Highlights

- The relation between group number and SSN (N_{SS}/N_G) is variable from cycle to cycle ! (true for area, B, …)
- Clear progress in the long-term biases of the SSN:
  - More data set comparisons are possible: R_A, SONNE, Staudacher.
  - Analyses are valid but must be interpreted and expressed in terms of upper-lower limits for trends (first derivative!)
  - New trends found over 1981-2012 can change several other analyses.
- Converging evidence for a change in the size distribution of spots, but not yet conclusive:
  - Need to validate the lower limit for small sunspot detection in different data sets
  - Translate the declining core magnetic fields in a corresponding observable distortion of the spot distribution *(e.g. explaining the lack of weak spots between 1500 and 1800 G in 2002-2007)*
  - Need for better and more comprehensive sunspot catalogs (with *additional key parameters:* ***tilt*** *!)*

Wrapping up the SSN workshops

- Multiple analyses prompted by the SSN workshops
- Many results obtained independently in parallel
- Many possible connections between results or results that can be fed into other analyses:
  - Set of corrections to the SSN series
  - Corrections to the RGO sunspot areas
  - Updated catalogs (sunspots, MW, …)
  - Improved knowledge of accuracy limits in indices and proxies ($F_{10.7}$, CaII index, …)

➡ Need to focus on those links between results collected so far = PHASE 2 of the SSN workshops.

Final products

- Key topics requiring collective “synthesis” work
- Focus shifted towards the combination of data and new understanding
- Forming subteams : focus on a key topic
  - Potential co-authors for the final papers
  - “Review” papers: summarizing all aspects (established progresses and remaining contradictions)
  - Exemples:
    - SSN calibration: Svalgaard, Clette, Hathaway, Love, Howe, …
    - Group Number vs SSN: Schatten, Clette, Wauters, Svalgaard, …
    - Historical data: Vaquero, Arlt, Svalgaard, …
    - RGO, areas: Foukal, Willis, Hathaway, Balmaceda, …
    - WMO, CaII: Foukal, De Luca, Pevtsov, …
    - Cycle 23-24: Penn, Livingston, Lefèvre, De Toma…
    - Sunspot catalogs & proxies: De Toma, Lefèvre, Ludmany, Watson, Willis, ….

A common tool: data repository

- Collecting useful data to be shared:
  - Base data created, calibrated, etc. to feed analyses
  - Output data: new data series, corrected series (several tentative versions)
- For internal private exchange only : until publication of the SSN final products
  - Using the Cloud? E.g. **DropBox directory**
- Can be unfinished work: updates possible
- For large data sets: only README (data description) + link
- Use of the new data series data producer becomes co-author of resulting publications

➡ Allows to do a pre-release and get feedback from users

➡ Can lead to improved data sets (contents and data format)

Preparing for the future

- Keeping the impetus of the SSN workshops
- Organized way to manage future updates of the data sets relevant to the SSN:
  - SILSO and/or NOAA/NGDC ?
  - Large data sets: only links but centralized information about the data sets
  - Global reference info (Wikipedia page)
- Maintain synergies through
  - dedicated sessions at main conferences (space climate sessions !)
  - Inclusion as a special topic in the IAU “G-B Synoptic” WG ?