

First Sunspot Workshop

Conclusions and actions

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Task 1: Rz scaling before 1882

- rY geomagnetic index validation:
 - **T1a**: rY secular trend, extension to 2011 (cycle 23 minimum) [Leif]
 - **T1b**: Sensitivity of geomagnetic and ionospheric indices (daytime rY, aa) to secular changes in the Earth magnetic field (global strength + geographical variations) [Ingrid, Erdal, Alexis, Kalevi]:
 - 1-month simulations at different levels of EUV irradiance and different levels of solar wind disturbances (CMEs, CIRs)
 - Long-term interpolations based on actual Earth magnetic field evolution (tie-points and “proxy” relations given by the 1-month simulations)
- Rg scale jump around 1882:
 - **T1c**: Investigating biases in the early RGO data and observer K coefficients (Hoyt & Schatten) around that epoch [José, Ken, David]
 - **T1d**: Understanding the relation between Rg and Ri over the last 30 years (Incl. cycle 23) [Frédéric, Laure]

T2: Diagnosing the 1945 “Waldmeier” jump in R_z

- Locating the time of the actual introduction of the sunspot weighting:
 - **T2a**: Study of the Zürich-Locarno microfilms (single isolated large spots) [Leif, Frédéric]
- Quantifying the “weighting” bias:
 - **T2b**: Dual counting “Blind test” with Locarno [Leif, Marco]
 - **T2c**: $R_i - R_A$ (AAVSO) comparison and possible bias sources in R_A [Frédéric, Laure, Rodney]
- **T2d**: Impact of a small sunspot deficit (cycle 23) on the weighted counts vs standard Wolf number [Frédéric, Laure]

T3: Study of vanishing sunspots in cycle 23

- *Diagnosing impact of cycle 23 anomalies (small-spot deficit, fading of sunspots, changes in meridional drifts) on mutual relations between indices >>> new insights on possible similar or opposite evolutions in the past centuries*
- **T3a**: Small-spot deficit and differential evolution between groups of different types and sizes [Frédéric, Laure, Ali]
- **T3b**: Extension of the sunspot magnetic field weakening study [Bill + Watson & Fletcher?]
 - *How can the two above effects be related?*
- **T3c**: Signature of the changing meridional migration (active region, weak fields) in the SSN and other indices [David]

T4: SSN as a proxy: “optimal” sunspot indices

- **T4a**: A missing quantity: total photospheric magnetic flux B_p or flux emergence rate B_E (global, active regions) >>> which solar index is the best proxy ? [Thierry + Alexei? + Watson?]
- **T4b**: Exploitation of detailed sunspot group information: which are the optimal sunspot parameter combinations for specific target proxies (spectral irradiance, dynamo, flares) [Thierry, Laure, Ali?]
- **T4c**: Identify which scientific goals and issues can be addressed by improving the SSN? What will be the impact? In which fields? [Phil, Ed + all]
- **T4d**: How to build an automated image-based sunspot index? What kind of approach can lead to an automated splitting and classification of sunspot groups? [Bala, Frédéric, David?]

Workshop 2: the next step

- Identify specific goals that can be achieved within 6 to 12 months based on progresses
- Update the links between subtasks based on results
>>> towards a coherent picture
- Invite (a few) new partners who are currently missing:
 - K. Mursula, M. Cagnotti & S. Cortesi (Locarno), S. Solanki, Watson & Fletcher, P. Foukal, R. Arlt
- Acting as a community: how can we have more impact on scientific programs and for seeking funding by communicating as a single and worldwide community (“critical mass” effect)

