NUMERICAL SIMULATION OF AEROSOL IMPACT ON HEAVY SNOWFALL FORMATION

Pirnach A.M., Romash T.A., Shpyg V.M.
Ukrainian Hydrometeorological Institute

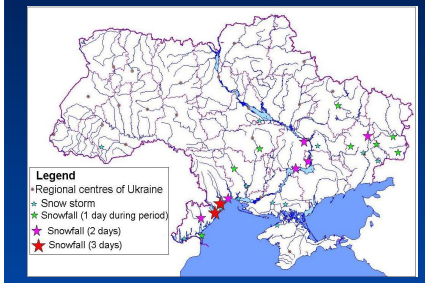

Fig.1 – Number of days with snowfalls in Ukraine during December 15-21, 2009

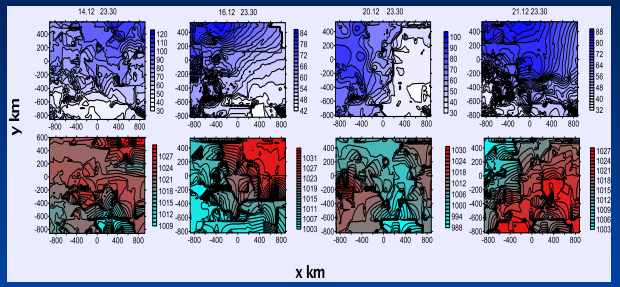

Fig. 2 – Spatial distribution of INC, 10^5 cm/g (1st row) and sea level pressure, hPa (2nd row)

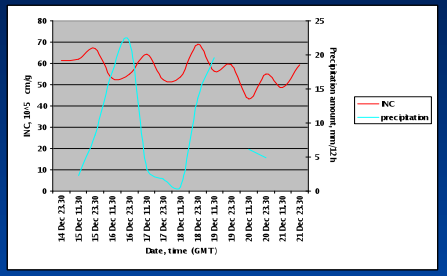

Fig. 3 – Evolution of INC and recorded precipitation in Odesa

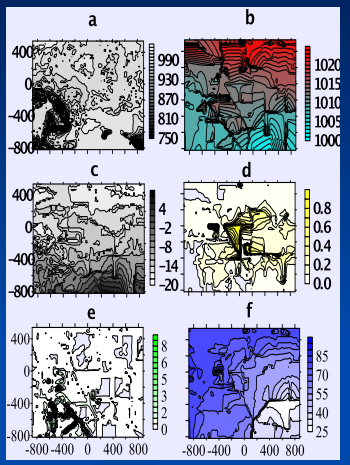

Fig.4 – Initial conditions on December 18, 2330GMT

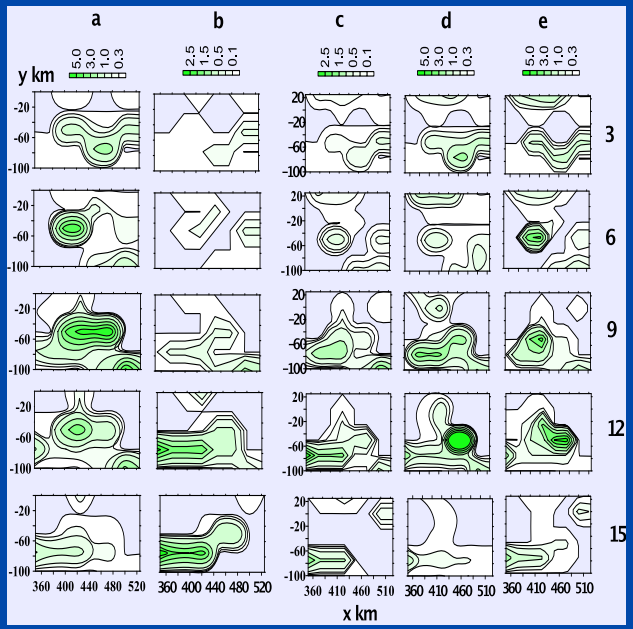

Fig.6 – Spatial evolution of precipitation amount with different a

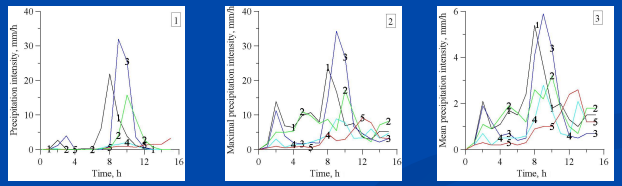

Fig.5 – Evolution of precipitation intensity. Numbers near lines: 1) case calculated with riming and coagulation of large and small drop and parameter a=-2; 2) riming and parameter a=-2, 3) a=-3, 4) a=-4, 5) a=-5

Conclusions

•Numerical experiments show the noticeable dependence on precipitation sums and precipitation intensities of INC.

• The optimal INC that caused the highest snowfall intensity existed. Oscillation of snowfall intensity in precipitation cores occurred in all cases but if INC approached to optimal the amplitude was the highest.

• As a rule, the highest snowfall intensity take place in decaying stage of precipitation core development. Including of coagulation rain drops with cloud drops approaches time of precipitation maximum, increased the size of precipitation core and oscillation intensity.

• INC was simulated during all period and compared with sea level pressure. Deepening cyclone caused increase of INC.

• Simulated ice nuclei concentration was compared with recorded precipitation amount. Heavy precipitation caused INC decrease involving them into process of precipitation formation. If precipitation is light INC increases.