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Genetic characterization of Iranian subpopulations using 15 forensic autosomal STR loci

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Abstract

The objective of present study was to compare genetic structure of seven Iranian provinces and to understand the genetic relationship among these seven provinces (Isfahan, Fars, Hormozgan, Kerman, Chaharmahal & Bakhtiari, Kohgiluyeh & Boyer Ahmad, and Yazd). For this purpose, a set of 15 STR's loci were investigated. This panel of STRs is standard forensic science genetic testing tool that we added some importance to them by putting them in genetic variation analysis. The results based upon Fisher exact test for Hardy-Weinberg equilibrium (HWE) indicated that the allele and genotype distributions were in accordance with Hardy-Weinberg expectations except for D16S539. From genetic diversity point of view, D2S1338 was among the best STR loci and Isfahan has the highest value in aspect of these indices. Our results indicated that high amount of gene flow have been from Isfahan to Fars, which should be further investigated. Also, we indirectly shown that those forensic motivated genetic markers could be used as reliable tool for genetic differentiation when sounds data are available. We did not mean to estimate forensic science specific measures e.g. probability match and etc. for current study.

Keywords: *STR's loci, genetic relationship, genetic diversity, Iranian population*

Introduction

Despite wide-range ethnic groups which have dwelled and still are living in Iran territory, the volume of genetic investigations in this population have been surprisingly so narrow. There are some reasons which would make genetic investigations in courtiers like Iran to be deeply compelling and spectacular e.g. Iran's ethnic, religious

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composition, geographic breakdown ethno-religious diversity, population growth rates in the Middle East, geographical non-uniform landscape to names a few sounds to be unique. Also based upon its historical and prehistorical facts, Iranian landscape and plateau, has been the core of multinational traders, invaders, from both Asia and European regions. Adding to this matter, the Iran's central power hegemony across long history, either relocated own Iranian ethnic people within Iran for forever reasons or have brought up some many slaves and peoples from other countries to Iran.

In one of the first formal scientific study, Akbari et al. (1986) by help of different sort of diverse genetic markers (blood group antigens, serum proteins and red cell enzymes), studied four ethnically distinct populations of Iran. He has shown that the ethnic affiliation genetic structure and their breeding structure, besides disruptive selection are more likely the key of genetics difference among Iran ethnic groups. In his paper he cited many formal studies which have done in deciphering Iranian population genetically. Senemar et al. (2009) investigated south Iranian population using Cystathionine B-synthase 844INS 68 polymorphism. She concluded that south Iranian population, based upon aforementioned polymorphism gene, shows far distance from East Asian and African populations. Also he concluded that, south Iranian population shares much genetic background with other Caucasian populations, though, high amount of admixture of Iranian population with the neighboring non-Caucasoid populations is expected.

In a forensic science-based study, Fakhrzar et al. (2008) compared different Iranian ethnic group based upon mitochondrial haplogroup. He shown that in Fars, Azari, Gilaks, Kurds and Sistani groups, west Eurasia haplogroup was dominant, but in Arab, Balouch, west Eurasia haplogroup was dominant. In a study, Mojtabavi-Naeini et al. (2013) investigated the informativeness of D7S2420 CA repeat STR marker in 5 end of SLC26A4 gene region in Iranian five ethnic groups (Fars, Azari, Turkmen, Gilaki, and Arabs). It was turned out that all ethnic groups investigated in his study were in equilibrium ($P > 0.05$) from Hardy-Weinberg point of view. In a very interesting study, Bahmanimehr et al. 2015 investigated genetically a random population of northwest of Iran using haplogroup G2-M406. This region is renowned to be as cradle of great civilizations like Mesopotamia and Elam and is surrounded by Zagros Mountain. It was calculated that the entrance of haplogroup G2-M406 to this region backed before 8800 years before present time. They highlighted that the gene flow from neighboring regions and free movements of the local people have been sharply restricted by geographic due to Zagros Mountains. Also they shown a westward migration of Iranian population dwelled in this plateau to the Europe through Turkey and Caucasus. By investigating D9S1837 within TMC1 gene in five different ethnic Iranian groups, the heterozygosity of all investigated ethnic groups obtained more that 70%, though in two ethnic groups (l Arab and Azeri) this measure of genetic variation was about 84.8% (Motamedi and Samira et al., 2015). Other study using HLA DRB1 polymorphism has shown high level of genetic diversity in Iranian population dwelled in Russia and Eastern and Southern European countries (Yari et al., 2007). It has been many studies which stressed the potential of STRs in human genetic variation analysis.

In Iran, the results population analysis using STR loci were published in 2006 and 2009 (Valianand et al., 2006; Lahmi et al., 2009). The human genome contains a large amount of polymorphic sequences, which are known as polymorphic markers (Valian et al., 2006). Tandem repeat DNA sequences, which are widespread throughout the human genome, show sufficient variability among individuals in a population (Lahmi et al., 2009). An important topic in DNA studies is the development of STR

databases and their detailed population-genetic analysis regarding the diversification and differentiation of subpopulations. Because of high level of polymorphism, STR have been recommended as optimal genetic markers to study genetic diversity in closely related populations (Bradley, 1997; Eding and Laval, 1999), thus the present study aimed at characterize these Iranian population and to investigate the genetic relatedness between seven districts using a set of 15 STR loci. In many studies undertaken human genetic analysis in Iran, the number of genetic markers, particularly STRs, have been quite low, after all, they didn't include (south) central part of Iran plateau, which is dwelled by different ethnic and ethno-religious groups. Therefore, this study was designed to make some hidden genetic association across subpopulation visible.

Material and methods

Subpopulations

Figure 1 shows subpopulations (provinces) which people from there used in this study. These provinces and the number of people (N) used in this study were *Isfahan* (N= 83), *Fars* (N= 52), *Hormozgan* (N= 6), *Kerman* (N= 19), *Chaharmahal & Bakhtyari* (N= 13), *Kogiluye & Boyer Ahmad* (N= 8), *Yazd* (N= 7). However there were 15 persons which were not clear to which provinces belong to, we treated these people as an *Unknown* group. In other words, the data that did not allocated to special province placed in *Unknown* category. In total, our entire data composed of 203 unrelated healthy Iranian people. The *Isfahan* and Fars districts are located at center and Southwestern of Iran and has a high density of population. Because these two cities are the biggest and industrialized among these seven districts, the gene pool of these populations is subject to active migrations from small cities such as *Yasouj*, *Shahrkord* and towns suburbs these cities. However, the genetic analysis of these populations may not correctly show the genetic structure of the regional ethnic population but we hoped that it would shed some light on this regards.

Figure 1: Subpopulations investaged in this study.

DNA Experiment

DNA extraction: DNA from 203 unrelated individuals (after removing suspected related people, gathered over 4 years, were used in this study samples was extracted using QIAmp1 DNA Mini Kit (QIAGEN, Hagen, Germany) according to manufacturer's instructions. DNA quantification: The total amount of human genomic extracted DNA was determined by using Quantifiler TM Human DNA Quantification Kit (Applied Biosystems, Foster City, CA ,USA), which employs a TaqMan1 MGB Probe-based technology (Applied Biosystems, Foster City, CA, USA) on ABI Prism1 7000 Sequence Detection System (Applied Biosystems, Foster City, CA, USA (PCR: Simultaneous amplifications of 16 STR loci (multiplexed PCR) were performed by using the AmpFlSTR1 Identifiler TM PCR Amplification Kit according to the user's manual recommendations. The 16 loci amplified in this study are D3S1358, vWA, FGA, D8S1179, D21S11, D18S51, D5S818, D13S317, D7S820, TH01, TPOX, CSF1PO, D19S433, D2S1338, D16S539 and the gender determination marker, Amelogenin. Typing: The separation and detection of amplified products were conducted with the ABI Prism1 3100 Genetic Analyzer 4-capillary array system (Applied Biosystems, Foster City, CA, USA) following manufacturer's protocols. Data collection was performed with Data Collection v. 2.0 software (Applied Biosystems, Foster City, CA, USA) and samples were analyzed by GeneMapper1 v. 3.2 software (Applied Biosystems, Foster City, CA, USA).

Statistical analyses

Test for Hardy-Weinberg equilibrium (HWE) was carried out for 8 subpopulations (including unknown group) and 15 loci. Two test for this purpose were done. Ordinary chi square test by PopGene (Yeh et al., 1997) and GeneAlex (Peakall et al., 2012) and Fisher Exact Test by Arlequin (Excoffier et al., 2005). Also *P* value for Global test of differentiation among sample and Pairwise FSTs differences were calculated using Arlequin. Genetic diversity parameters such as expected and observed heterozygosity, gene flow, Nei and Shannon indices were estimated by PopGene and GeneAlex. Pairwaise comparison of loci for Linkage Disequilibrium (LD) test was performed by GenePop (Raymond et al., 1995). Population assignment was carried out by GeneAlex program. Mean number of allele per locus, mean of heterozygosity, mean of Nei genetic diversity was performed by Gene Class 2 (Piry et al., 2004).

Results and discussion

Hardy-Weinberg equilibrium

The general assumption in estimating genetic studies for is that data should be independent (this assumptions sometimes hardly rarely fulfilled) and data should fit the assumption genetic testing measures. For example, the general Hardy–Weinberg measure/law is based on large sample size. In our study for some subpopulations, large-sample size data weren't exist. For this reason two approaches were followed to evaluate Weinberg measure/law for STR loci. In Table 1 the loci were categorized on these two methods. The first one was ordinary chi square test, in this method only 6 out if 15 loci (D7S820, TH01, D13S317, D16S539, VWA, D5S818) didn't placed in HWE. In fact because the low number of individual in 6 district except for *Isfahan* and *Fars*, the comparisons between expected and observed allele frequency could be bias and we were to use Fisher exact test method for these districts. Using fisher exact test it was indicated that all loci in exception of D16S539 (P = 0.05) were in equilibrium from Hardy-Weinberg point of view. Population genetic theory predicts the loss of

genetic diversity in population that remain small for several generations (genetic drift), in population that initiated from a low number of colonist (founder effect) and in population that suffer rapid decline in size (population bottleneck) (Barett and Cohn, 1991).

Table 1: Hardy-Weinberg equilibrium for total population

Locus	*P* by chi square		*P* by Fisher exact test	
D8S1179	0.925	ns	0.1699	ns
D21S11	0.42	ns	0.9724	ns
D7S820	0	**	0.2223	ns
CSF1PO	0.132	ns	0.2151	ns
D3S1358	0.331	ns	0.9351	ns
TH01	0.038	*	0.0769	ns
D13S317	0	**	0.2434	ns
D16S539	0	**	0.0023	**
D2S1338	0.472	ns	0.2927	ns
D19S433	0.647	ns	0.3535	ns
VWA	0	**	0.7792	ns
TPOX	0.268	ns	0.4603	ns
D18S51	0.556	ns	0.3838	ns
D5S818	0	**	0.5222	ns
FGA	0.909	ns	0.1205	ns

ns = non-significant
* $P<0.05$
** $P<0.01$

The result of Table 1 is kind of surprise in a way that it shows up there were'nt any Hardy–Weinberg distributing factcors (migration, selction etc) in the population (lumping the whole subpopulation togher).

Genetic diversity

Different genetic population parameters such as number of individual (N), average number of alleles (MN_A), effective number of alleles (N_E), allelic richness (AR), private alleles (PA), Shannon gene diversity index (I), Nei gene diversity (Nei), average heterozygosity (Ave H) and gene flow (GF) for each 15 loci across whole population and 8 subpopulations are illustrated in Tables 2 to 4. Genetic diversity in comparing different populations was expressed as heterozygosity. There are three ways that variation in population expressed. The first one is gene diversity that is the proportion of polymorphic loci across the genome. All loci in 8 subpopulations were 100% polymorphic (data hadn't been shown). The second is fraction of individual that is heterozygous at a specific locus. The average heterozygosity as shown in Table 3 were high, the average Ho were 0.746 ranging from 0.668 (TPOX) to 0.832 (D18S51). The third is mean number of allele per locus. As seen in Table 2, number of alleles per all loci were high in 8 populations and ranged from 4.5 for TH01 to 14 for D18S51 with a mean of 9.2.

The allelic richness is an estimate of number of allele per locus corrected by sample size (Bi et al., 2003). The D2S1338 had the highest amount of allelic richness (6.098) and *Isfahan* had the most (8.37) among the other populations.

Table 2: Genetic diversity parameters for each locus

Loci	N	MNA	NE	PA	AR	Ave H	Nei	I	Gene Flow
D8S1179	402	7	4.586	1	5.169	0.773	0.823	1.901	4.896
D21S11	406	6.75	5.234	1	5.250	0.808	0.823	1.821	9.097
D7S820	388	5.75	4.100	2	4.378	0.738	0.793	1.699	5.197
CSF1PO	390	4.5	3.140	2	3.561	0.671	0.712	1.367	5.741
D3S1358	402	5	3.780	1	4.160	0.728	0.763	1.534	5.143
TH01	404	4.25	3.190	0	3.623	0.682	0.718	1.347	4.167
D13S317	402	5.875	3.997	1	4.509	0.739	0.785	1.727	4.568
D16S539	402	5.625	4.007	1	4.338	0.716	0.801	1.749	2.891
D2S1338	386	8.625	6.449	1	6.098	0.827	0.881	2.222	4.470
D19S433	398	5.125	3.646	1	4.036	0.716	0.753	1.526	4.780
VWA	404	6.125	4.139	3	4.721	0.753	0.781	1.717	7.117
TPOX	400	4.75	3.040	3	3.661	0.668	0.700	1.393	3.870
D18S51	388	8.625	6.087	2	5.859	0.832	0.867	2.154	5.051
D5S818	402	5.625	3.645	5	4.029	0.720	0.745	1.559	8.962
FGA	392	7.750	5.515	2	5.522	0.814	0.847	2.006	5.465
Mean	398	9.2	4.586	1.733	4.594	0.746	0.786	1.715	5.016

Table 3: Genetic diversity parameters for each districts

Districts	MNA	NE	PA	AR	I	F	He	Ho
Isfahan	8.4	5.03	1.267	8.37	1.716	-0.008	0.786	0.793
Fars	7.333	4.849	0.2	7.359	1.678	0.032	0.780	0.756
Hormozgan	4.533	3.416	0	4.283	1.299	-0.120	0.671	0.758
Kerman	6.133	4.306	0	6.071	1.564	0.077	0.753	0.697
CH.B	5.533	3.996	0	5.511	1.480	-0.090	0.731	0.798
Unknown	5.933	4.496	0.2	5.801	1.570	0.112	0.761	0.676
K.B	5.333	3.984	0	5.172	1.477	-0.048	0.733	0.765
Yazd	5.533	4.354	0.067	5.329	1.531	-0.016	0.749	0.760

MNA: mean number of alleles- NE: number of effective alleles- PA: private alleles- HO: heterozygosity observed- he: heterozygosity expected- AR: allelic richness- I: Shannon index- F: fixation index

Private alleles are alleles that are found only in a single population among a broader collection of populations. These alleles have proven to be informative for diverse types of population-genetic studies, in such areas as molecular ecology and conservation genetics (Kalinowski, 2004) and human evolutionary genetics (Szpiech et al., 2008). Private alleles were observed in 4 out of 8 populations (*Isfahan, Fars, Unknown and Yazd*) and in all loci except for TH01. Frequency of private alleles for each loci haven't been shown. Also for each locus the Nei and Shannon gene diversity were depicted in Table 3. According to Nei and Shannon indices, the TPOX and TH01, respectively had the lowest and D2S1338 for both indices had the highest gene diversity index (see Table 4). However, the amount of allelic richness and private allele depends on sampling errors due to finite sample size.

As Fis suggest the mean inbreeding was close to zero (Fit= 0.059, Fis= 0.016) indicating that marriage in these 8 population isn't based upon familial relationship. Fst was the interpolation genetic differentiation based on fisher equation ranging from 0.027 to 0.061 with a mean of 0.048. As Gst showed in Table 5, only slight variation assigned between populations and most of the diversity allocated to within

Table 4: Nei's estimation of heterozygosity and F statistics

	He	Ho	Ht	Dst	Gst	Fis	Fit	Fst
D8S117	0.772	0.811	0.812	0.01	0.013	-0.05	0.001	0.049
D21S11	0.808	0.837	0.83	-0.009	-0.011	-0.006	0.021	0.027
D7S820	0.738	0.699	0.773	0.002	0.002	0.053	0.097	0.046
CSF1PO	0.671	0.661	0.7	0.001	0.002	0.014	0.055	0.042
D3S135	0.728	0.774	0.763	0.008	0.011	-0.063	-0.014	0.046
TH01	0.682	0.685	0.723	0.013	0.017	0.04	0.094	0.057
D13S31	0.739	0.768	0.78	0.012	0.015	-0.038	0.016	0.052
D16S53	0.716	0.610	0.778	0.029	0.037	0.148	0.216	0.08
D2S133	0.827	0.838	0.873	0.012	0.013	-0.014	0.039	0.053
D19S43	0.716	0.829	0.753	0.008	0.011	-0.026	0.025	0.05
VWA	0.753	0.767	0.779	-0.003	-0.004	-0.018	0.016	0.034
TPOX	0.668	0.581	0.711	0.013	0.018	0.13	0.182	0.061
D18S51	0.832	0.832	0.873	0.005	0.005	0	0.047	0.047
D5S818	0.720	0.753	0.74	-0.008	-0.01	-0.046	-0.017	0.027
FGA	0.814	0.812	0.851	0.004	0.005	0.016	0.059	0.044
Overall	0.787	0.74	0.787	0.006	0.008	0.008	0.055	0.048

Ho=Observed, Ht = Total Expected Heterozygosity, Gst = Analog of Fst, adjusted for bias, Dst=the genetic diversity among populations

population differences. According to Fst there are little and negligible differentiation between populations (for 10 loci Fst < 0.05). This phenomenon is relatively attributed to high rate of migration between these populations as earlier mentioned in the introduction section that said *Isfahan* and *Fars* are the two big cities in Iran and absorb people of surrounded cities and towns.

Genetic relationship

Results of Nei genetic identity and Nei genetic distance are presented in Table 5. Elements above and below diagonal are Nei genetic identity and NEI genetic distance, respectively. In most comparison a high identity was observed for all sets except for the *Kerman-Unknown* (0.006), *KB-Yazd* (0.045) and *Kerman-Yazd* (0.056). As seen in Table 5, identity of unknown probably was more similar to *Isfahan* and *CH.B*. Thus we think that the most of *Unknown* population were belongs to these two provinces. While the most genetic identity values were obtained for *Isfahan-Yazd* (1.023), *Fars-Yazd* (1.022) and *Isfahan-Fars* (1.005).

Table 5: Nei genetic identity & Nei genetic distance

	Isfahan	*Fars*	*Hormozgan*	*Kerman*	*CH.B*	*Unknown*	*K.B*	*Yazd*
Isfahan	----	1.003	0.844	1.005	0.949	1.001	0.990	1.023
Fars	-0.004	----	0.868	0.980	0.943	0.996	0.981	1.022
Hormozgan	0.169	0.142	----	0.820	0.820	0.851	0.881	0.825
Kerman	0.006	0.020	0.199	----	0.953	0.006	0.992	0.056
CH.B	0.052	0.058	0.199	0.048	----	0.925	0.964	0.944
Unknown	-0.001	0.004	0.161	-0.006	0.712	----	0.946	0.083
K.B	0.010	0.019	0.127	0.008	0.037	0.055	----	0.045
Yazd	-0.023	-0.022	0.193	-0.054	0.058	-0.080	-0.044	----

Elements above diagonal are Nei genetic identity and elements below diagonal are Nei genetic distance

This result indicates that because of special geographic and ease trip between *Fars*, *Isfahan* and *CH.B*, there are more migration between these cities. Surprisingly, between the Provinces with most Nei identity values (As mentioned above) had the lowest Nei distance indices. *Unknown-Isfahan* (-0.001) and *Fars-Isfahan* (-0.004) were the comparisons with the lowest Nei distance values. The most genetic distance was pertained to *Hormozgan*, that it had the large genetic distance value in comparison to other cities (*Hormozgan* in comparison to other cities was almost 0.1). Besides, in Table 6, the results of FST genetic distance are below diagonal elements. By pair-wise Fst comparison, also we determined significance status for each comparison. Among these, total *Hormozgan* comparison with other cities were significant ($P < 0.05$). Result of differentiation test shows that *Hormozgan* relative to other cities had a different genetic structure. Peoples living in adjacent provinces around *Hormozgan* are less tended to live in *Hormozgan*, and most of the *Hormozgan* population constitute of native and people from other cities. Also *K.B* with *Isfahan, Fars and Unknown* had significant differences ($P < 0.05$). Above diagonal elements in Table 6 are P-values for global test among these 8 populations. As presented in this table, none of the comparison were significant.

Table 6: Global test of differentiation among sample (P-value) (Above diagonal), Distance method: Pairwise FSTs differences (Below diagonal)

	Isfahan	*Fars*	*Hormozgan*	*Kerman*	*CH.B*	*Unknown*	*K.B*	*Yazd*
Isfahan	0	0.137	0.865	0.696	0.87	0.836	0.834	0.847
Fars	-0.002	0	0.65	0.657	0.307	0.259	0.58	0.609
Hormozgan	0.037*	0.035*	0	1	0.545	0.569	1	1
Kerman	-0.005	0.004	0.054*	0	0.505	0.488	1	1
CH.B	0.010*	0.014*	0.055*	0.012	0	0.232	0.501	0.515
Unknown	-0.005	-0.002	0.042*	-0.004	0.020*	0	0.529	0.545
K.B	0.001	0.005	0.032*	0.002	0.010	0.013	0	1
Yazd	-0.006	-0.005	0.046*	-0.014	0.016	-0.020	-0.011	0

Population assignment

Brief results of Iranian population assignment are depicted in Table 7. From 88 *Isfahan* Population samples, only 33 of them originally pertaining to Isfahan and the rest of them was from *Kerman* (17), *Fars* (15), *CH.B* (6) and *Yazd* (5). Extended population assignment table was in Appendix 1.

Table 7: Number of assignment pertaining to each district

Pop	*N*	*Isfahan*	*Fars*	*Hormozgan*	*Kerman*	*CH.B.*	*Unknown*	*K.B.*	*Yazd*
Isfahan	83	32	15	0	17	6	8	0	5
Fars	52	7	33	1	2	2	1	1	5
Hormozgan	6	0	0	6	0	0	0	0	0
Kerman	19	0	1	0	15	1	1	0	1
CH.B	13	0	0	0	0	12	1	0	0
Unknown	15	1	0	0	1	1	12	0	0
K.B	8	1	0	0	0	0	0	7	0
Yazd	7	0	0	0	0	0	0	0	7

Conclusion

Iranian population is an admixture of different ethnic ethno-religious groups (Persians, Lorish, Muslim, Jews, and Christians etc). Because Iranian population wasn't studied thoroughly previously, thus we intended to characterize Iranian population in aspect of genetic diversity, genetic relationship and population assignment to have clear understanding about these Iranian subpopulation. Loci was in HWE equilibrium except for the D16S539. Different genetic diversity parameters such as mean number of alleles (MNA), number of effective allele (NE), private alleles (PA), allelic richness (AR), Shannon index (I), Fisher test (F), heterozygosity expected (He), heterozygosity observed (Ho) for each loci and each population. From genetic relationship point of view, different test was performed on the population (Nei genetic identity & Nei genetic distance, global test of differentiation among sample, Pairwise FSTs differences). In assignment test result showed that expect for big cities such as *Fars* and *Isfahan*, samples from each provinces pertained to themselves. The most immigrants were to *Isfahan* and *Fars*. The STR data of Iranian population from this study is available (sending a request e-mail to author). We strongly recommend that the genetic population test was performed on Iran's capital (*Tehran*) and in the availability of instruments, STR information from the other important provinces of Iran (*Tabriz, Sistan & Baluchistan, Mashhad, Kermanshah* , …) would be gather to reveal the genetic background beyond total Iranian population.

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Appendix Table 1: Assignment values

Sample	Pop	Isfahan	Fars	Hormozgan	Kerman	CH.B	Unknown	K.B	Yazd	Assigned Population	
4	Isfahan	-21.089	-20.926	-28.276	-24.810	-25.284	-22.972	-26.820	-21.812	2	Fars
173	Isfahan	-21.353	-21.088	-27.308	-24.553	-21.919	-22.117	-23.674	-21.247	2	Fars
12	Isfahan	-18.568	-20.379	-27.709	-19.303	-22.806	-19.630	-20.308	-21.555	1	Isfahan
18	Isfahan	-17.877	-18.662	-20.526	-18.348	-18.473	-22.093	-18.904	-22.493	1	Isfahan
20	Isfahan	-18.798	-19.616	-22.769	-20.487	-22.588	-23.410	-25.181	-25.231	1	Isfahan
35	Isfahan	-20.144	-19.937	-23.052	-19.281	-24.673	-22.259	-22.524	-23.284	4	Kerman
47	Isfahan	-16.772	-16.850	-27.317	-18.152	-16.489	-16.358	-18.320	-16.492	6	Unknown
32	Isfahan	-17.059	-16.572	-25.861	-18.537	-19.305	-17.944	-19.780	-18.055	2	Fars
40	Isfahan	-17.445	-17.925	-18.121	-20.082	-21.233	-20.366	-19.973	-20.620	1	Isfahan
50	Isfahan	-16.875	-17.323	-28.465	-17.811	-17.989	-18.706	-19.356	-20.474	1	Isfahan
72	Isfahan	-19.831	-19.342	-29.128	-21.699	-19.095	-22.611	-21.201	-21.715	5	CH.B
60	Isfahan	-18.929	-19.816	-25.246	-22.371	-22.721	-22.971	-22.820	-22.872	1	Isfahan
69	Isfahan	-18.929	-19.816	-25.246	-22.371	-22.721	-22.971	-22.820	-22.872	1	Isfahan
63	Isfahan	-20.441	-20.656	-24.098	-21.694	-21.587	-20.170	-23.729	-21.441	6	Unknown
54	Isfahan	-18.826	-20.111	-22.179	-22.121	-20.839	-22.417	-22.848	-25.897	1	Isfahan
66	Isfahan	-16.310	-17.079	-26.700	-15.961	-18.579	-16.592	-16.239	-14.432	8	Yazd
89	Isfahan	-17.515	-17.569	-20.156	-18.284	-21.884	-17.047	-23.087	-22.238	6	Unknown
92	Isfahan	-18.733	-18.898	-22.623	-19.454	-22.272	-20.295	-18.780	-18.515	8	Yazd
97	Isfahan	-18.438	-18.479	-27.843	-19.612	-21.384	-19.445	-25.207	-19.513	1	Isfahan
102	Isfahan	-19.160	-18.658	-22.473	-17.792	-22.061	-18.453	-26.054	-19.796	4	Kerman
123	Isfahan	-17.068	-17.704	-27.690	-18.824	-18.281	-18.658	-19.156	-18.224	1	Isfahan
112	Isfahan	-19.001	-19.266	-20.697	-20.411	-21.937	-23.653	-23.225	-26.744	1	Isfahan
115	Isfahan	-20.138	-20.276	-27.859	-18.873	-22.646	-20.184	-24.326	-21.219	4	Kerman
126	Isfahan	-18.716	-18.430	-25.934	-20.230	-22.601	-18.511	-21.503	-20.703	2	Fars
132	Isfahan	-18.722	-20.257	-23.891	-20.870	-21.697	-22.463	-22.294	-24.479	1	Isfahan
144	Isfahan	-18.277	-18.762	-23.611	-23.013	-21.717	-20.979	-22.908	-21.344	1	Isfahan
168	Isfahan	-17.150	-17.114	-21.656	-18.780	-19.835	-18.336	-21.894	-20.374	2	Fars
158	Isfahan	-19.380	-18.744	-26.190	-17.996	-20.984	-20.350	-21.093	-19.939	4	Kerman
165	Isfahan	-20.947	-22.240	-27.474	-20.919	-25.205	-20.825	-24.350	-23.961	6	Unknown
129	Isfahan	-20.080	-19.971	-28.547	-22.114	-21.231	-24.762	-21.785	-26.013	2	Fars
136	Isfahan	-20.126	-21.043	-28.782	-21.781	-20.853	-22.533	-20.463	-21.703	1	Isfahan
194	Isfahan	-18.980	-19.797	-22.517	-18.775	-20.711	-19.950	-19.220	-22.344	4	Kerman
189	Isfahan	-18.048	-19.325	-28.308	-17.938	-18.171	-20.147	-20.001	-19.627	4	Kerman

203	Isfahan	-20.247	-20.162	-25.958	-21.605	-21.454	-22.515	-22.514	-22.067	2	Fars
200	Isfahan	-17.868	-19.046	-22.554	-18.089	-17.289	-20.487	-20.184	-22.490	5	CH.B
206	Isfahan	-19.928	-20.495	-22.718	-19.601	-22.593	-19.282	-26.401	-20.955	6	Unknown
215	Isfahan	-21.222	-20.973	-27.730	-23.603	-25.580	-23.244	-25.407	-25.583	2	Fars
231	Isfahan	-18.319	-19.207	-26.195	-19.939	-22.754	-19.943	-19.700	-19.909	1	Isfahan
241	Isfahan	-19.019	-20.272	-23.315	-18.303	-22.199	-20.833	-22.267	-23.529	4	Kerman
207	Isfahan	-18.993	-19.539	-26.037	-19.524	-23.143	-19.708	-20.611	-21.081	1	Isfahan
172	Isfahan	-17.821	-18.588	-26.945	-17.755	-18.741	-18.650	-19.019	-19.872	4	Kerman
6	Isfahan	-21.198	-21.184	-28.991	-24.812	-25.622	-24.603	-23.560	-23.359	2	Fars
175	Isfahan	-18.400	-18.303	-27.218	-20.667	-23.048	-21.645	-22.605	-20.271	2	Fars
14	Isfahan	-18.177	-19.389	-24.195	-20.522	-19.493	-19.747	-21.661	-21.141	1	Isfahan
34	Isfahan	-17.216	-18.821	-21.450	-17.194	-20.191	-17.472	-20.424	-20.314	4	Kerman
43	Isfahan	-16.958	-17.171	-24.450	-18.773	-19.398	-18.196	-19.621	-21.761	1	Isfahan
75	Isfahan	-17.725	-18.224	-26.491	-17.661	-21.764	-19.125	-20.536	-19.599	4	Kerman
53	Isfahan	-20.609	-21.147	-31.093	-22.034	-22.543	-21.298	-24.468	-23.298	1	Isfahan
101	Isfahan	-19.901	-19.737	-22.162	-20.247	-23.491	-19.465	-23.917	-20.319	6	Unknown
62	Isfahan	-20.711	-21.032	-27.461	-22.333	-19.296	-23.428	-19.708	-21.814	5	CH.B
71	Isfahan	-16.808	-17.559	-28.070	-14.527	-19.474	-16.716	-16.887	-18.067	4	Kerman
65	Isfahan	-19.304	-19.580	-26.405	-20.887	-19.667	-20.942	-22.025	-23.113	1	Isfahan
56	Isfahan	-20.297	-20.650	-24.912	-21.343	-24.564	-22.775	-25.431	-22.724	1	Isfahan
49	Isfahan	-18.399	-18.421	-26.940	-18.530	-23.711	-17.732	-23.831	-17.627	8	Yazd
68	Isfahan	-18.914	-20.470	-30.259	-18.875	-19.465	-20.287	-19.683	-21.578	4	Kerman
91	Isfahan	-18.391	-19.442	-27.350	-20.029	-20.984	-19.861	-20.812	-17.916	8	Yazd
96	Isfahan	-19.822	-20.328	-28.848	-19.945	-24.744	-23.381	-24.491	-23.580	1	Isfahan
99	Isfahan	-22.113	-22.056	-29.237	-21.724	-23.782	-21.202	-26.026	-23.522	6	Unknown
104	Isfahan	-16.881	-18.053	-22.919	-18.471	-19.748	-19.290	-19.934	-21.365	1	Isfahan
125	Isfahan	-17.579	-18.791	-20.751	-17.070	-19.280	-19.759	-20.019	-20.347	4	Kerman
114	Isfahan	-17.046	-17.428	-27.098	-18.406	-18.576	-19.355	-19.047	-21.247	1	Isfahan
122	Isfahan	-23.720	-23.790	-31.265	-25.379	-27.111	-25.068	-27.430	-27.316	1	Isfahan
128	Isfahan	-19.200	-19.568	-26.697	-19.869	-18.766	-18.913	-22.190	-22.389	5	CH.B
160	Isfahan	-17.346	-17.805	-22.442	-18.761	-20.647	-18.185	-20.857	-22.805	1	Isfahan
167	Isfahan	-16.650	-17.284	-22.213	-17.782	-15.206	-15.682	-18.924	-18.110	5	CH.B
131	Isfahan	-18.971	-20.022	-23.554	-17.816	-22.317	-18.728	-23.633	-21.897	4	Kerman
135	Isfahan	-18.585	-18.762	-29.218	-19.972	-21.463	-21.726	-20.037	-23.736	1	Isfahan
202	Isfahan	-17.258	-18.227	-22.572	-16.883	-20.057	-19.030	-20.797	-20.492	4	Kerman
208	Isfahan	-16.085	-15.416	-21.588	-17.964	-18.895	-17.964	-19.961	-18.615	2	Fars
217	Isfahan	-19.512	-20.771	-24.424	-20.642	-21.795	-22.986	-24.641	-24.750	1	Isfahan
182	Isfahan	-15.909	-16.758	-22.797	-18.605	-19.137	-18.903	-22.781	-21.414	1	Isfahan
196	Isfahan	-16.940	-17.766	-26.718	-16.741	-20.889	-17.603	-22.706	-20.446	4	Kerman
233	Isfahan	-19.157	-19.804	-26.906	-18.793	-20.219	-21.566	-20.474	-18.960	4	Kerman
170	Isfahan	-18.463	-18.495	-21.167	-19.146	-21.190	-18.861	-19.804	-22.011	1	Isfahan
258	Isfahan	-17.256	-16.681	-18.325	-17.906	-19.686	-16.279	-18.195	-17.764	6	Unknown
265	Isfahan	-16.507	-16.106	-23.720	-17.408	-20.647	-17.242	-19.468	-16.606	2	Fars
267	Isfahan	-16.325	-15.913	-19.725	-16.614	-17.711	-17.045	-16.603	-18.757	2	Fars
263	Isfahan	-17.110	-18.013	-21.843	-17.423	-15.050	-19.588	-17.105	-20.807	5	CH.B
264	Isfahan	-18.976	-19.146	-25.883	-20.912	-21.406	-20.285	-20.825	-19.319	1	Isfahan
260	Isfahan	-17.187	-17.829	-21.396	-17.203	-20.268	-18.585	-18.126	-21.471	1	Isfahan
283	Isfahan	-22.593	-22.515	-29.162	-23.012	-25.639	-24.933	-24.986	-24.816	2	Fars
292	Isfahan	-19.169	-18.473	-28.031	-20.478	-23.282	-22.139	-24.827	-24.578	2	Fars

266	Isfahan	-19.279	-19.709	-25.478	-19.954	-21.614	-20.674	-22.876	-18.065	8	Yazd
186	Fars	-18.013	-17.246	-26.332	-18.457	-19.573	-20.262	-20.752	-18.939	2	Fars
1	Fars	-18.197	-17.147	-24.572	-20.484	-17.652	-18.700	-21.963	-19.335	2	Fars
7	Fars	-21.305	-21.268	-26.162	-23.667	-19.570	-21.426	-21.496	-22.937	5	CH.B
29	Fars	-18.014	-17.737	-20.973	-23.010	-21.139	-19.435	-21.415	-23.660	2	Fars
10	Fars	-17.164	-16.930	-22.878	-17.349	-20.211	-20.026	-18.447	-21.009	2	Fars
76	Fars	-16.770	-15.375	-22.723	-17.721	-19.775	-18.820	-20.708	-18.654	2	Fars
80	Fars	-19.148	-19.218	-21.445	-17.265	-20.389	-21.289	-23.973	-22.566	4	Kerman
108	Fars	-21.822	-20.497	-27.299	-23.818	-24.863	-23.596	-23.514	-24.469	2	Fars
105	Fars	-17.593	-17.615	-27.833	-19.168	-21.162	-20.516	-22.271	-19.511	1	Isfahan
138	Fars	-16.772	-16.150	-21.940	-19.247	-16.159	-17.413	-18.399	-20.141	2	Fars
146	Fars	-18.892	-18.452	-25.817	-20.118	-19.814	-20.464	-19.371	-19.617	2	Fars
152	Fars	-19.402	-19.742	-22.070	-20.543	-21.033	-20.975	-22.657	-23.006	1	Isfahan
209	Fars	-18.889	-18.665	-27.827	-19.211	-22.306	-19.007	-20.843	-22.650	2	Fars
212	Fars	-17.027	-16.560	-22.748	-17.660	-20.940	-15.672	-18.945	-18.599	6	Unknown
238	Fars	-16.869	-16.286	-21.806	-18.097	-17.816	-17.524	-19.192	-19.046	2	Fars
243	Fars	-19.030	-18.831	-23.751	-18.894	-21.934	-18.711	-21.702	-16.310	8	Yazd
188	Fars	-17.760	-16.986	-23.299	-18.416	-22.081	-18.776	-24.190	-19.136	2	Fars
3	Fars	-16.811	-16.765	-24.424	-16.767	-19.704	-18.294	-19.206	-21.173	2	Fars
9	Fars	-19.000	-17.486	-23.970	-19.993	-22.283	-19.849	-20.639	-22.217	2	Fars
31	Fars	-19.200	-18.379	-26.213	-19.226	-23.022	-20.319	-22.736	-22.152	2	Fars
11	Fars	-20.993	-19.802	-25.253	-23.487	-19.971	-19.855	-22.267	-19.229	8	Yazd
25	Fars	-17.275	-16.936	-24.924	-17.856	-19.382	-20.495	-17.603	-17.812	2	Fars
79	Fars	-18.874	-17.870	-30.799	-21.395	-20.227	-19.224	-18.956	-22.553	2	Fars
82	Fars	-20.001	-19.674	-25.128	-22.382	-20.172	-20.994	-20.984	-20.190	2	Fars
111	Fars	-18.471	-17.733	-19.461	-18.712	-21.346	-17.773	-24.237	-17.491	8	Yazd
107	Fars	-19.728	-19.270	-23.769	-21.432	-24.442	-21.144	-21.053	-23.271	2	Fars
140	Fars	-18.340	-17.428	-21.292	-20.452	-21.609	-18.368	-22.866	-20.435	2	Fars
164	Fars	-20.935	-21.516	-24.973	-22.218	-21.137	-23.175	-21.269	-23.014	1	Isfahan
148	Fars	-24.463	-22.890	-31.788	-26.872	-28.226	-24.145	-27.723	-26.918	2	Fars
154	Fars	-19.266	-18.324	-14.399	-19.889	-20.988	-20.999	-20.508	-20.085	3	Hormozgan
211	Fars	-23.325	-22.639	-27.873	-23.869	-26.882	-24.672	-24.491	-27.375	2	Fars
214	Fars	-17.357	-18.011	-20.463	-18.851	-20.045	-20.832	-23.007	-24.772	1	Isfahan
227	Fars	-18.600	-17.740	-24.572	-18.874	-26.043	-21.059	-21.259	-22.173	2	Fars
240	Fars	-16.372	-16.516	-24.366	-17.724	-19.742	-18.125	-21.906	-17.025	1	Isfahan
245	Fars	-18.095	-17.522	-21.956	-19.780	-17.284	-20.786	-18.780	-20.889	5	CH.B
255	Fars	-17.285	-16.265	-28.192	-18.847	-18.445	-17.605	-19.639	-17.462	2	Fars
256	Fars	-19.329	-18.501	-26.357	-20.490	-20.540	-18.834	-22.565	-20.386	2	Fars
273	Fars	-19.674	-18.867	-23.132	-20.483	-23.213	-19.328	-24.338	-22.770	2	Fars
254	Fars	-17.285	-16.265	-28.192	-18.847	-18.445	-17.605	-19.639	-17.462	2	Fars
252	Fars	-20.063	-18.574	-25.340	-20.728	-24.332	-22.911	-23.963	-22.359	2	Fars
272	Fars	-20.910	-19.623	-26.065	-24.031	-25.194	-24.499	-26.975	-26.578	2	Fars
284	Fars	-20.910	-19.623	-26.065	-24.031	-25.194	-24.499	-26.975	-26.578	2	Fars
295	Fars	-17.705	-18.289	-26.542	-14.739	-17.948	-19.932	-18.792	-17.694	4	Kerman
290	Fars	-19.041	-19.730	-32.621	-21.583	-23.656	-23.073	-22.866	-23.125	1	Isfahan
296	Fars	-20.065	-18.654	-25.144	-20.626	-19.655	-21.880	-21.603	-21.083	2	Fars
301	Fars	-20.533	-19.390	-28.672	-22.020	-24.179	-19.811	-24.498	-19.321	8	Yazd
224	Fars	-16.597	-17.365	-22.195	-18.360	-20.567	-17.341	-18.612	-18.696	1	Isfahan
309	Fars	-6.353	-6.002	-6.896	-6.398	-6.449	-8.715	-4.867	-6.321	7	K.B

276	Fars	-19.465	-18.076	-27.751	-20.691	-22.221	-23.134	-22.276	-23.976	2	Fars
278	Fars	-15.767	-15.232	-16.065	-15.563	-17.277	-16.663	-16.847	-14.125	8	Yazd
277	Fars	-17.840	-17.682	-27.656	-18.921	-22.638	-19.259	-24.106	-19.717	2	Fars
161	Fars	-18.453	-16.631	-19.412	-18.429	-19.597	-19.279	-19.917	-18.648	2	Fars
57	Hormozgan	-19.363	-18.532	-13.077	-17.956	-18.539	-19.683	-20.202	-21.287	3	Hormozgan
59	Hormozgan	-19.362	-19.266	-12.544	-18.689	-23.374	-20.123	-22.778	-21.185	3	Hormozgan
58	Hormozgan	-20.074	-19.244	-10.472	-19.984	-22.204	-19.240	-20.248	-21.184	3	Hormozgan
303	Hormozgan	-19.810	-19.281	-15.737	-22.695	-21.413	-21.371	-23.082	-21.782	3	Hormozgan
306	Hormozgan	-17.859	-17.097	-13.478	-18.656	-18.511	-19.522	-17.663	-18.696	3	Hormozgan
274	Hormozgan	-17.934	-18.911	-13.958	-18.987	-23.453	-20.605	-18.986	-22.201	3	Hormozgan
26	Kerman	-18.937	-19.487	-21.779	-16.858	-17.728	-21.795	-20.287	-22.393	4	Kerman
83	Kerman	-20.396	-20.686	-24.274	-16.563	-22.008	-20.217	-22.401	-22.391	4	Kerman
86	Kerman	-20.855	-21.190	-30.001	-18.955	-29.202	-22.777	-24.330	-20.270	4	Kerman
141	Kerman	-18.077	-18.531	-21.218	-17.678	-24.029	-21.550	-18.764	-21.155	4	Kerman
155	Kerman	-18.446	-19.067	-25.609	-15.867	-22.574	-20.087	-20.535	-22.867	4	Kerman
218	Kerman	-17.103	-17.041	-22.764	-15.862	-19.315	-17.329	-18.179	-18.889	4	Kerman
183	Kerman	-17.036	-18.593	-28.810	-16.409	-20.844	-19.179	-20.218	-21.395	4	Kerman
28	Kerman	-18.242	-18.570	-24.968	-16.638	-18.834	-18.824	-22.644	-18.775	4	Kerman
88	Kerman	-17.308	-18.530	-25.383	-16.772	-17.571	-20.188	-18.308	-18.370	4	Kerman
85	Kerman	-19.629	-19.140	-29.922	-19.302	-21.445	-19.489	-20.575	-19.000	8	Yazd
143	Kerman	-18.177	-18.049	-19.383	-17.934	-17.105	-21.712	-19.489	-21.493	5	CH.B
157	Kerman	-16.983	-17.388	-20.440	-17.115	-19.324	-16.625	-21.057	-18.423	6	Unknown
220	Kerman	-12.794	-12.877	-16.758	-11.956	-12.389	-14.285	-12.944	-14.148	4	Kerman
250	Kerman	-20.834	-22.003	-23.623	-18.182	-19.941	-19.433	-21.406	-22.581	4	Kerman
251	Kerman	-19.690	-21.924	-26.547	-17.633	-25.677	-19.586	-24.663	-22.912	4	Kerman
249	Kerman	-19.719	-20.829	-30.259	-18.862	-27.597	-19.251	-24.629	-22.407	4	Kerman
247	Kerman	-17.705	-18.289	-26.542	-14.739	-17.948	-19.932	-18.792	-17.694	4	Kerman
257	Kerman	-12.121	-11.989	-15.274	-12.319	-16.749	-13.356	-18.189	-15.234	2	Fars
248	Kerman	-16.211	-16.574	-21.253	-13.827	-15.816	-16.196	-15.283	-17.754	4	Kerman
37	CH.B	-18.573	-17.812	-28.715	-19.477	-14.924	-20.507	-18.922	-18.754	5	CH.B
261	CH.B	-18.759	-19.952	-27.211	-17.547	-16.526	-21.389	-16.994	-22.840	5	CH.B
149	CH.B	-18.787	-21.043	-25.894	-18.815	-16.342	-20.660	-21.475	-21.520	5	CH.B
197	CH.B	-17.681	-18.048	-22.627	-18.556	-16.633	-18.667	-20.734	-20.782	5	CH.B
305	CH.B	-8.883	-9.102	-12.901	-9.080	-8.411	-8.074	-10.319	-8.884	6	Unknown
39	CH.B	-18.988	-18.792	-27.339	-21.178	-15.432	-21.252	-20.580	-21.639	5	CH.B
262	CH.B	-17.110	-18.013	-21.843	-17.423	-15.050	-19.588	-17.105	-20.807	5	CH.B
151	CH.B	-17.932	-19.157	-23.179	-17.234	-16.103	-18.391	-18.952	-18.444	5	CH.B
199	CH.B	-20.123	-20.345	-26.697	-19.834	-15.146	-20.156	-19.598	-22.511	5	CH.B
270	CH.B	-20.418	-19.419	-25.338	-21.955	-15.540	-20.835	-21.718	-21.115	5	CH.B
269	CH.B	-20.418	-19.419	-25.338	-21.955	-15.540	-20.835	-21.718	-21.115	5	CH.B
313	CH.B	-17.196	-16.752	-20.450	-17.435	-15.058	-21.273	-16.752	-18.062	5	CH.B
271	CH.B	-18.256	-18.095	-19.405	-19.695	-15.498	-19.211	-19.371	-19.578	5	CH.B
275	Unknown	-17.497	-18.125	-19.146	-17.857	-19.362	-13.615	-21.337	-18.613	6	Unknown
293	Unknown	-17.968	-19.202	-25.639	-18.037	-18.317	-18.754	-19.954	-19.411	1	Isfahan
297	Unknown	-19.210	-19.645	-26.455	-22.586	-18.656	-18.860	-25.063	-23.828	5	CH.B
268	Unknown	-9.773	-9.816	-12.414	-11.328	-9.949	-8.379	-10.710	-10.773	6	Unknown
286	Unknown	-16.704	-16.341	-22.822	-18.355	-20.089	-14.094	-19.950	-15.782	6	Unknown
287	Unknown	-20.563	-21.608	-24.567	-19.810	-23.454	-15.843	-23.713	-20.870	6	Unknown
288	Unknown	-20.563	-21.608	-24.567	-19.810	-23.454	-15.843	-23.713	-20.870	6	Unknown

314	Unknown	-15.677	-16.966	-17.621	-16.343	-18.904	-13.861	-15.025	-17.055	6	Unknown
304	Unknown	-17.256	-16.681	-18.325	-17.906	-19.686	-16.279	-18.195	-17.764	6	Unknown
282	Unknown	-18.940	-19.250	-25.059	-18.724	-23.149	-18.465	-25.924	-19.560	6	Unknown
281	Unknown	-18.993	-17.969	-29.644	-19.675	-19.944	-15.911	-18.904	-17.213	6	Unknown
280	Unknown	-18.567	-19.200	-25.272	-16.792	-21.117	-19.026	-23.381	-21.824	4	Kerman
289	Unknown	-21.683	-21.613	-29.019	-23.502	-25.678	-19.193	-27.700	-21.298	6	Unknown
291	Unknown	-19.548	-18.476	-26.468	-21.759	-24.249	-16.667	-23.207	-19.622	6	Unknown
308	Unknown	-19.079	-19.189	-23.605	-19.754	-22.446	-17.521	-23.843	-22.712	6	Unknown
15	K.B	-17.393	-17.113	-17.503	-17.621	-17.460	-17.104	-15.006	-18.430	7	K.B
221	K.B	-21.478	-22.134	-29.098	-21.819	-22.056	-22.080	-17.410	-25.034	7	K.B
235	K.B	-20.107	-19.009	-23.424	-19.901	-22.840	-21.844	-16.649	-20.673	7	K.B
17	K.B	-19.577	-19.456	-26.185	-19.996	-19.569	-21.505	-15.542	-18.678	7	K.B
223	K.B	-15.734	-16.330	-23.225	-19.000	-17.285	-19.037	-15.743	-20.909	1	Isfahan
237	K.B	-19.385	-20.798	-28.745	-18.104	-19.308	-21.063	-15.552	-19.127	7	K.B
302	K.B	-18.505	-19.578	-27.246	-18.207	-18.096	-22.337	-14.746	-19.967	7	K.B
300	K.B	-20.442	-20.116	-22.082	-20.500	-19.279	-23.183	-14.330	-20.840	7	K.B
44	Yazd	-20.223	-20.269	-28.845	-20.851	-23.928	-21.249	-21.827	-16.861	8	Yazd
191	Yazd	-16.734	-16.794	-22.991	-16.569	-16.103	-17.364	-17.195	-15.930	8	Yazd
228	Yazd	-23.179	-22.570	-25.401	-25.344	-26.782	-23.524	-28.919	-18.177	8	Yazd
46	Yazd	-19.096	-18.450	-30.928	-21.825	-21.558	-19.631	-22.844	-16.863	8	Yazd
193	Yazd	-18.923	-19.580	-23.603	-16.909	-19.623	-19.081	-19.182	-15.576	8	Yazd
230	Yazd	-19.333	-18.830	-25.491	-19.858	-22.568	-18.283	-21.053	-16.953	8	Yazd
246	Yazd	-16.649	-17.803	-22.644	-15.198	-15.762	-17.795	-15.738	-12.551	8	Yazd