



The model of automated forecast of dangerous and hazards wind including squalls and tornadoes for the territory of Europe

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Advance forecast (from 12-36h of strong winds that destroy buildings and electric wires makes possible to take proper measures, to reduce the losses and to protect the people. Prediction of these phenomena stays a very difficult problem for synoptic till recently. The existing graphic and calculation methods depend on subjective decisions of operators. At the present time there is no hydrodynamic model for forecast of the maximal velocity of wind, hence the main tools of objective forecast are statistical methods. This short-term (12-24 -36h) forecast of strong winds was developed on the basis of statistical interpretation of prognostic output fields of hemispheric model of Russia. Statistical decisive rules for the calculation of alternative categorical forecast for the phenomena strong wind with the velocities more then 20m/s and more then 25m/s (including squalls and tornadoes) were obtained in accordance with the concept of "perfect prognosis" using the data of objective analysis. For this purpose the teaching samples were automatically arranged that include the values of forty physically substantiated potential predictors. Before the construction of the decisive rules of recognition we must solve the problem to select the most informative and independent parameters. Then the empirical statistical method was used that one involved diagonalization of the mean correlation matrix R containing forty predictors and extraction of diagonal blocks of strongly correlated predictors. Thus for these phenomena the most informative predictors were selected without losing information, those predictors being either representatives of blocks or independent informative predictors according

certain criterion (we used the Mahalanobis distance and the Vapnik-Chervonenkis criterion of the minimum entropy). The statistical decisive rules for diagnosis and prognosis of the phenomena involved development of objective automated forecast methods for the wind with the velocities more than 20m/s and more than 25m/s for 12-36h ahead. Hydrometeorological Center of Russia recommended those methods for practical usage after independent tests in the European part of Russia. This method is successful for Europe too. The Pirsy assessments are high ($T=0,52-0,68$). The forecast of the velocity of strong squalls and tornadoes we calculate by regression function for 12 – 24h ahead. The value of velocity square error is less than 2,7m/s.