



Comparison of solar active region complexity and geomagnetic activity

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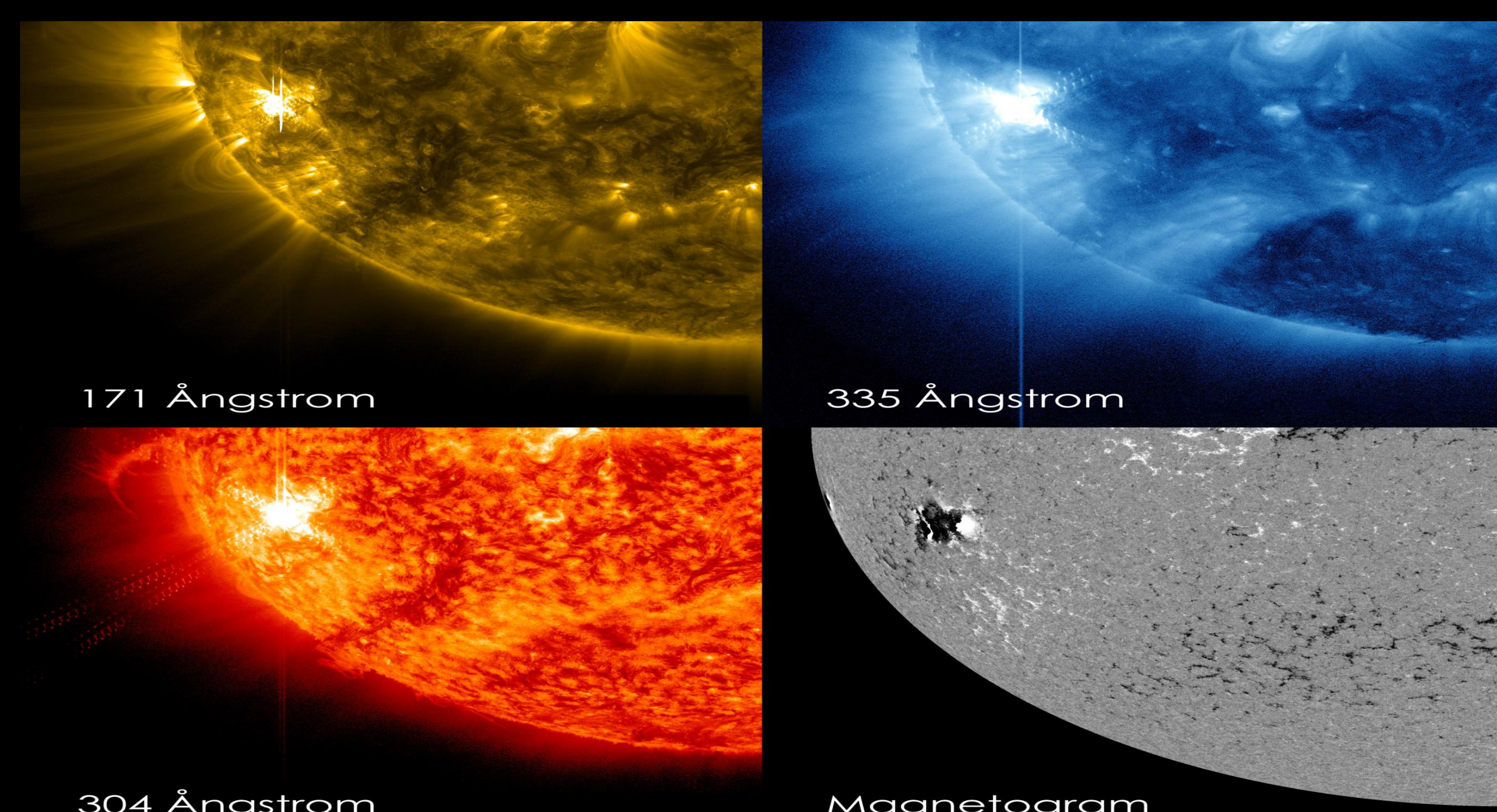
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Motivation of the study

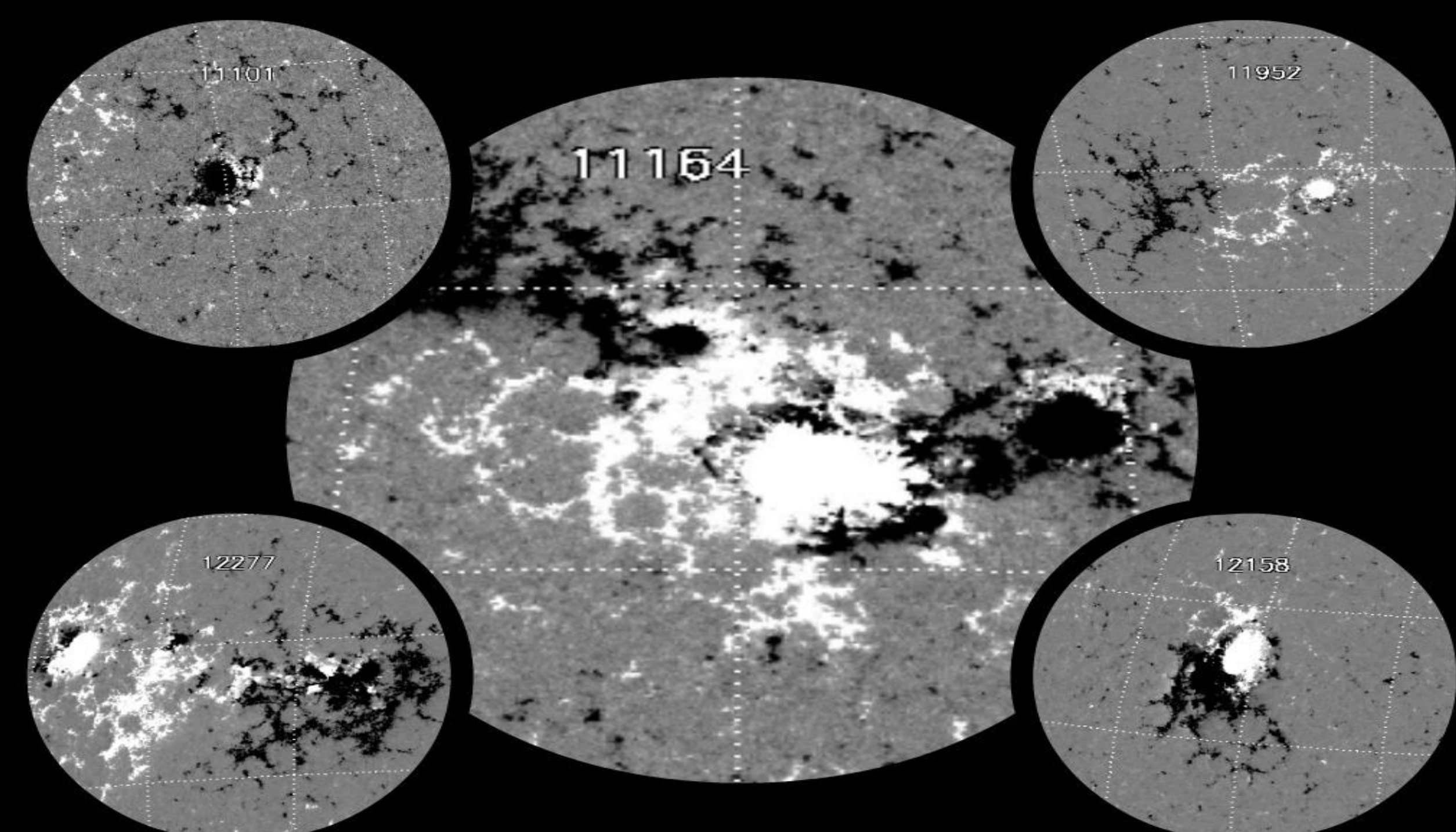
- Sunspots are visual indicators of solar active regions (ARs) where the solar magnetic field is concentrated
- ARs frequently host various type of solar activity such as solar flares and coronal mass ejections (CMEs)



Solar active region 1598, Oct. 22, 2012, created by NASA/SDO/Goddard

Introduction

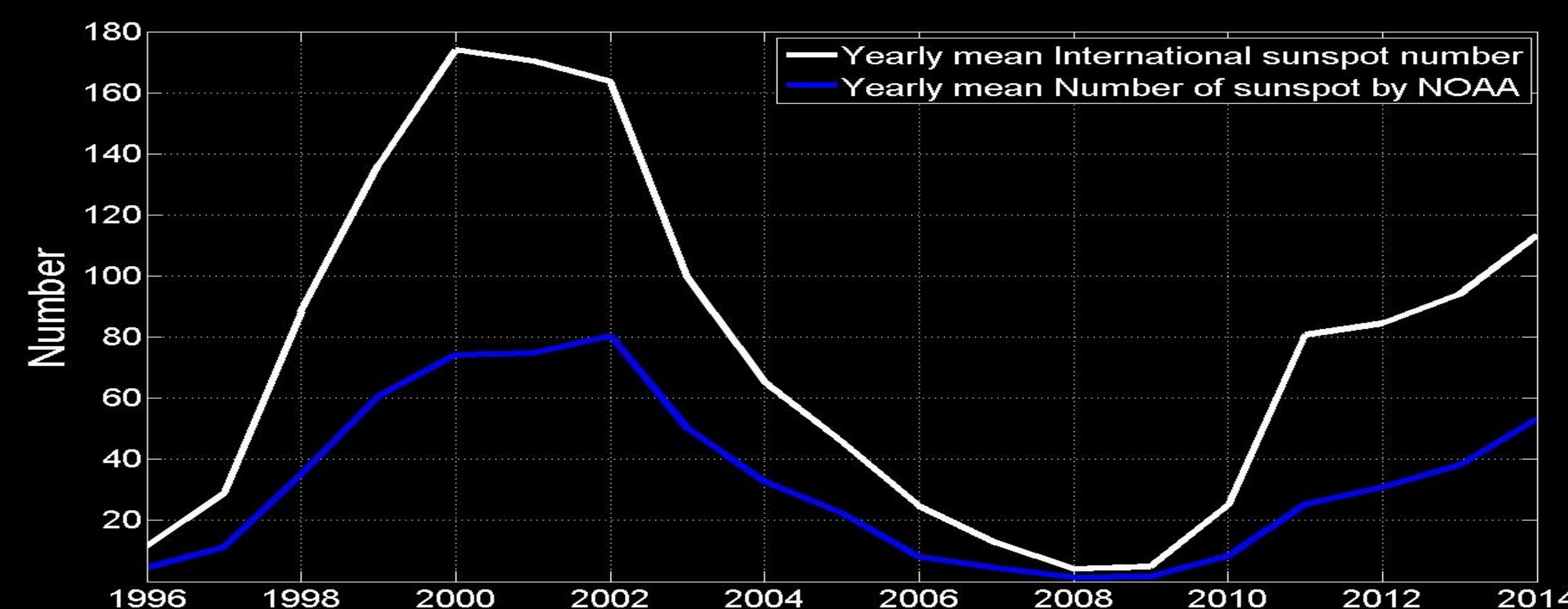
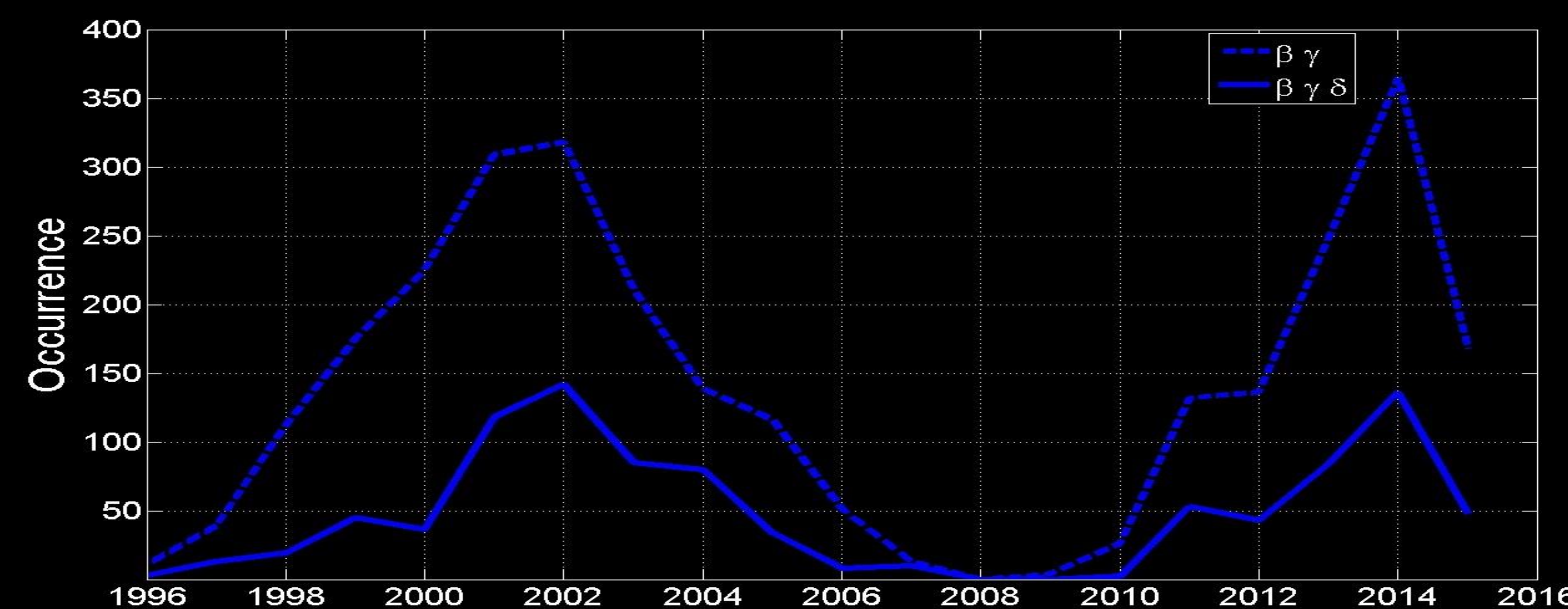
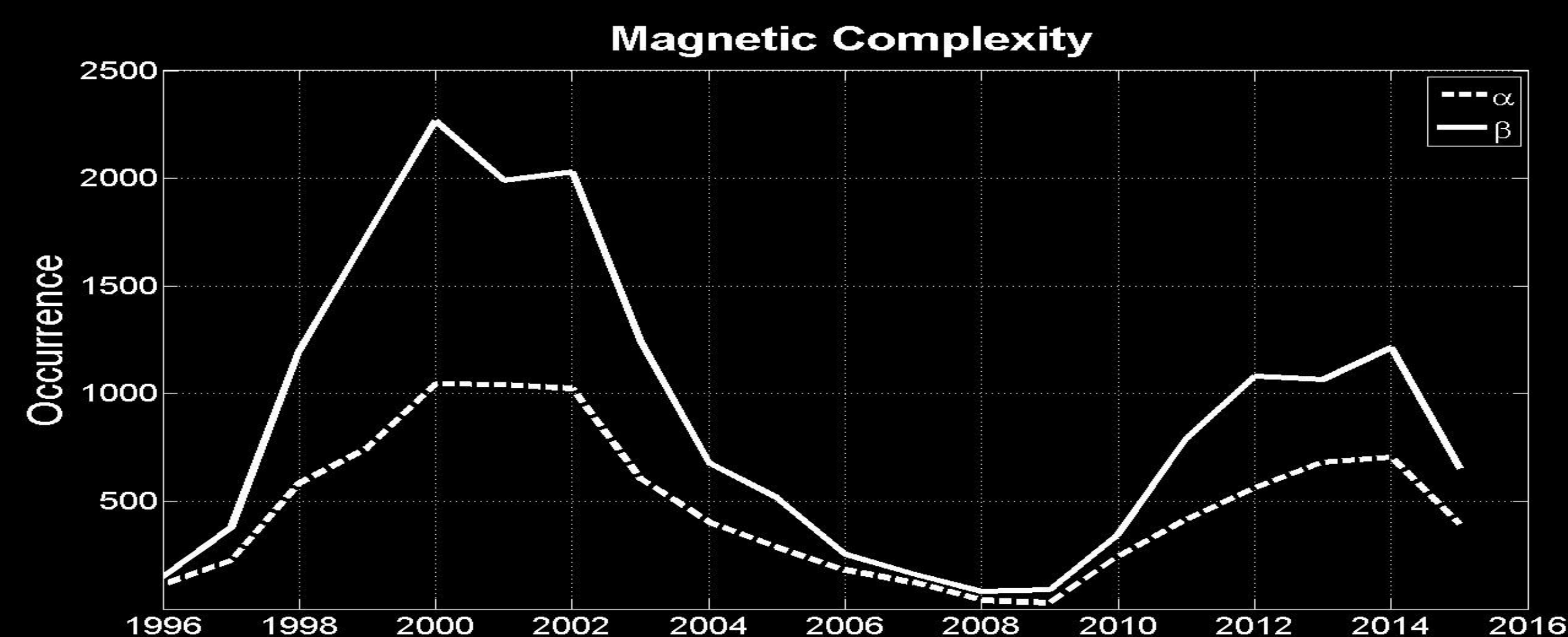
- Mount Wilson classification of active regions : α , β , γ , $\beta\gamma$, δ , $\beta\delta$, $\beta\gamma\delta$ and $\gamma\delta$.



The image shows $\beta\gamma\delta$ at the middle and moving clockwise from the top left α , β , $\beta\delta$ and $\beta\gamma$.

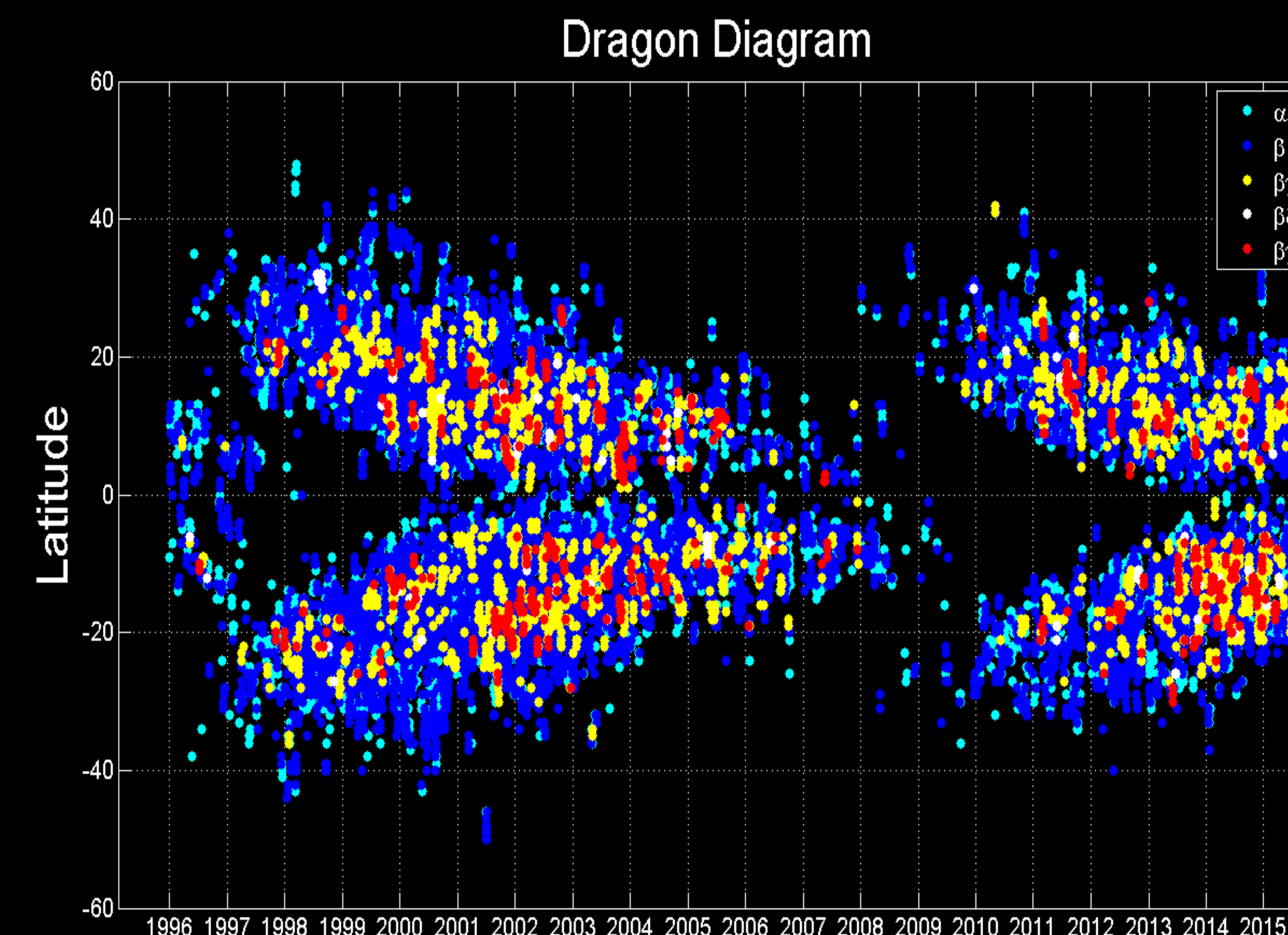
Data and Result

- Total number of more complex structures reaches its maximum in 2002 while the number of α and β decreases
- NOAA/SWPC yearly number of sunspots has maximum in 2002 although this maximum appears in 2000 for International Sunspot Number (ISS), version numbered 2.0



Discussion

- NOAA/USAF solar active region magnetic complexity daily data from 1996 to 2015
- Emerging more complex structures during solar maximum



Time vs. solar latitude diagram of the magnetic complexity of active regions from 1996 to Oct 2015.

References and acknowledgements

- International sunspot data presented here are provided by the World Data Center, SILSO, Royal Observatory of Belgium, Brussels.
- NOAA number of sunspot is available at <http://www.ngdc.noaa.gov/nndc/struts/results?t=102827&s=1&d=8,4,9>.
- Solar magnetic complexity active region data can be found at <ftp://ftp.swpc.noaa.gov/pub/forecasts/SRS>
- We acknowledge the financial support by the Academy of Finland and the ReSoLVE Center of Excellence and Väisälä foundation