RESEARCH ON REMOTE SENSING INVERSION AND PREDICTION METHOD OF SEA ICE AREA IN LIAODONG BAY

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Abstract: Sea ice plays an important role in the field of marine environment and disaster research, sea ice area affects the production and life of coastal military and civilian, so both the sea ice area inversion and area prediction are drawing increasing public attention. Liaodong Bay is the sea area where heavy ice most easily gets formed in China, the inversion algorithms of sea ice area are mostly based on statistical methods, prediction models are usually the simple linear fitting between temperature and sea ice area, new algorithm of sea ice inversion and prediction model should be researched to get higher accuracy. Images of Environmental Satellite 1were taken as the data source, according to the difference and the rate of change characteristics of surface reflectance, threshold method on sea ice area inversion of Liaodong bay was studied in the paper; 40 days average temperature and negative accumulated temperature of 8 cities around Liaodong Bay were considered as the influence factor of sea ice area. Taking 36 days average temperature and negative temperature days as the input vector and sea ice area as the target vector, a BP neural network model was trained to reveal the relationship between daily average temperature as well as negative accumulated temperature days and sea ice area, with the Levenberg-Marquardt back propagation training function for training function, gradient descent method momentum factor for learning function, and expected error setting 0.001.The results show that: (1) NDSI index K1 applied to the Liaodong Bay sea ice area inversion was 0.45, threshold of CCD band of the Environmental Satellite 1 (520nm-600nm) K2 was 0.1, threshold of infrared band of the Environmental Satellite 1 (1550nm-1750nm) K3 was 0.07, areas that meet the condition (K1>=0.45)∩(K2>0.12)∩(K3>0.07) were considered as sea ice area. The method was applied to the Environmental Satellite 1 image data on February 4, 2010 to inverse the sea ice area of Liaodong Bay, contrasted with sea ice area of January 28, 2010 forecasted on the internet, the relative error is 0.07. (2) In testing four different kinds of net varied in input layer neuron numbers which respectively valued 36, 42, 49, 64, the network worked well and had a better prediction result when the input layer neurons valued 64, the relative error of 4 test samples were 0.05, 0.15, 0.14, 0.18.

Key Words: sea ice, temperature, negative accumulated temperature days, BP neural network.