Cosmic ray's Effect on Ionospheric Critical Frequencies and Heights

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with
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OUTLINE

1. Introduction
2. Data
3. Method
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5. Summary and Conclusion
The ionosphere is the ionized component of the Earth's upper atmosphere.

<table>
<thead>
<tr>
<th>Ionospheric Layers</th>
<th>Ionospheric Heights (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>50-90</td>
</tr>
<tr>
<td>E</td>
<td>90-140</td>
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<tr>
<td>Es</td>
<td>90-140</td>
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<tr>
<td>F</td>
<td>140-600</td>
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</tbody>
</table>
Solar activity anti-correlate with the cosmic rays (Atac, 2009).
The investigated time interval covers from January 2006 to December 2017. The ionospheric critical frequency and heights data sets are taken from the Sodankylä Geophysical Observatory at 14:00 for each day. Cosmic ray data are also taken from the same station.
Monthly median values of each ionospheric layer data was calculated.

The temporal variations of the critical frequencies and heights of each ionospheric layer compared with cosmic ray count.

To investigate possible relation between these data sets correlation analysis was applied.

Fisher test was also applied to determine to confidence intervals of obtained correlation coefficients.
PART 1

Cosmic-Ray & foF2

Correlation Coefficient: -0.74

Difference Cosmic-Ray & foF2

Correlation Coefficient: -0.005
Cosmic-Ray & foF1

Correlation Coefficient: -0.45

Difference Cosmic-Ray & foF1

Correlation Coefficient: -0.14
Cosmic-Ray & foE

Correlation Coefficient: -0.23

Difference Cosmic-Ray & foE

Correlation Coefficient: -0.12
Cosmic-Ray & foEs

Correlation Coefficient: -0.26

Difference Cosmic-Ray & foEs

Correlation Coefficient: -0.15
Cosmic-Ray & hF2

Correlation Coefficient: -0.53

Difference Cosmic-Ray & hF2

Correlation Coefficient: -0.22
Cosmic-Ray & hF1

Correlation Coefficient: -0.31

Difference Cosmic-Ray & hF1

Correlation Coefficient: -0.14
Correlation Coefficient: 0.05
Cosmic-ray & hES

Correlation Coefficient: -0.08
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<tr>
<th>Correlation C.</th>
<th>foF1</th>
<th>foF2</th>
<th>foE</th>
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<tr>
<td>Cosmic Rays</td>
<td>-0.45</td>
<td>-0.73</td>
<td>-0.23</td>
<td>-0.26</td>
</tr>
<tr>
<td>Confidence Intervals</td>
<td>± 0.09</td>
<td>± 0.17</td>
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<tr>
<td>Correlation C.</td>
<td>detrend-foF1</td>
<td>detrend-foF2</td>
<td>detrend-foE</td>
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Summary and Conclusion

• We investigated the possible relation between cosmic rays and ionospheric critical frequencies and heights.

• We may conclude that correlations between these data sets mainly come from the general trend.
Thank You...

Study is in still progress..