

CIRCULATION WEATHER TYPES THAT HAVE CAUSED HEAVY PRECIPITATION IN ESTONIA IN PERIOD 1961-2005.

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I. INTRODUCTION

Estonia is situated on the eastern coast of the Baltic Sea. This is a region of intensive cyclonic activity with both oceanic and continental influences. In our work an analysis of heavy precipitation, its frequency and spatial and temporal distribution in Estonia during the last 45 years is presented. Our second aim was to study the synoptic situations that caused heavy rainfalls in Estonia and to find out the main features of the atmospheric circulation in the Baltic Sea area for all days with extreme rainfalls.

II. PRESENTATION OF RESEARCH

We have defined a heavy rainfall as an event when the rate of precipitation accumulation exceeds 50 mm per 24 hours. A day during which at least in one of the stations this amount of precipitation was registered was considered to be a day with heavy rainfall. In the period 1961-2005 all together 199 days with heavy rainfall were registered in Estonia. All of them occurred in the warm period from May to October, whereby 87% of these days were in the summer months. Especially the days with very heavy rainfalls exceeding 100 mm per 24 hour were studied, and during the named period there have been 12 days. An absolute record of 24-hour precipitation for Estonia is 148 mm in Metskula. Figure 1 shows a rising trend of number of days with heavy rainfall until 1990's. Then during 90's a less amount of heavy rainfall has detected and this century's five years have given also a lot of extreme rainfall.

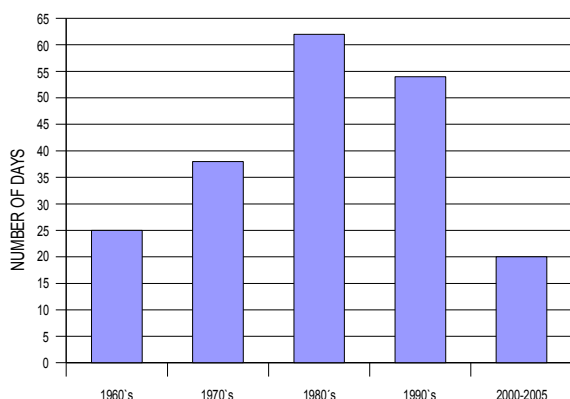


FIG. 1: Heavy precipitation in Estonia per decade.

By using surface analysis and 500 hPa charts we have distinguished six basic synoptic situations leading to

heavy rains. Weather type A is associated with surface and upper deep depression which centre was near Estonia,

B with lower level small depression that usually forms near the cold-front wave or point of occlusion (triple point).

C with cold-front wave

D with active surface and upper trough with cold or occluded front

E with slowly moving slack area of low pressure with cold or occluded front

F with the field of weak pressure gradient and we have defined this type as convective precipitation. Origin and moving trajectory of all baric systems (weather types A-D) were taken into account. Trajectories have been roughly classified as from North, Northwest, West, Southwest, South and Local (within a radius of 500 km from Estonian geographical centre). The results of this analysis are presented in the Table 1.

Trajectory \ Weather type	NW	W	SW	S	N	L	
A	2	8	9	22	-	8	49
B	5	2	7	25	2	16	57
C	-	-	6	5	-	9	20
D	11	14	4	1	-	2	32
E							16
F							24
Unclassified type							1

TABLE I: Occurrences of weather types (the number of days) that have caused heavy precipitation in Estonia in the period 1961-2005. .

III. RESULTS AND CONCLUSIONS

This study revealed that 12% of heavy precipitation in Estonia from 1961 to 2005 were convective and 88% were produced by different frontal systems. The most important heavy rain bringers are south cyclones (24%), also significant contribution has been made by local cyclones (12%) that have a short lifetime and trajectory.

IV. AKNOWLEDGMENTS

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V. REFERENCES

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