

A neural network based prediction of the September sea ice extent using winter air temperature and the extent of the previous year

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A neural network approach was used to predict the September sea ice extent by the use of two state variables, the surface air temperature of the northern hemisphere from NCEP reanalysis and the September sea ice extent of the previous year. The time series of Cavalieri et al. (2003) and the Sea Ice Index (NSIDC) was merged to a 36 years monthly dataset starting in 1972.

A feed forward neural network with two input neurons, a hidden layer with two neurons and one output neuron was used with a random initialization of the weights (ffnet by Marek Wojciechowski). Two different runs with five realizations were performed. In the testing run the year to be predicted was left out in the training data. In the next run the years to be predicted were included in the training data except for (of course) 2008. The results are shown in Figure 1 and 2. The prediction for September 2008 is **3.6 Mio km²**.

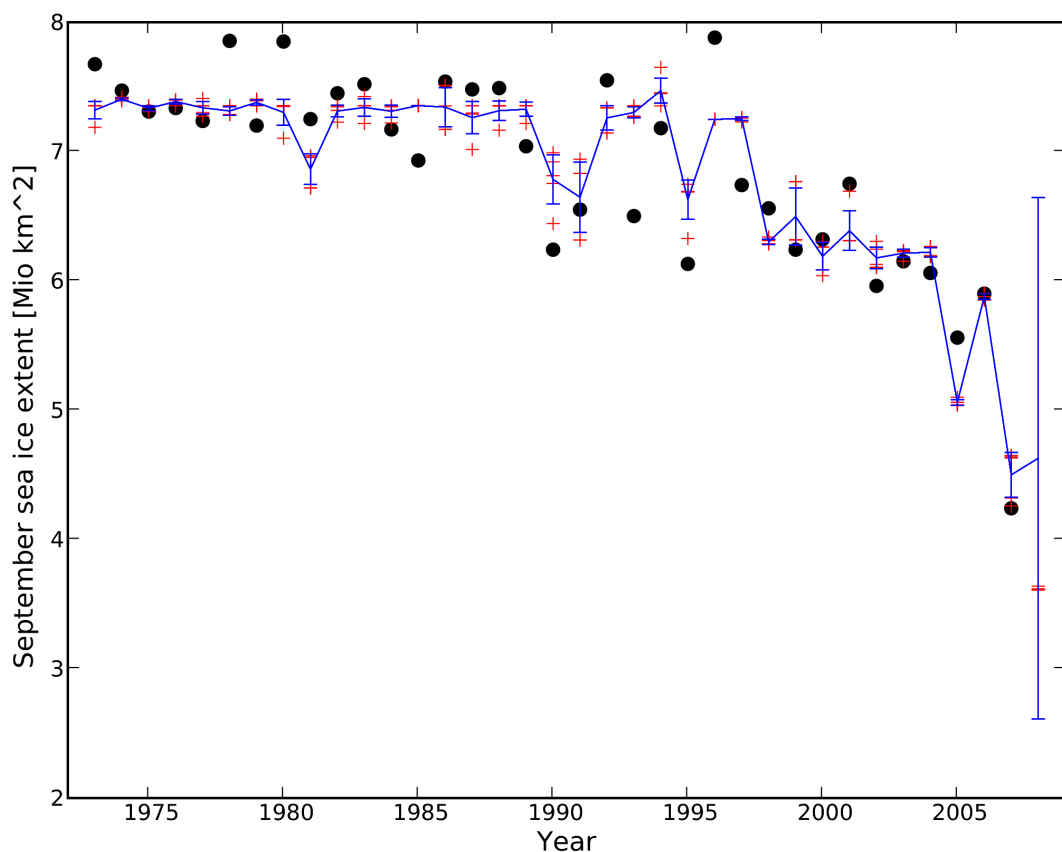


Figure 1: Neural network based prediction of the September sea ice extent. Black dots are from satellite observations. Red crosses mark five different realizations of the neural net predictor. The blue error bars indicate their mean and standard deviation. The average correlation of all individual realizations of the prediction with the true ice extent is 0.9

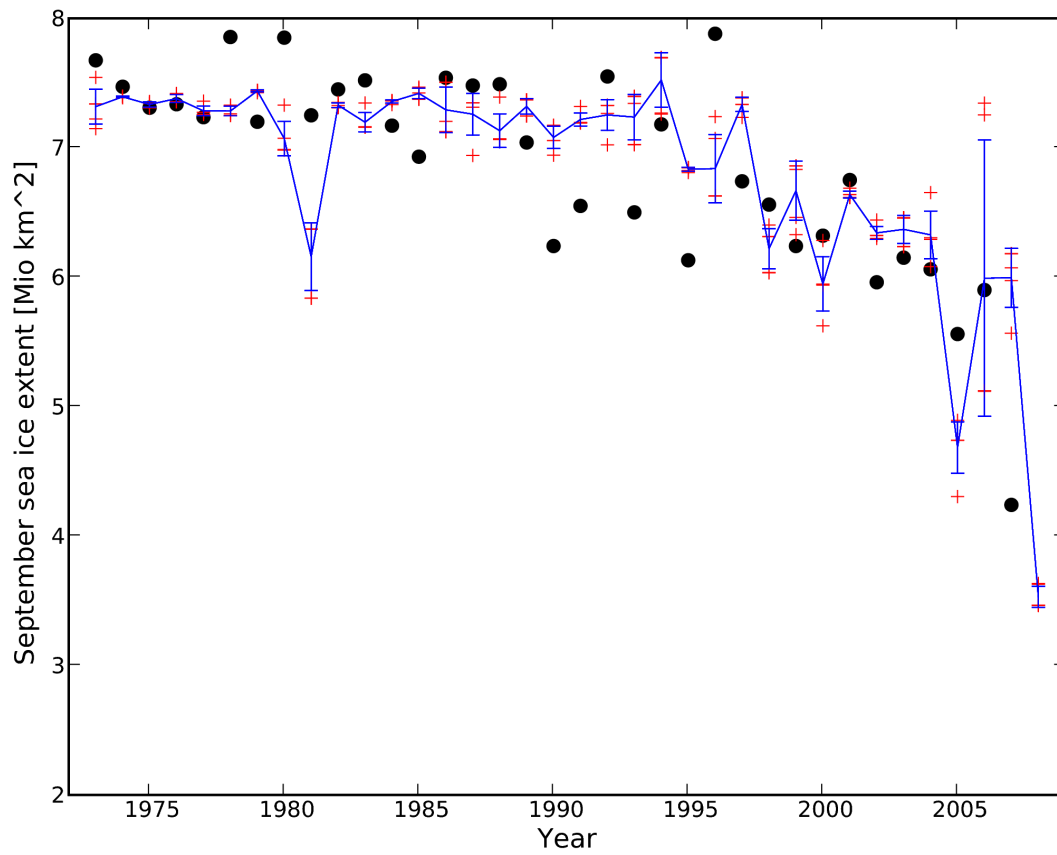


Figure 2: Same as Figure 1 but with the individual years to be predicted left out in the training dataset. The average correlation of all individual realizations of the prediction with the true ice extent is 0.7