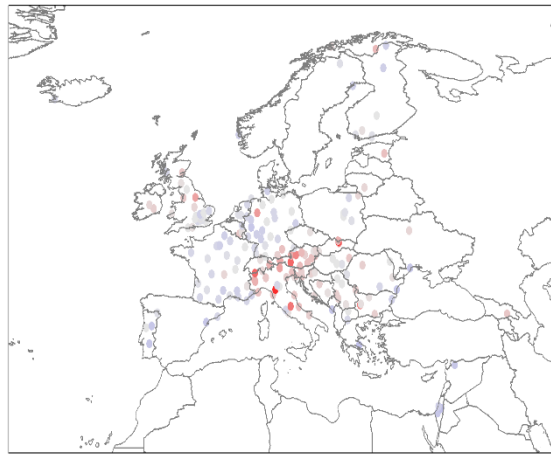


- Reasonable agreement between ECHAM simulations and ground-based observations
- Gradual regional differences between North, Middle and Southern Europe

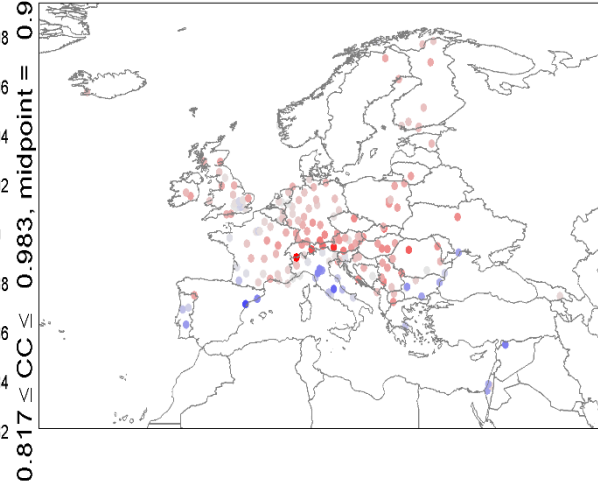


GEBA vs ECHAM irradiances over Europe: dimming period (1954-1985)

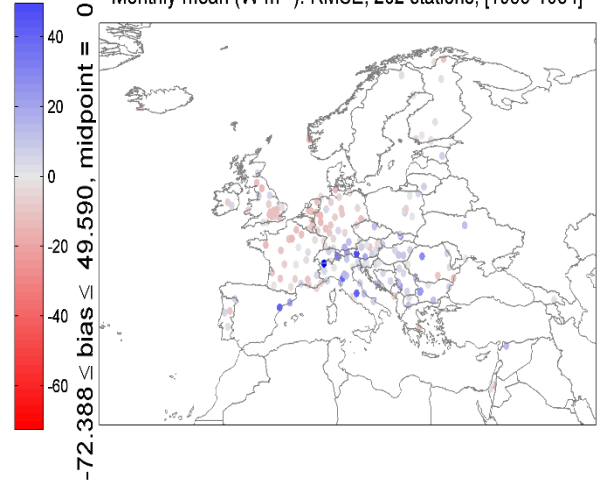
Monthly-mean ($W m^{-2}$): Corr. Coef.; 202 stations; [1955-1984]



Monthly-mean ($W m^{-2}$): Bias; 202 stations; [1955-1984]



Monthly-mean ($W m^{-2}$): RMSE; 202 stations; [1955-1984]



- The performances depends on the time period



○ Conclusions and *perspectives*

- Comparisons on AOD and irradiances have been carried out between ECHAM simulations and SD-AOD retrievals and GEBA measurements
- Reasonable agreement depending on the regions due to spatial and temporal AOD.
- Clear influence of dust emissions possibly not very well taking into account in ECHAM
- *Further investigations should be done to explain discrepancies on AOD and SSR*
- *Extension of the study as many sites as possible in other regions of the world such as Africa, America (North & South), Australia and Asia.*
- *Comparing results with other findings from the literature*