

## Review and Determine the Amount of Radioactive Element Cesium -137 and its Environmental Impacts In lake Water and Soil Shoorabil

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### Abstract

Shoorabil Lake, which locates in the middle of Ardabil city, is higher than the city itself. It is an enclosed sedimentary basin in southern mountain foots of Ardabil. This lake as one of the sensitive ecosystems of Ardabil is of unique and special physical, chemical, ecological, and biological properties . One of the elements which is potentially destructive to environment is ion generating radiances. This is the result of natural recourses with cosmic origin, natural radioactive substances in earth's crust, and artificial resources like artificial radioactive substances and radioactive systems in the reactor. The Cs – 137 Ashrams Chernobyl scattered in the environment and the CIS, Eastern Europe and possibly parts of the province of Ardabil is also affected .For determining activity degree of elements Cs-137, Iran's atomic energy agency laboratory (Jaber-Ebn-Hayyan laboratory), and measured by HPGe Gamma spectrometer with germanium detector in water-samples reached nearly to its acceptable level. No density of cesium 137 – which is among artificial radioactive substances – was observed, and in all samples, it is lower than the level identified by Gamma spectrometer system of Jaber Ebn Hayyan laboratory in Iran's atomic energy agency. Therefore, it can be said that there is no evidence of Chernobyl or any other unnatural phenomenon in the waters around Shoorabil Lake. The amount of Cesium 137, which is unnatural radioactive substance and its presence can be due to Chernobyl

**Keyword:** Shoorabil Lake, Cs-137, Pollutions, Chernobyl. Ardabil

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**Investigating the Relation Between Heavy Precipitation and Circulation Patterns of  
the Upper Atmosphere**  
(case study : Southern Khorasan Province)

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**Abstract**

For exact recognition of heavy precipitation of a region there is a need to sufficient studies about dynamic and synoptic conditions of that occurrence. In this study we used environmental-to-circulation method and approach and data from 61 stations of meteorology organizations and 9 hydrometric stations of South Khorasan province. In relation to the circulation patterns of the upper atmosphere by using base component analysis and cluster analysis between 1990-2007, 4 circulation patterns were identified. In analysis of these precipitations one representative day was introduced for every circulation pattern. The results of data analysis showed that the circulation patterns N0.2 and 4 justify the most of precipitations and more than 60% of these precipitations occur in these two patterns. In the point of view of the origin of humidity source we can say that 3 regions have had roles in these precipitations: Mediterranean Sea, the Arabian Sea, and the Persian Gulf. These findings can play an important role in forecasting the precipitation and preventing from flooding in the region.

**Key Words:** Circulation Patterns, Geopotential Height, Cluster Analysis, Heavy Rain, Southern Khorasan

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## Predication of Frost In Zabol Region Based on Simulations of General Circulation Model

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### Abstract

The aim of this study was to simulate the impact of climate change on frost phenomena in the Zabol station. For this purpose, the method of comparing and selecting the best model fitted to the series of general circulation models were used. At First the daily data of Zabol synoptic station in period (1966-2008) was prepared. Then the general circulation model data in two separate periods (1988- 2004 and 2010- 2039) to develop a climate change scenario were used.

After the providing the basic scenario ,four circulation models including HADCM3, BCM2, HADGEM NCPCM were selected and these models evaluated by statistical methods.

The bias , mean absolute error , means and standard deviations of each model was calculated and finally generate daily data until 2037. By selecting the best model, artificial data for future climate of Zabol station was generated.

The results showed that the component of future climatic temperature will increase compared to the previous period. Increase the maximum temperature for spring and autumn more than winter and summer. Maximum increase in low temperature is observed from August to February. Frost range in the observed climate period are about six months and continued from November to April.In the future climate period this time reduce to five months from November to March.

The results showed that all three types of frost are Non-static .The trend of weak frost will increase in the future and trend of moderate and severe frosts will decreases . Increasing the number of weak frosts and increasing of moderate and severe frosts in future indicates the sensitivity of frost in Zabol station to global warming.

**Keywords:** Simulation, frost, general circulation model (GCM), Zabol

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## Applications of Multivariate Adaptive Regression Spline (MARS) for Modeling and Explaining Long Term Salinity and Total Dissolve Solid (TDS) river water

Case study: Basins of khorasan jonobi

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### Abstract

Salinity (Ec) and Total Dissolve Solid (TDS) are considered as quality factors of drinking water, agriculture and industry. First relation between Debit-Ec and Debit-TDS (rating function) of taken samples doing with the fitted regression models, exponential, power and the neural network. The long-term analysis of Ec and TDS of water river (day, month and annual scales) did with the selected model. Almost analytical samples taken from normal flow and small flood. River floods and low floods have important effects in analyzing and explaining the volatility Ec and TDS. Therefore it is need to estimate Ec and TDS of these flood and low flood (extrapolation). Through Ec and TDS are bounded, so current models can not be well in Extrapolation. Propose of this paper is implementation a new model multivariate adaptive regression spline (MARS) to solve this problem. Also South Khorasan province basins were selected for case study. MARS is a piecewise linear regression model (or nonlinear) that better perform in extrapolation and observe in bound. Three models exponential, power, and MARS (with transform) were fitted on the statistics of Debit-Ec and Debit-TDS stations in South Khorasan province. Two views of the physical and statistical model are superior selection criteria that MARS show superiority in these models. The results of models fitting were compared with two modes of interpolation and extrapolation. The MARS model extrapolation represented the reasonable values, while extrapolation of other models represented very big values (infinite). Analysis showed that the MARS model with transform can be suitable replacement for rating curve modeling of Ec and TDS.

**Key words:** water salinity, MARS Regression, Exponential, Power, khorasan jonobi basins.

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## Mid-tropospheric Trough and Severe Frosts in Iran

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### Abstract

Sever frosts during autumn, winter and spring seasons cause damages in the agriculture, industry and transport parts of Iran every year. These frosts are including radiation and frontal types. The location of Iran in mid-latitudes and the spreading of westerlies over much of Iran especially during cold half-year provide the happening and strengthening of frontal frosts. The cA air-masses from north (Arctic basin), cP and mP ones respectively from northeast (Siberian basin) and (Europe and Black Sea basin) causes frosts in Iran.

Our study area within 25° - 40° north latitude and 44° - 63° east longitude is at the risk of cold air attacks during cold half-year. Thus we selected 50 air stations from throughout Iran in the southwest of Asia. In first step, we determined 75 frost waves based on mean daily temperatures including the zero and under zero degrees Celsius during recent decade from 1994 to 2003 years. In second step, we could determine 31 cold air waves based on the daily distribution of low temperatures and so their beginning, peak and end (based on date), their severity (based on air temperature) and duration (based on day). We measured the depth of every trough during the peak day of every cold air waves for statistical analysis including plot and regression.

Results showed the severe frosts have happened during winter except the frost wave of 1994 that happened during autumn. We found February as the most frosty month (based on the frequency of frosty days) and January as the coldest one. While it was accepted that spring frosts cause more damages, instead it our results showed that autumn ones has more frequency. It was determined that the location of western troughs at most in Iran is 10 degrees lower than middle location in southern hemisphere and frosts severity had significant relationship with troughs depth (58 %). Synoptic patterns showed that all axes were located over Eastern Iran and they are oriented northeastern-southwestern during peak days. This orientation facilitates very cold air flows from high latitudes toward southern areas. Migrant troughs from higher latitudes caused sever frosts and migrant troughs from low latitudes cause widespread ones.

The irregular occurrence of continued and low temperatures over vast areas as frost waves is an expected characteristic for Iran climate. We were losing resources and products in North, Central and sometimes South of Iran because of these cold air waves. Although the safety of the frosts over Southern Iran is better than other parts but the water and soil resources of southern areas for agriculture are so limited. It means, we have many fertile plains and permanent rivers over Western and Northern Iran and so frost risk can not take up agriculture activities. It looks; reducing damage to growers in these damage-prone areas require changes in cropping patterns, usage of resistant and late seed and varieties as basic strategies.

**Key words:** Synoptic review, sever frosts, migrant troughs, Iran.

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## Assessment of the Environmental Risks of the Urmia Lake Peripheral Parts Due to the Lake's Border Fluctuations During 1985 to 2010

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### Abstract

Evaluating the effects and environmental capacities is one of the most fundamental issues for economical and social planning, urban and rural projects these days. Lake Urmia is situated between 45°10' and 45°45' east longitude and lies between 37° to 38°16' north latitude. Its maximum area is in the months of May and June and minimum spread occurs in September and October. The total area of the Lake Urmia's drainage basin is over than 51,876 square kilometers; its length, width and environment are estimated respectively almost 140, 20 to 50 and 500 square kilometers. At the West side of this lake there is an internal flow that rills from north to south, on its east part it rills from south to north, while in the northern coast it has east-west direction, in the southern coast it has west-east direction and it would increase the problems of the east coast that also has maximum rollback. The research according to the type of the purpose is an applied manner and point of view pictures of the years 1985 and 2010 were utilized. In software's environment different sections were cut and in ARC GIS software environment on the Lake Urmia four levels were determined considering the state of land's staff productivity and population area. Then by using different layers of population, residential areas, height, usage etc... and by laying layers on each other, five appropriate maps were provided that each map was analyzed, and on the basis of it most of the cities that located in the east part of study area such as Tabriz, Azar shahr, Sufian, Miandoab, Marand etc... are most exposed to ones to danger and therefore the cities like Bonab where wind blows from the west they are at the highest risk because the most peripheral parts of the lake are 30 meters lower than sea level and it causes this area to be more risky. Transferring salt by wind and irrigation of the lands by farmers cause the salination of 10 million hectares of the water and dryland farms and being at the risk of more problems and therefore immigration of hundred thousands of our compatriots during the time. So this problem added to the other environmental problems that should be taken seriously. There are two ways to decrease the danger; first, it is suggested to abandon water withdrawals from the illegal digging wells immediately and abusers should be met by justice, Secondly the share of Lake's water should be increased, otherwise according to diffusion of Mediterranean winds to west of our country not only it can cause damage to the peripheral provinces but also it can destroy Tehran

**Key words:** Environmental effects, ranking, assessment, GIS, Urmia lake