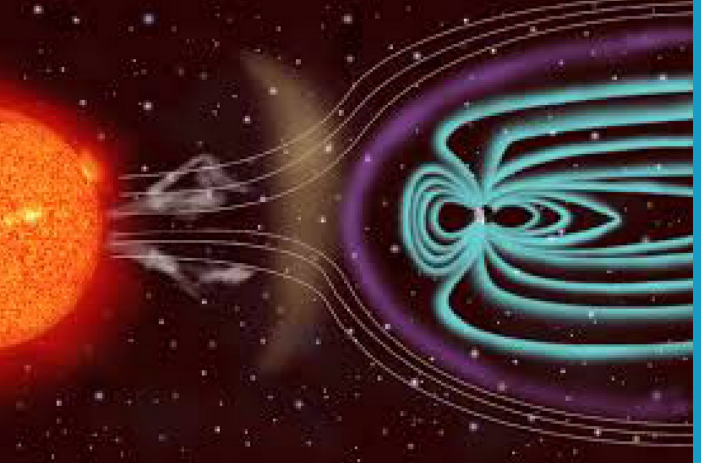

Relation between sprites and whistlers based on AWDANET and WWLLN data

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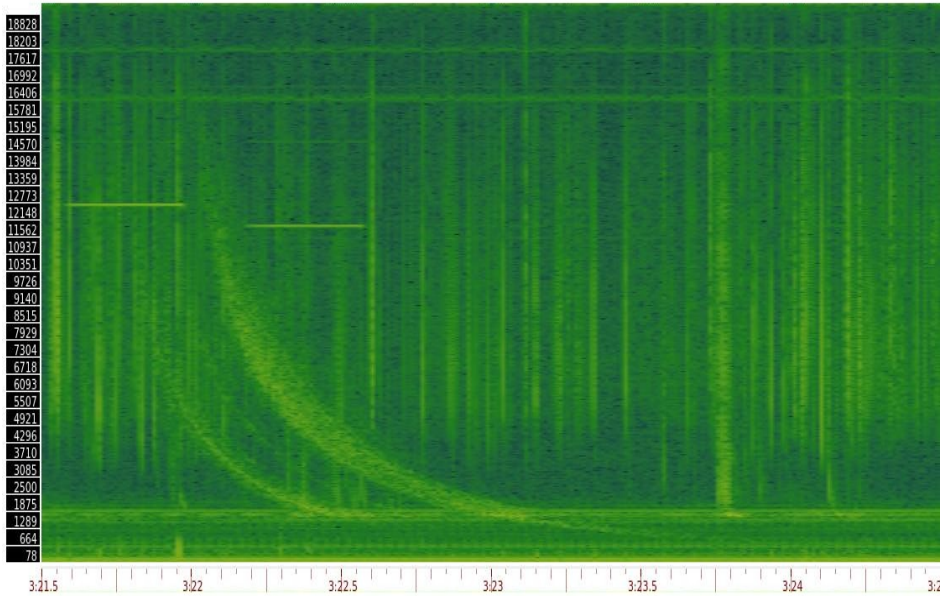
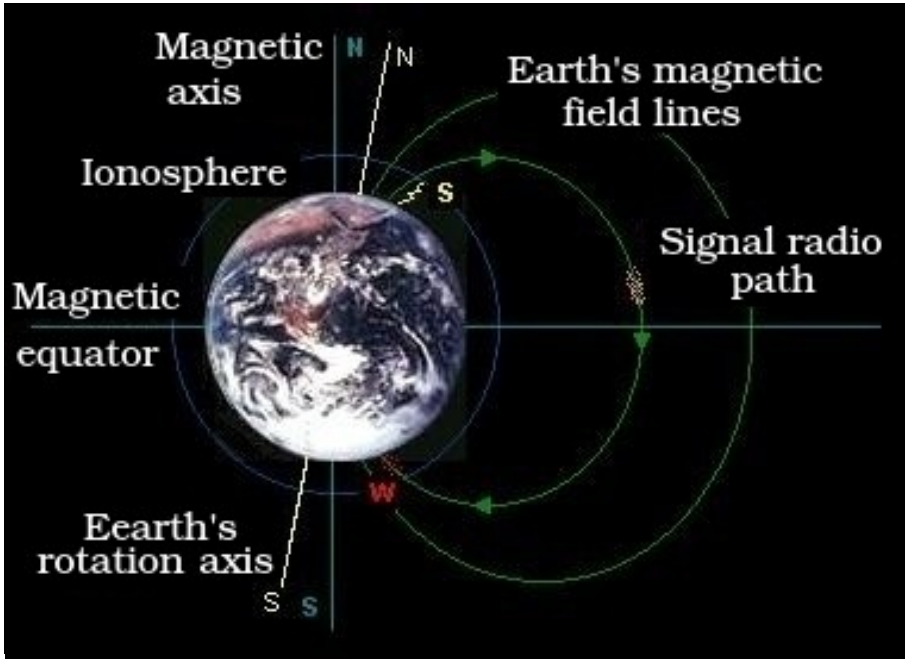
Whistlers.



The spectrogram of VLF signal segment containing whistler

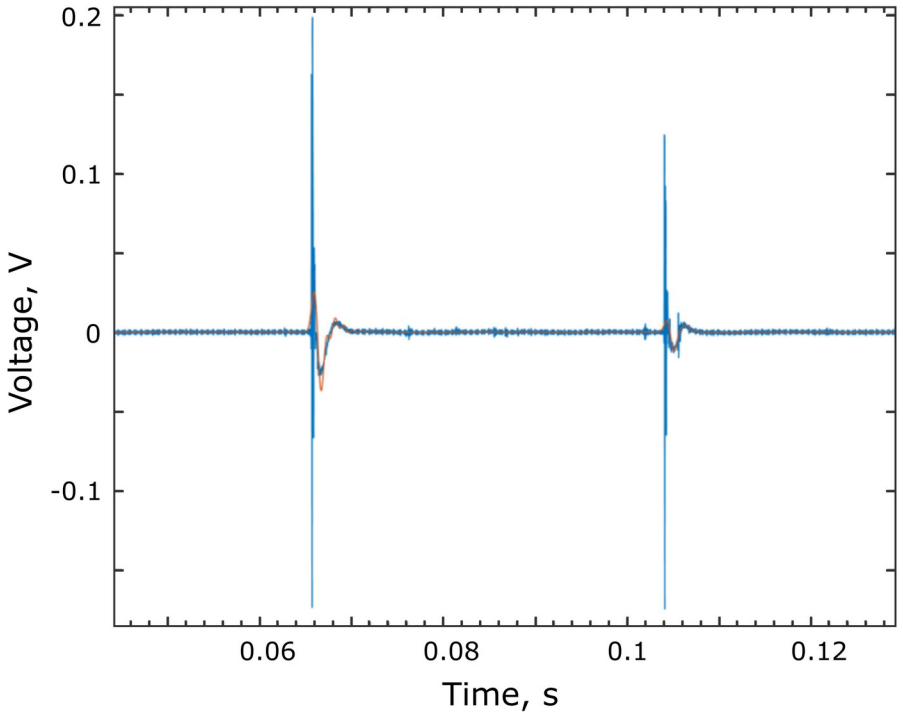


Scheme of radio signal propagation in the magnetosphere S-lightning W-whistle

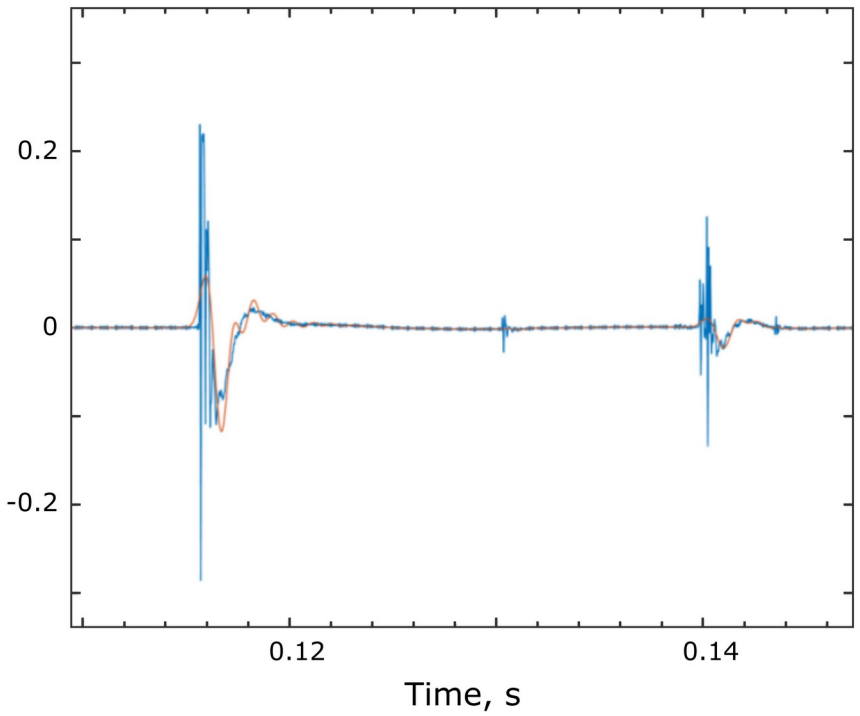
Sprites

The upper edge of a thundercloud illuminated by the initiating discharge and a group of sprites located above it.

Atmospherics initiated by sprites



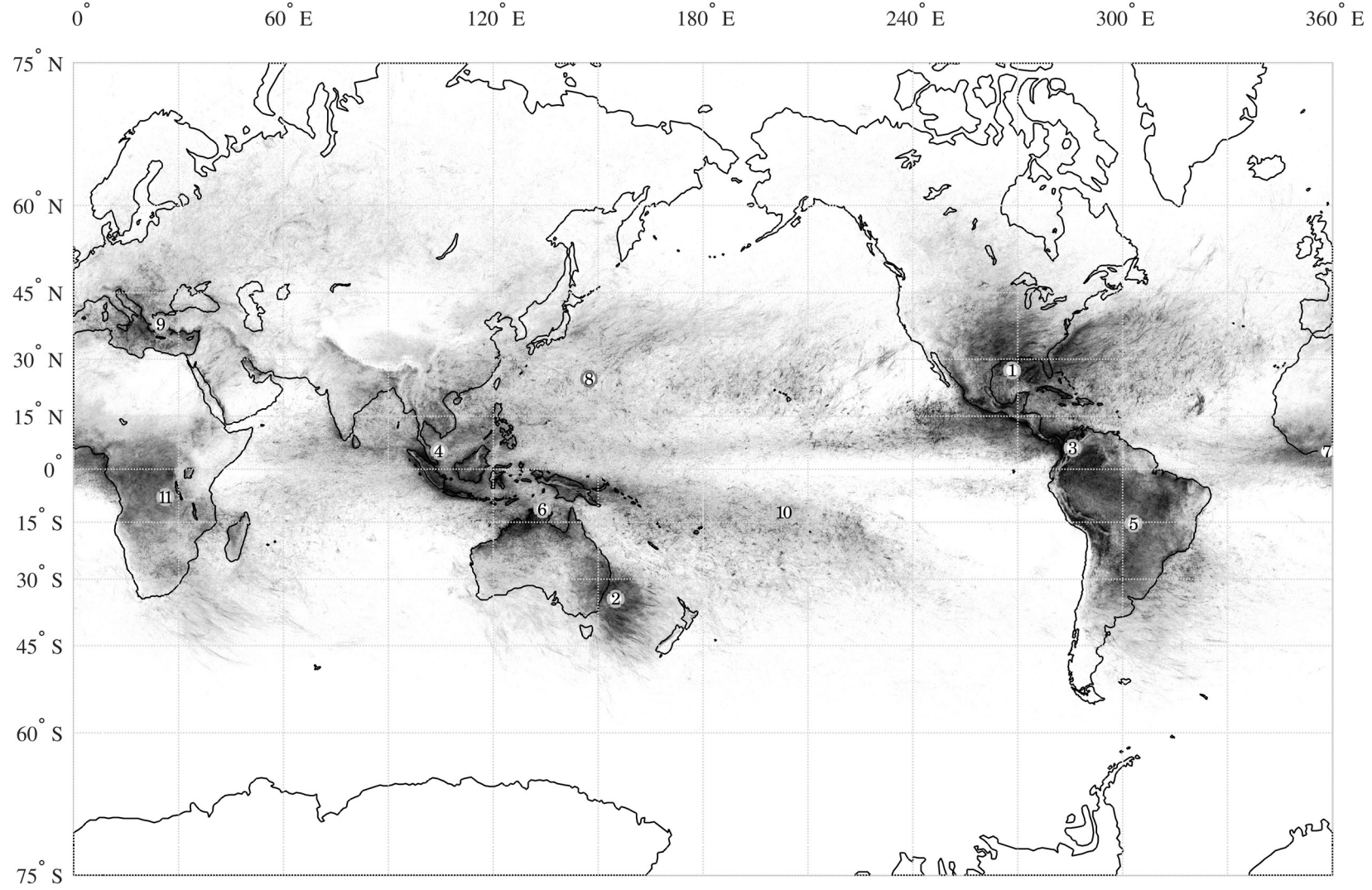
a)



b)

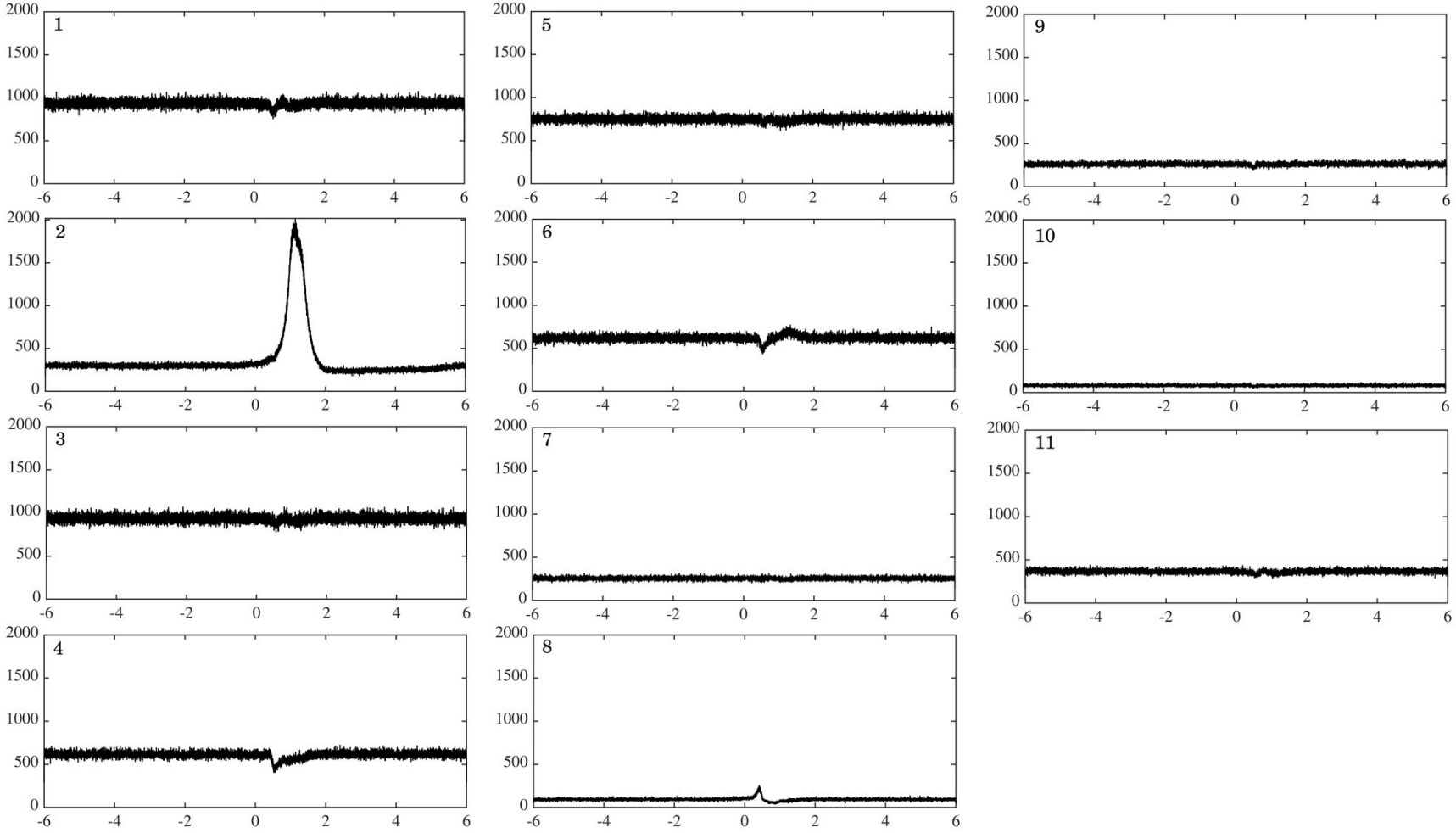
82% positive stroke pairs (+CG, +CG)
7% negative stroke - negative stroke (–CG, -CG)
9% negative stroke - positive stroke (–CG, +CG)
2% one stroke observed at the VLF direction finder output.

Whistlers and sprites (KRM)



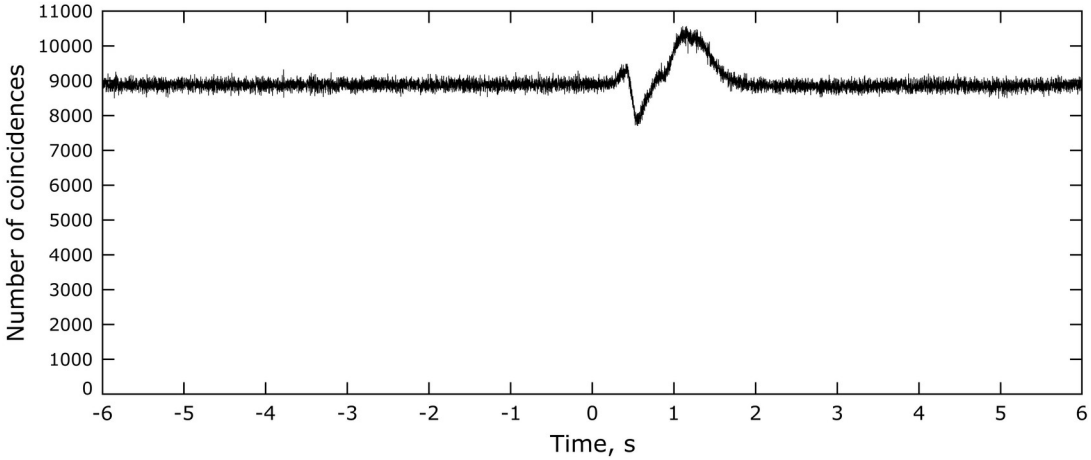
Map of lightning stroke density distribution, the numbers denote the centers of the clusters entering the maximum of the distribution (From Karimshina data)

Whistlers and sprites (KRM)

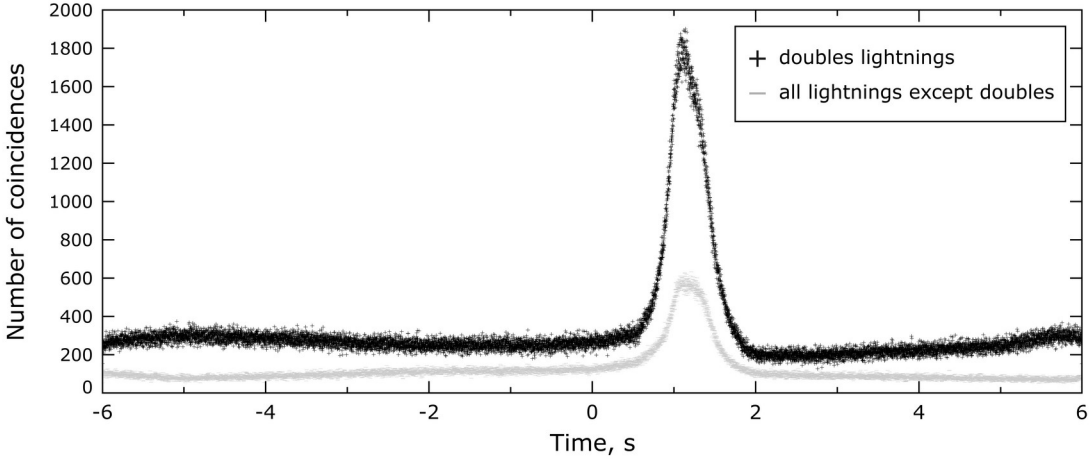


Distribution of the number of coincidences in delay times between the whistler recording times and the times of lightning strokes occurred in the regions located at the distances of not more than 1400 km from its centers.

Whistlers and sprites (KRM)



a)

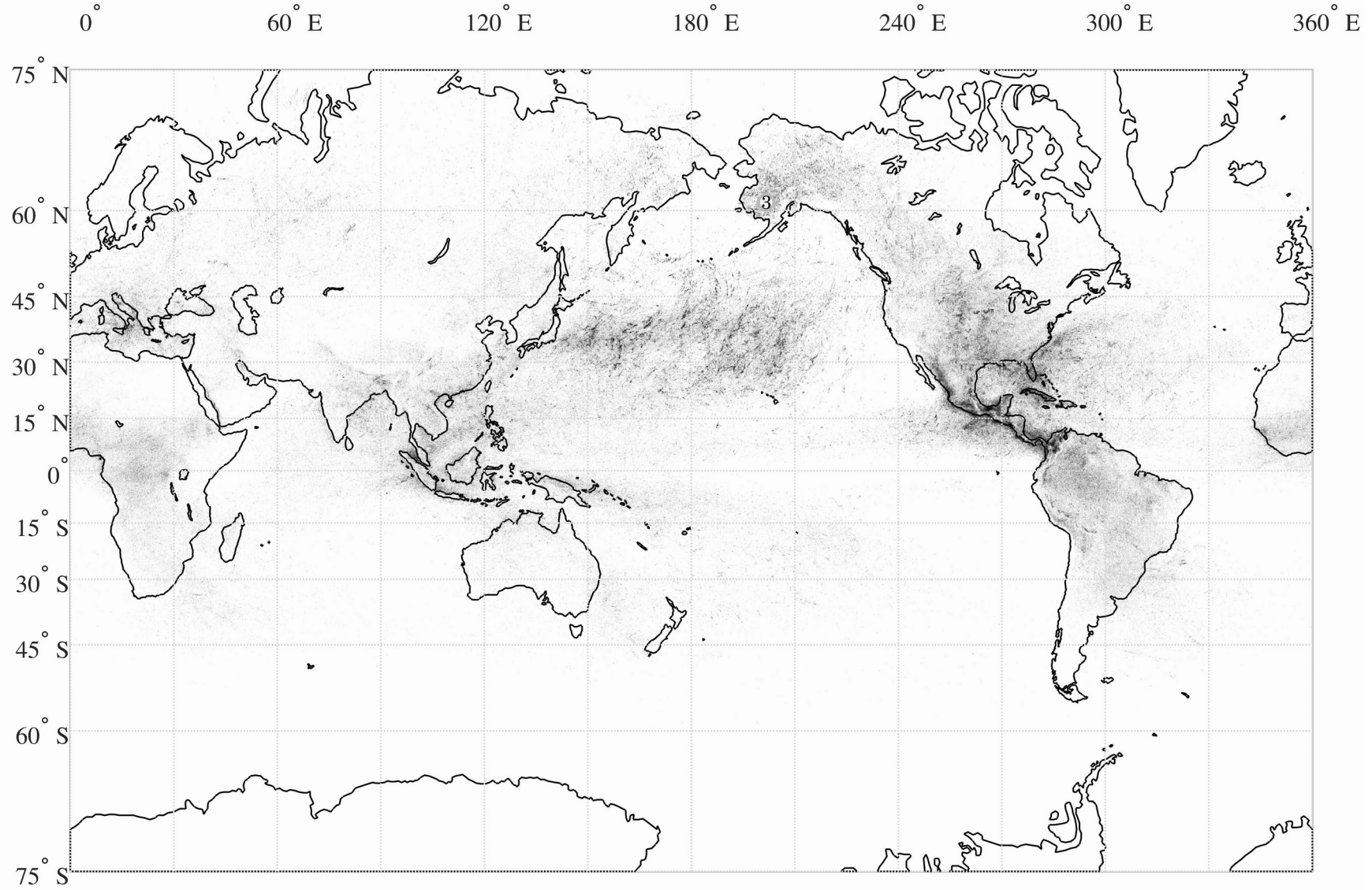


b)

Distribution of the number of coincidences in delay times between whistler recording times and lightning stroke occurrences times. The series is centered with respect to the whistler recording times (a).

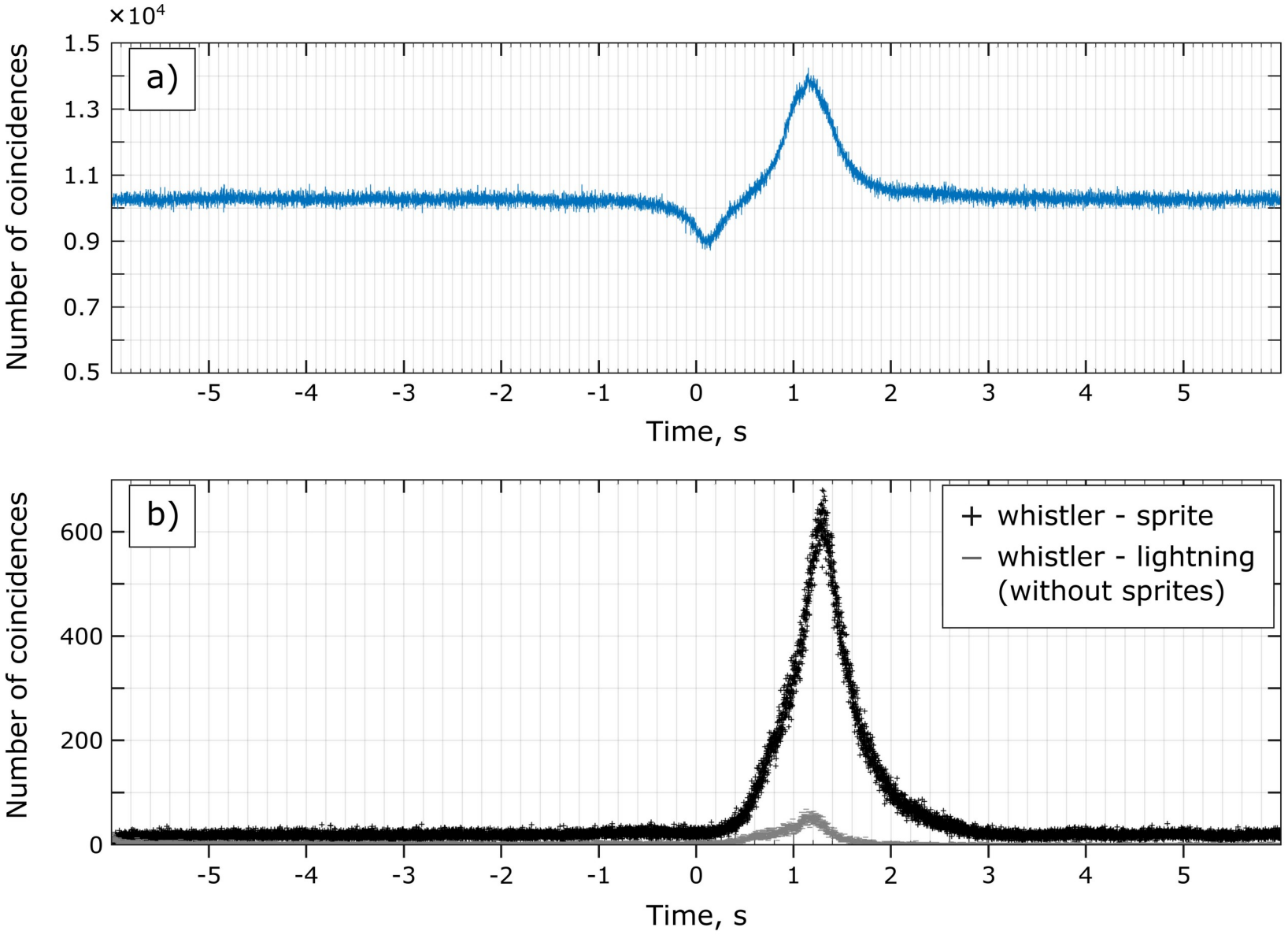
Distribution of delay times: + between whistler recording times and recording times of the sprites triggering CG strokes; – between whistler recording times and the recording times of all the strokes but sprites triggering CG strokes (b).

Whistlers and sprites (Dunedin)



Map of lightning stroke density distribution, the numbers denote the centers of the clusters entering the maximum of the distribution (From Dunedin data)

Whistlers and sprites (Dunedin)



Conclusions

Statistical analysis was carried out to detect the sources of whistler generation based on the data of the global Automatic Whistler Detector and Analyzer Network (AWDANet), World Wide Lightning Location Network (WWLLN) and the VLF direction finder of IKIR FEB RAS. As the result of the work we obtained:

- distribution of the number of coincidences in the delay times between whistler recording times and the lightning stroke occurrence times for Karymshina and Dunedin stations;
- distribution of the number of coincidences in the delay times between whistler recording times and recording times of the sprites triggering CG strokes for Karymshina and Dunadin stations;

Comparative analysis of the obtained distributions was carried out for all the strokes occurred in the magnetically conjugated region as well as taking into account only the strokes associated with sprites triggering CG strokes. The analysis showed that there is statistical relation between the two phenomena, in particular, the triggering lightning strokes of sprites accompany whistlers.


Thank you for your attention