

Solar Forcing for CMIP6

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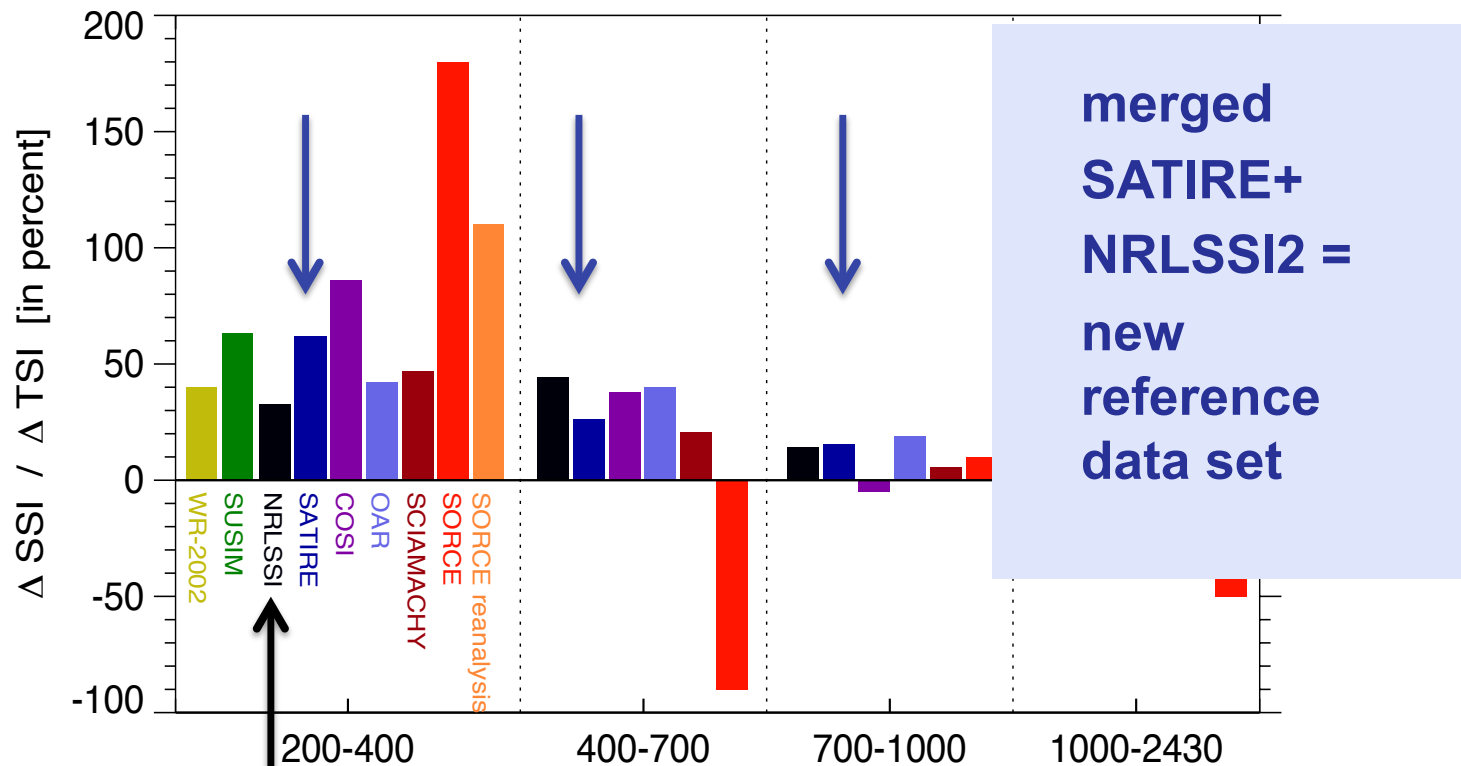
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Overview

- New reference SSI/TSI (and particle) forcing
- Future solar (SSI and particle) forcing
- Final comments (solar forcing in PI control, solar ozone forcing)

New SSI Reference!

Relative Contribution to TSI

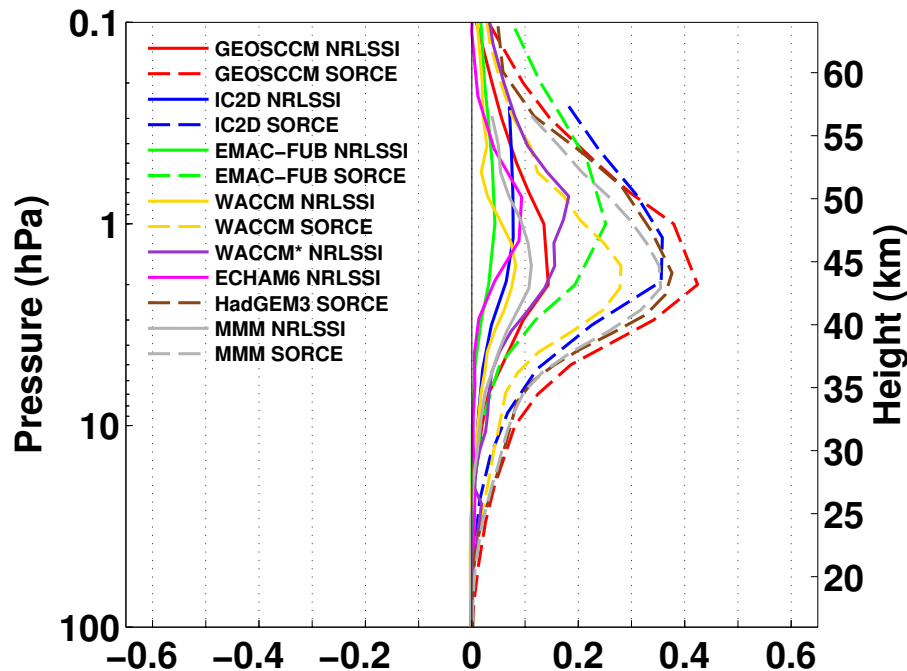


NRLSSI1 = standard so far (CMIP5, CCMVal, CCMI)

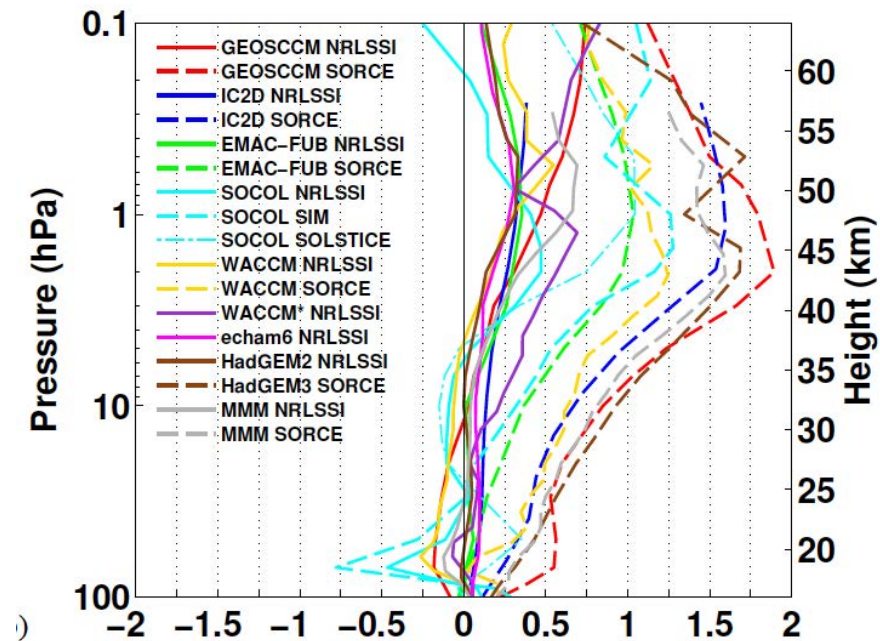
SSI Impact on Atmospheric Response

Solid - NRLSSI Dashed - SORCE

Shortwave Heating Rate

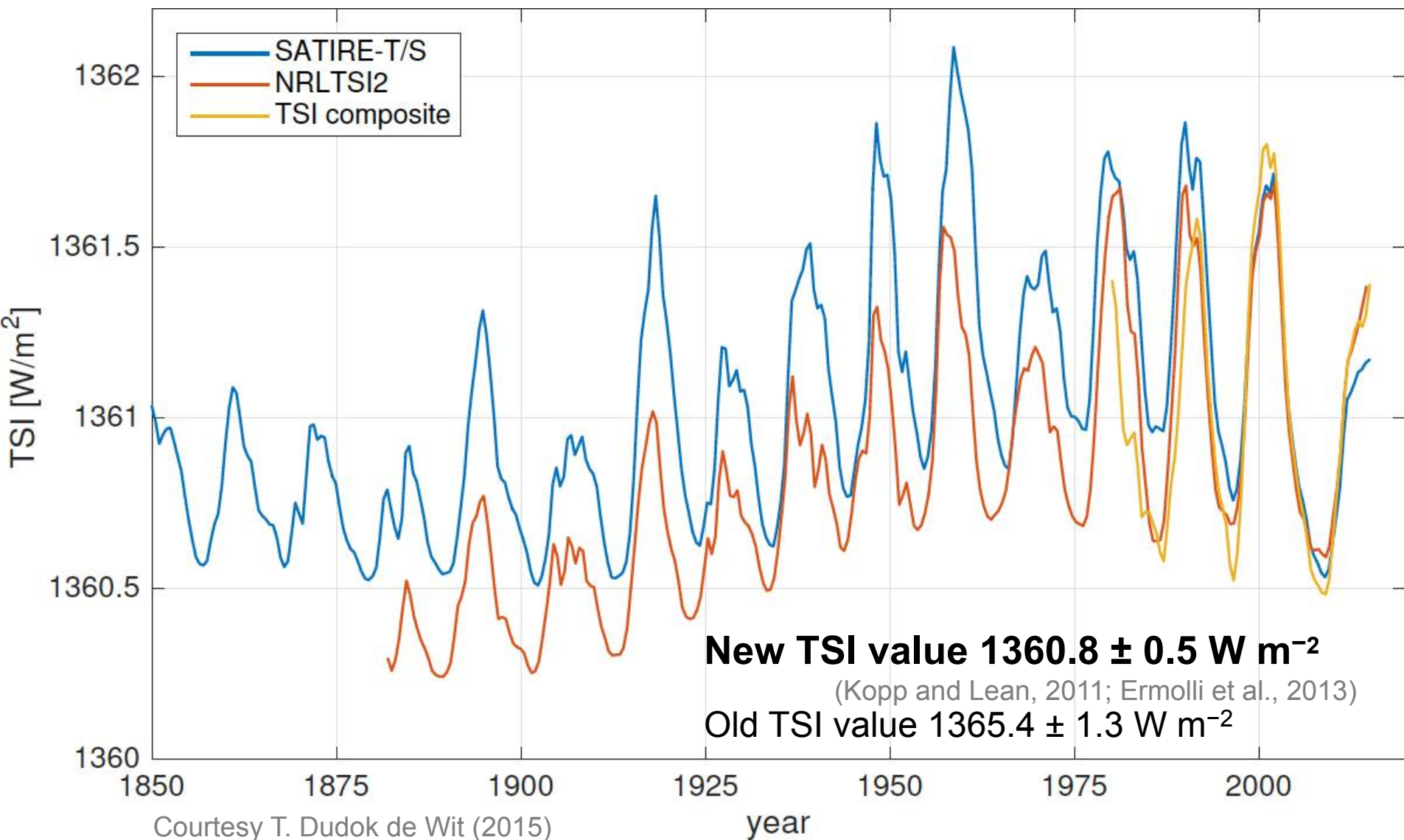


Temperature



Stronger SSI forcing leads to stronger SW HR and temperature response!

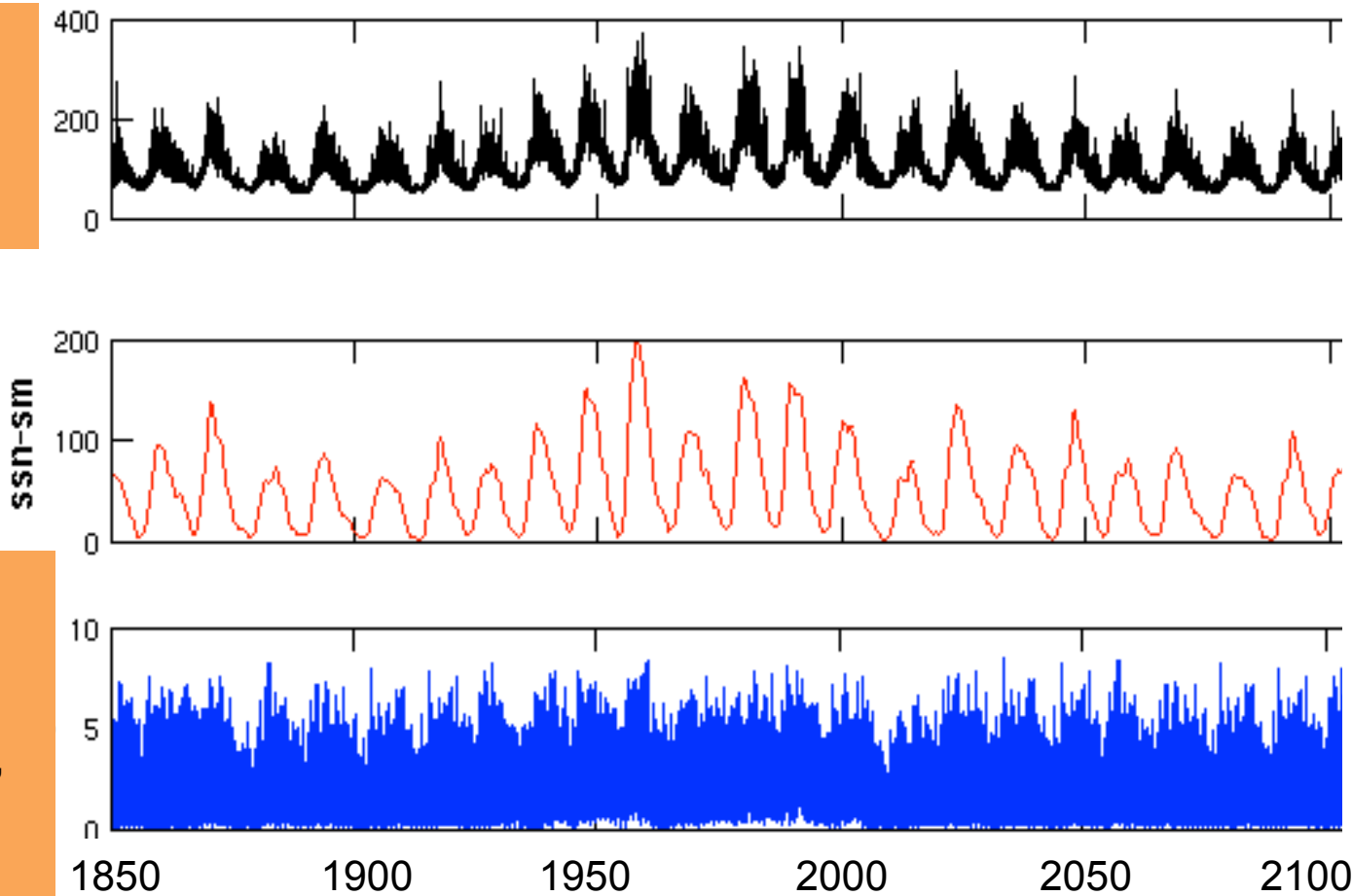
New TSI Reference Value





New CMIP6 Reference Dataset

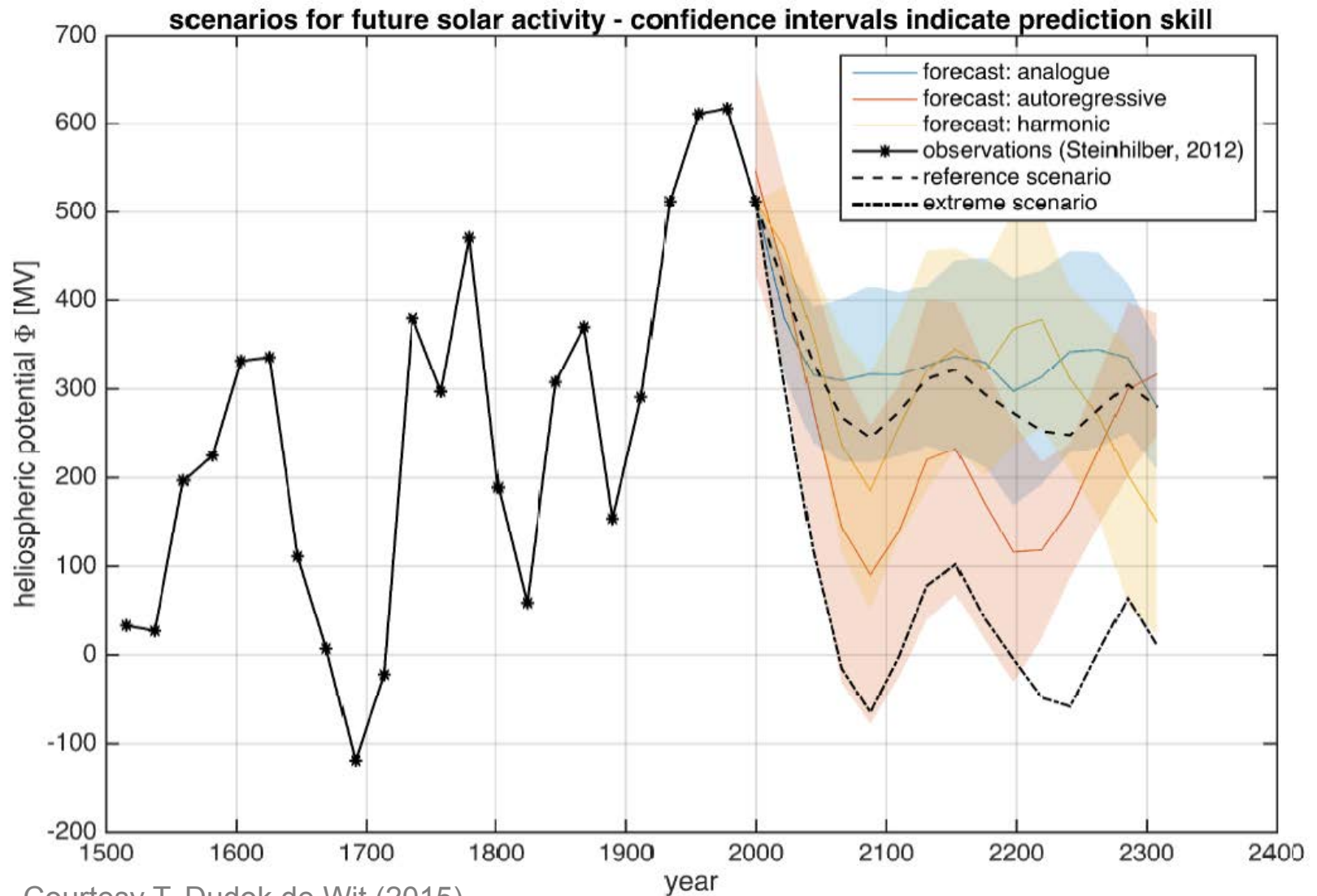
radiative
forcing:
TSI, SSI,
F10.7cm



particle
forcing:
auroral
electrons,
solar
protons,
galactic
cosmic
rays

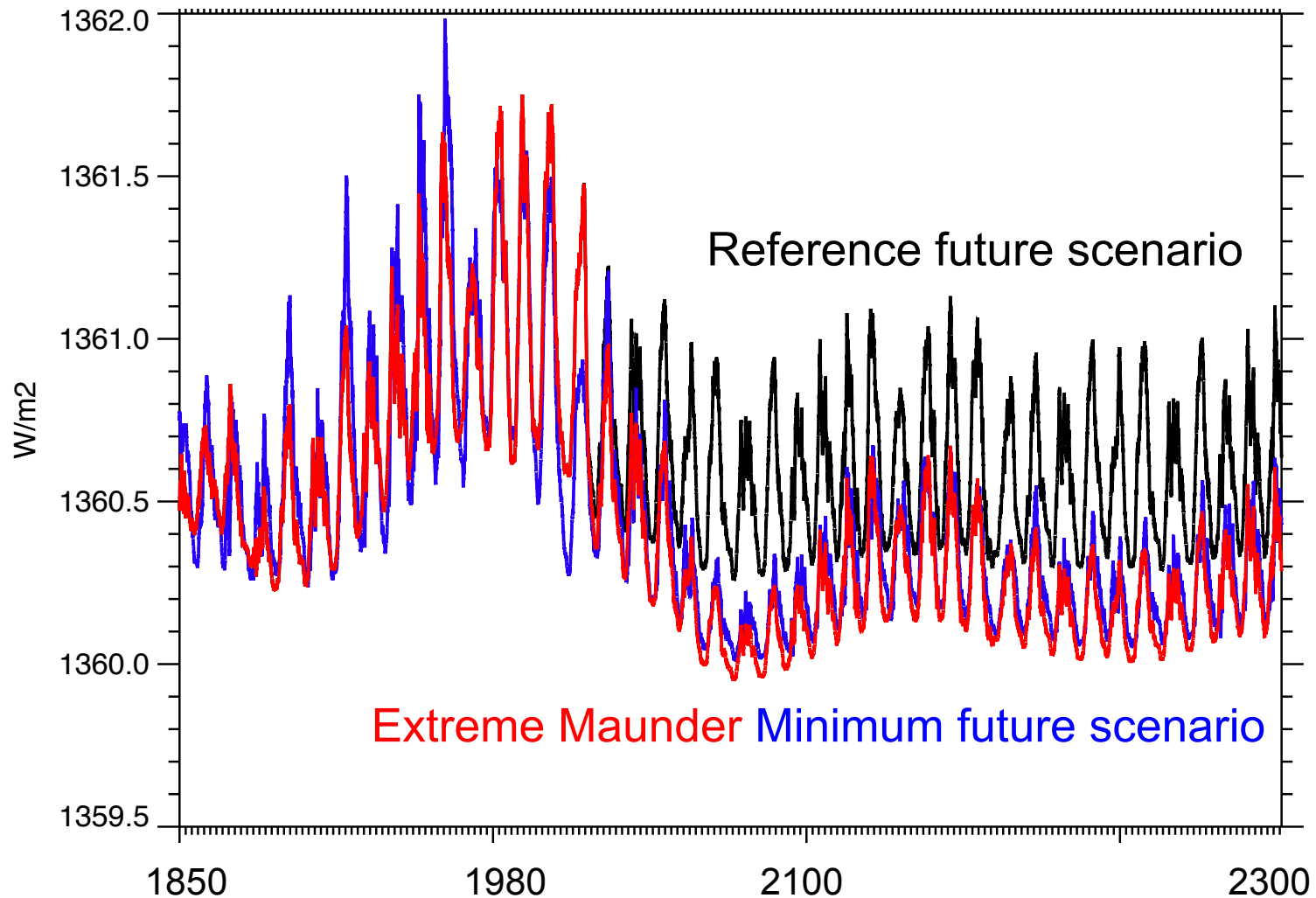
CMIP6 solar forcing: one netcdf file
SSI, TSI, F10.7cm, kp, ap, GCR, protons
daily resolution, 1850-2300, 2 scenarios (ref, extreme min)

Two Future Scenarios

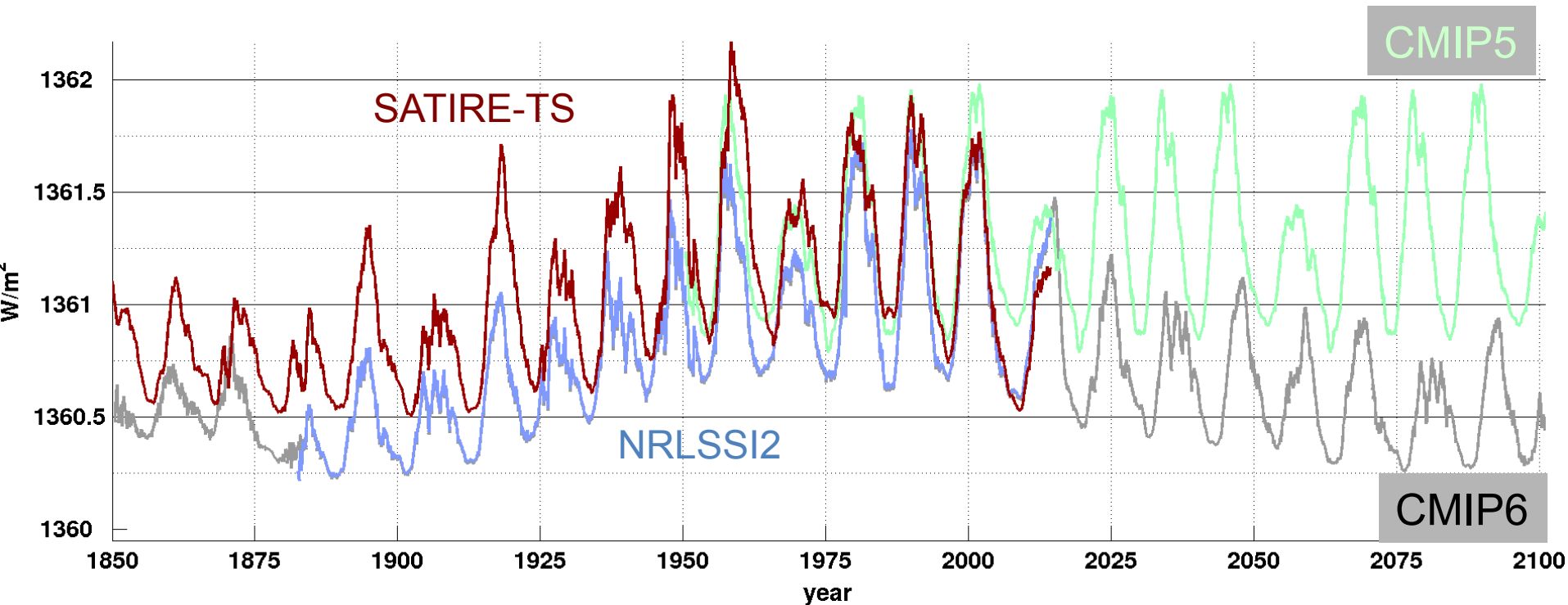


Courtesy T. Dudok de Wit (2015)

Two Future Scenarios



CMIP6 Solar Forcing



Current status CMIP6 solar forcing dataset:

Option1: Reconstruction based on empirical scaling (sunspot number – solar modulation potential) (ready, grey curve above)

Option2: Merged SSI/TSI dataset from NRLSSI2 and SATIRE-S models (SATIRE-S ready, NRLSSI2 almost)

Summary

- New reference SSI/TSI (+particle forcing) dataset ready by January 1st 2016 (1nm, daily resolution, 1850-2300, one netcdf file)
- Will be validated in Ibl and climate model simulations (part of CMIP6 solar forcing special issue)

Final Remarks

- **Solar forcing for PI control experiment:**
 - ✧ **One constant value for TSI and SSI spectrum representative for 1850 solar cycle mean conditions**
 - ✧ Optional: second PI control with solar cycle variability but no long-term trend included
- **Solar ozone forcing timeseries is coordinated with CCMI ozone dataset (M. Hegglin)**