The cyclic variation of solar activity have a direct impact on our lives. An increasing in such activity have serious implications in telecommunications and space researches, it have also impact in global climate variations [1].

Focusing on the space researches and telecommunications, commissioning orbit satellites is particularly sensitive to changes in solar activity, specially for those in low Earth orbits (LEOs). An increasing in solar activity implies an increase in emissions from the sun like X-ray, UV-radiation, solar energetic particles (SEPs) and others. These emissions cause that the terrestrial upper atmosphere is heated and diluted, making that satellites experience an extra orbital drag reducing its utile lifetime. For these reason is important to have solar activity levels related to planning when to reboost LEO satellites to anticipate radiation exposure for current and upcoming missions, and to plan for outages in radio-based communication and navigation systems.

The International Sunspot Number

In order to estimate the solar activity levels, we need an indicator related to the amount of solar emissions and the frequency of occurrence of solar phenomena. Despite its somewhat arbitrary construction, the International Sunspot Number (ISSN) a.k.a. Wolf’s Number is the de facto standard indicator used to make solar activity forecasting. It is calculated by

\[
R_k = k \left( 10^g + s \right)
\]

where \( g \) is the number of sunspot groups (including solitary spots), \( s \) is the total number of all spots visible on the solar disc, while \( k \) is a correction factor depending on a variety of circumstances, such as instrument parameters, observatory location, and details of the counting method.

The Modified McNish–Lincoln Method

The method used to make the solar cycle forecasting is a variant of the McNish-Lincoln method [4,5,11]. This variant works in this way:

1. Calculate the monthly ISSN (\( \mathcal{R} \)).
2. Calculate the smooth monthly ISSN.

\[
\mathcal{R}_n = \frac{1}{24} \left( \sum_{i=6}^{5} \mathcal{R}_{n+i} + \sum_{i=5}^{0} \mathcal{R}_{n+i} \right)
\]

3. Use the \( \mathcal{R}_n \) to calculate minima in the time series in order to decompose it in cycles.
4. Use the obtained cycles (from 9th onwards) to make a mean cycle.

\[
\Delta \mathcal{R}_{n+1} = \mathcal{R}_{MC} + k_m \Delta \mathcal{R}_n
\]

Where \( \mathcal{R}_{MC} \) correspond to the mean cycle, \( \Delta \mathcal{R}_n \) is \( \mathcal{R}_n - \mathcal{R}_{MC} \), and \( k_m \) is a regression coefficient.

Conclusions

The results showed in the figure 4 are consistent with data predicted made and publicized by SIDC at http://sidc.oma.be/sunspots/bulletins/monthlybulletin201401.pdf.

This consistency shows that the implementation made of modified McNish-Lincoln method produce reliable results compared with the methods used by SIDC.

Our results show that the solar cycle will have a second maximum, like last tree cycles, at the end of 2013, after this, it will enter in decreasing activity phase.

References