Reply to: Akyilmaz, O., 2010. Discussion of: Sertel, E.; Cigizoglu, H.K., and Sanli, D.U., 2008. Estimating Daily Mean Sea Level Heights Using Artificial Neural Networks. Journal of Coastal Research, 24(3), 727–734; Journal of Coastal Research, 26(6), 1184–1184

Authors: Sertel, E., Cigizoglu, H. K., and Sanli, D. U.

Source: Journal of Coastal Research, 27(4) : 791-792

Published By: Coastal Education and Research Foundation

URL: https://doi.org/10.2112/JCOASTRES-D-11-00038.1

Journal of Coastal Research	27	4	791–792	West Palm Beach, Florida	July 2011

REPLY

www.cerf-jcr.org

Reply to: Akyilmaz, O., 2010. Discussion of: Sertel, E.; Cigizoglu, H.K., and Sanli, D.U., 2008. Estimating Daily Mean Sea Level Heights Using Artificial Neural Networks. *Journal of Coastal Research*, 24(3), 727–734; *Journal of Coastal Research*, 26(6), 1184–1184

E. Sertel[†], H.K. Cigizoglu[‡], and D.U. Sanli[§]*

[†]Istanbul Technical University
Civil Engineering Faculty
Department of Geomatic Engineering
Maslak 34469 Istanbul, Turkey

[‡]Istanbul Technical University
Civil Engineering Faculty
Division of Civil Engineering
Maslak 34469 Istanbul, Turkey

[§]Bogazici University
Kandilli Observatory and Earthquake
Research Institute
Geodesy Department
Cengelkoy 34684 Istanbul, Turkey
ugur.sanli@boun.edu.tr

The general comment of the authors about the discussion of Akyilmaz (2010) is that it does not bring any novelty to the published paper by Sertel, Cigizoglu, and Sanli (2008). It mainly reflects the author's personal views and expectations on practical issues, usually based on speculations rather than scientific evidence. The Sertel, Cigizoglu, and Sanli (2008) paper is new and has a merit in that daily mean sea level is characterized comparatively with methods of artificial neural networks (ANNs), multiple linear regression (MLR), and least squares estimation. The results of the paper are interesting in that the available methods in the field are quantified relatively using one specific data set, and ANN methods and MLR show tremendous improvement in modeling over the classical approach least squares estimation. Furthermore, it is useful and necessary, because it satisfies the standards of a prestigious journal in the field. Therefore, the following information is found to be necessary to provide for the journal's readers to prevent the published discussion's negative and nonscientific effects.

There is no general common scientific terminology for variable forecasting of sea level or other water resources. One of the authors of the paper has specialized in hydrological variable prediction, as reflected in several papers (Cigizoglu, 2005; Cigizoglu and Kişi, 2006; Kişi and Cigizoglu, 2007; Partal and Cigizoglu, 2008; Yagci *et al.,* 2005). Therefore, the terms "forecasting," "estimation," and "prediction" are all used interchangeably for varying purposes, and readers are used to that form.

In regard to the comments on one-day-in-the-future predictions, such predictions were not the main motivation of the paper; rather, they were just one of the outcomes for a particular case study. Due to high tidal energy in daily mean sea levels, neural network analysis was only able to manage one-day-in-the-future predictions for Newlyn tide gauge in the United Kingdom. This study should motivate researchers to generalize the ideas tested in the paper for a network of tide gauges in the future. Furthermore, we do not agree with speculations that one-day-in-the-future predictions have no contribution to coastal research. Daily mean sea level data are routinely used in climate change forecasting, storm surge detection, various oceanographical and meteorological studies, tectonics, extreme sea level event explanations, and tidal analysis (Ansell *et al.,* 2006; Antunes and Taborda, 2009; Cayan *et al.,* 2008; Firing and Merrifield, 2004; Gonzalo and Wyss, 1983; Kumar, 2001; Palumbo and Mazzarella, 1982; Pugh, 2004; Raicich, 2010; Shoji, 1978; Sultan, Ahmad, and Nassar, 1996; Ueda, Ohtake, and Sato, 2001; Zhu *et al.,* 2009). We expect Sertel, Cigizoglu, and Sanli (2008) will spark new research in such popular scientific issues.

In the published paper by Sertel, Cigizoglu, and Sanli (2008), the performance of the estimation is evaluated with two criteria: the root-mean-square (RMS) error and the determination coefficient (R^2) for the testing period. In addition, the testing stage estimations are plotted, along with the observed values. These three comparison tools are more than sufficient, as reflected in the literature (Gedik *et al.,* 2009). Furthermore, it was shown in the paper that MLR and neural network methods proved to be far superior to least squares estimation (*i.e.,* R^2 of 0.71 vs. 0.19).

It is not fair to restrict someone's mind to one of the outcomes, such as a one-day-in-the-future prediction. The researcher would, for instance, also use the tested methodology to verify a whole daily mean sea level record against outliers occurring due to storm surges (Sztobryn, 2003). The results of such a study would shed light on research trying to solve various meteorological and oceanographical problems, especially in the modeling part (Ansell *et al.,* 2006; Cayan *et al.,* 2008; Raicich,

DOI: 10.2112/JCOASTRES-D-11-00038.1 received 25 February 2011; accepted in revision 28 February 2011.

* Corresponding author

2010). On the other hand, the discusser states, "We have used the same data." If there is more than one scientist involved in the discussion study, his or her name should appear in the author list of the discussion. Otherwise, the authors of the paper assume that the discussion was sent to the journal without the permission of the other author or authors of the discussion.

Setting one day's value for the next day would not contribute to the RMS of the data set; however, it would mask the real tidal energy that could be used to reveal, say, mesoscale eddy dynamics for that day (Firing and Merrifield, 2004). In other words, it would not be possible to capture real diurnal or extreme changes by assigning the present day's value as tomorrow's value, as presented by Akyilmaz (2010). In general, if his approach had been accepted, there would not have been any need for early warning studies. On the other hand, it is not fair to mislead the reader by putting the emphasis only on the comparison of the two specific sets of results, because the paper compares the results from five methods, including feed-forward backpropagation (FFBP) and radial basis function (RBF). Moreover, it was already stated in the paper that "MLR results were similar to those of FFBP and RBF."

The paper cannot be categorized as a review of the literature. To our knowledge, in review papers, no new research is presented. Rather, the author presents a new perspective or outlook using the findings in research papers presented in previously published academic journals. Hence, Sertel, Cigizoglu, and Sanli (2008) present an original investigation that conducted an experiment relating to daily mean sea level variations using various available methods. The findings of the paper can be extended with related climate change studies in the future.

We gathered the scientific evidence regarding the use of the daily mean sea levels from a spectrum of research fields. Page limitations allowed us to discuss only some or a little of the information available. The interest to employ daily mean sea levels and the availability of the data for the various purposes in the published literature clearly indicate that the paper by Sertel, Cigizoglu, and Sanli (2008) is likely to stimulate new research in the future. The paper has already proven to be "useful and necessary," with a few key applications from the literature given here. This contradicts the arguments suggested in Akyilmaz (2010).

LITERATURE CITED

Akyilmaz, O., 2010. Discussion of: Sertel, E.; Cigizoglu, H.K., and Sanli, D.U., 2008. Estimating daily mean sea level heights using artificial neural networks. *Journal of Coastal Research,* 24(3), 727–734.

Ansell, T.J.; Jones, P.D.; Allan, R.J.; Lister, D.; Parker, D.E.; Brunet, M.; Moberg, A.; Jacobeit, J.; Brohan, P.; Rayner, N. A.; Aguilar, E.; Alexandersson, H.; Barriendos, M.; Brandsma, T.; Cox, N. J.; Della-Marta, P. M.; Drebs, A.; Founda, D.; Gerstengarbe, F.; Hickey, K.; Jónsson, T.; Luterbacher, J.; Nordli, Ø.; Oesterle, H.; Petrakis, M.; Philipp, A.; Rodwell, M. J.; Saladie, O.; Sigro, J.; Slonosky, V.; Srnec, L.; Swail, V.; García-Suárez, A. M.; Tuomenvirta, H.; Wang, X.; Wanner, H.; Werner, P.; Wheeler, D., and Xoplaki, E. 2006. Daily mean sea level pressure reconstructions for the European: North Atlantic region for the period 1850–2003. *Journal of Climate,* 19, 2717–2742.

Antunes, C. and Taborda, R., 2009. Sea level at Cascais tide gauge: data, analysis and results. *In: Proceedings of the 10th International Coastal Symposium* (Lisbon, Portugal), Journal of Coastal Research, Special Issue No. 56, pp. 218–222.

Cayan, D.; Bromirski, P.; Hayhoe, K.; Tyree, M.; Dettinger, M., and Flick, R., 2008. Climate change projections of sea level extremes along the California coast. *Climatic Change,* 87(0), 57–73.

Cigizoglu, H.K., 2005. Generalized regression neural network in monthly flow forecasting. *Civil Engineering and Environmental Systems,* 22(2), 71–84.

Cigizoglu, H.K. and Kişi, O., 2006. Methods to improve the neural network performance in suspended sediment estimation. *Journal of Hydrology,* 317(3–4), 221–238.

Firing, Y.L. and Merrifield, M.A., 2004. Extreme sea level events at Hawaii: influence of mesoscale eddies. *Geophysical Research Letters,* 31, L24306.

Gedik, N.; Irtem, E.; Cigizoglu, H.K., and Kabdasli, M.S., 2009. Estimation of tsunami runup using three artificial neural network methods. *China Ocean Engineering,* 23(1), 85–94.

Gonzalo, C. and Wyss, M., 1983. Large earthquakes, mean sea level, and tsunamis along the Pacific Coast of Mexico and Central America. *Bulletin of the Seismological Society of America,* 73(2), 553–570.

Kişi, O. and Cigizoglu, H.K., 2007. Comparison of different ANN techniques in river flow prediction. *Civil Engineering and Environmental Systems,* 24(3), 211–231.

Kumar, P.K.D., 2001. Monthly mean sea level variations at Cochin, Southwest coast of India. *International Journal of Ecology and Environmental Sciences,* 27, 209–214.

Palumbo, A. and Mazzarella, A., 1982. Mean sea level variations and their practical applications. *Journal of Geophysical Research,* 87(C6), 4249–4256.

Partal, T. and Cigizoglu, H.K., 2008. Estimation and forecasting of the daily suspended sediment data using wavelet-neural networks. *Journal of Hydrology,* 358, 317–331.

Pugh, D., 2004. *Changing Sea Levels: Effects of Tides, Weather, and Climate*. Cambridge, United Kingdom: Cambridge University Press, 265p.

Raicich, F., 2010. On the contributions of atmospheric pressure and wind to daily sea level in the northern Adriatic Sea. *Continental Shelf Research,* 30, 1575–1581.

Sertel, E.; Cigizoglu, H.K., and Sanli, D.U., 2008. Estimating daily mean sea level heights using artificial neural networks. *Journal of Coastal Research,* 24(3), 727–735.

Shoji, D., 1978. Investigation of the variation of the Kuroshio and daily mean sea levels. *Journal of Oceanography,* 34(6), 310–315.

Sultan, S.A.R.; Ahmad, F., and Nassar, D., 1996. Relative contribution of external sources of mean sea-level variations at Port Sudan, Red Sea. *Estuarine, Coastal and Shelf Science,* 42(1), 19–30.

Sztobryn, M., 2003. Forecast of storm surge by means of artificial neural network. *Journal of Sea Research,* 49, 317–322.

Ueda, A.; Ohtake, M., and Sato, H., 2001. Afterslip of the plate interface following the 1978 Miyagi-Oki, Japan, earthquake, as revealed from geodetic measurement data. *Techtonophysics,* 338, 45–57.

Yagci, O.; Mercan, D.; Cigizoglu, H.K., and Kabdasli, S., 2005. Artificial intelligence methods in breakwater damage ratio estimation. *Ocean Engineering,* 32, 2088–2106.

Zhu, X.; Ding, G.; Bao, X., and Zhang, Z., 2009. The long-term variability and its possible mechanism of sea level around the Japan Island. *Acta Oceanologica Sinica,* 6, 22–30.