

Intense Arctic and Antarctic mesocyclones (polar lows) and their variability

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Some characteristics of intense polar mesocyclones or polar lows (PL) and of their variations are presented. In particular, comma- and spiral-type PLs in the North-European Arctic basin (between 20°W and 70°E) during 1981-1995 and over the Southern Ocean basin (between 0°E and 90°E) near Antarctic during 1984-1995 (Lagun and Lutsenko, 2000) are analyzed (see also Mokhov and Priputnev, 2001). The total number of analyzed PLs was 253 in the Arctic basin and 834 in the Antarctic basin.

Frequency of spiral- and comma-types of PLs is the lowest one in summer. PLs are the most frequent in winter and also in spring. There are also remarkable interannual variations of the PL frequency with a period about 5-6 years and correlation (particularly for comma-type) for Arctic (with a lag) and Antarctic basins.

Figure 1 shows annual-mean number of days with comma- and spiral-type cyclones and their total number in dependence on the PLs size (diameter) for the period 1981-1995 (a) and also for comma-types during different 5-year periods (b) in the North-European Arctic basin.

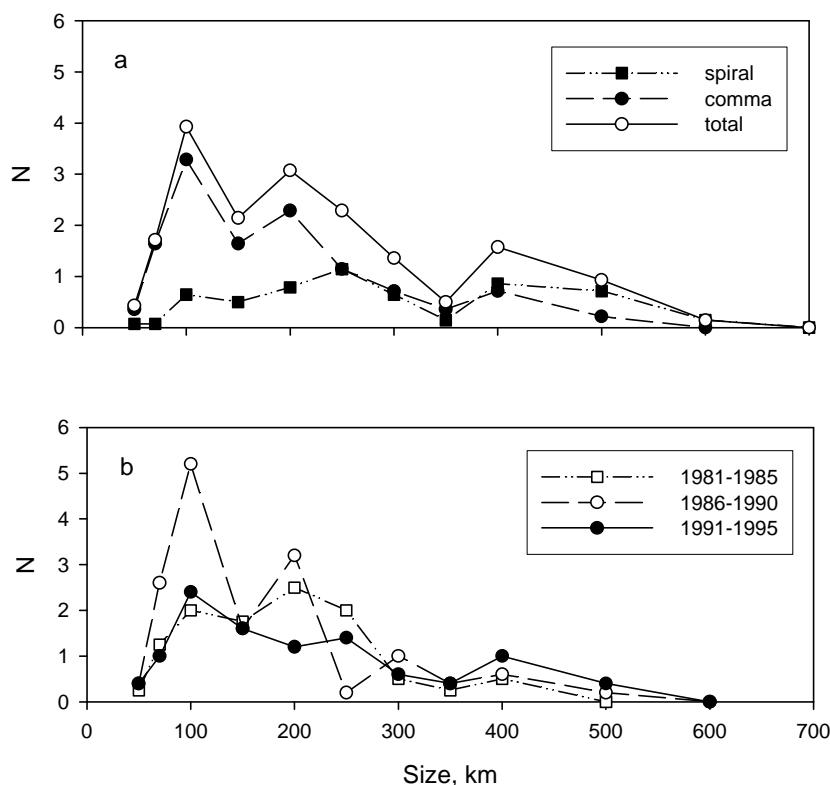


Fig.1.

Probability density functions (PDF) of the annual-mean PL number in the North-European Arctic basin in dependence of the PL size show several extremes. Local PDF maxima during the total period 1981-1995 and for different 5-year periods are displayed at PL

sizes about 400, 200-250 and 100 km. It should be noted that PDFs for comma-types and spiral-types are very different.

Figure 2 shows annual-mean number of days with comma- and spiral-type cyclones and their total number in dependence on the PLs size for the period 1984-1995 (a) and also for comma-types during different 5-year periods (b) in the Southern Ocean basin.

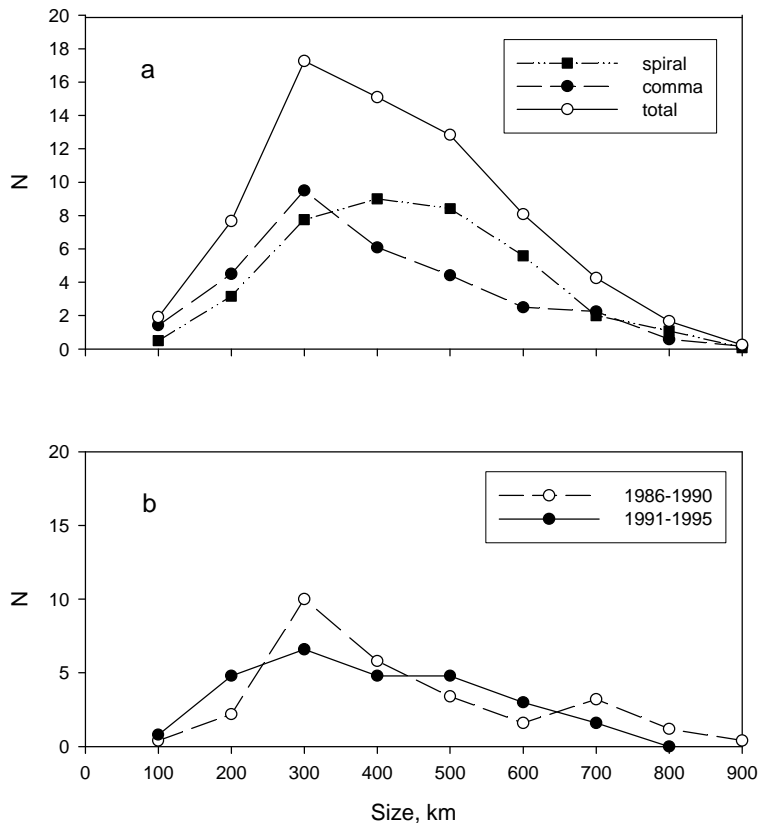


Fig.2.

The PDFs for PLs in dependence on their size over the Antarctic basin display only one maximum (about 300 km for comma-type and about 400 km for spiral-type) for the total period 1984-1995 (Fig.2a) with some peculiarities for different 5-year periods (Fig.2b). In comparison with Arctic mesocyclones the Antarctic ones are remarkably larger - up to 800 km and even larger. In the Arctic basin no PLs have been noted larger than 600 km.

Different features in PDFs for the Arctic and Antarctic PLs are related with differences of ocean-land distribution, mean seasonal regimes and different mechanisms of the PLs formation and evolution. In particular they can be related with different contribution of baroclinic instability and convection processes. The exhibition of some peculiarities in PDFs depends on statistics (number of analyzed PLs, in particular for short 5-year periods).

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References

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