



In the name of Allah

DESIGN AND DEVELOPMENT OF A CUSTOMIZED GIS FOR AIR QUALITY MANAGEMENT

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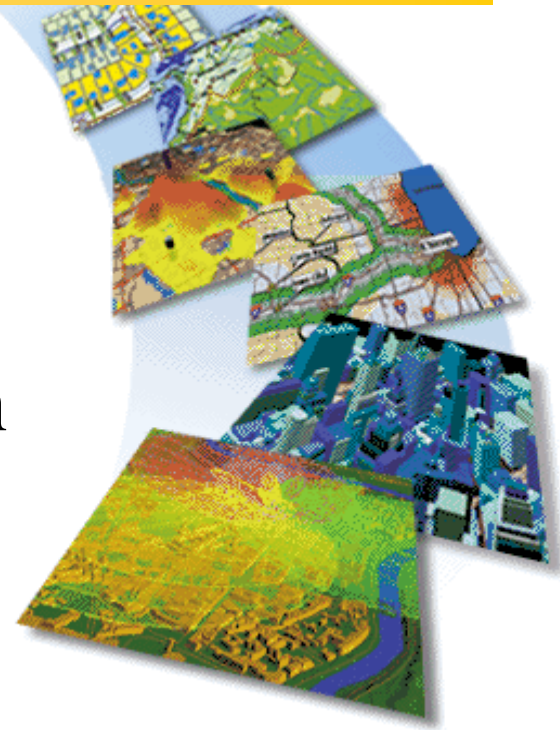
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- ❖ Abstract
- ❖ Introduction
- ❖ Air Pollution Monitoring Stations in Tehran
- ❖ GIS
- ❖ Temporal GIS
- ❖ GIS in Air Quality Management
- ❖ Conclusions and Future Directions





Abstract

- ⚡ **Spatial dispersion** of the pollutants.
- ⚡ lack of accurate, update and organized data
- ⚡ lake of spatial and non-spatial Data
- ⚡ lack of integrated system for capture, storage, manipulation, retrieval, analysis, presentation exchange of environmental data.
- ⚡ A geo-spatial information system (**GIS**) can be used as DSS.





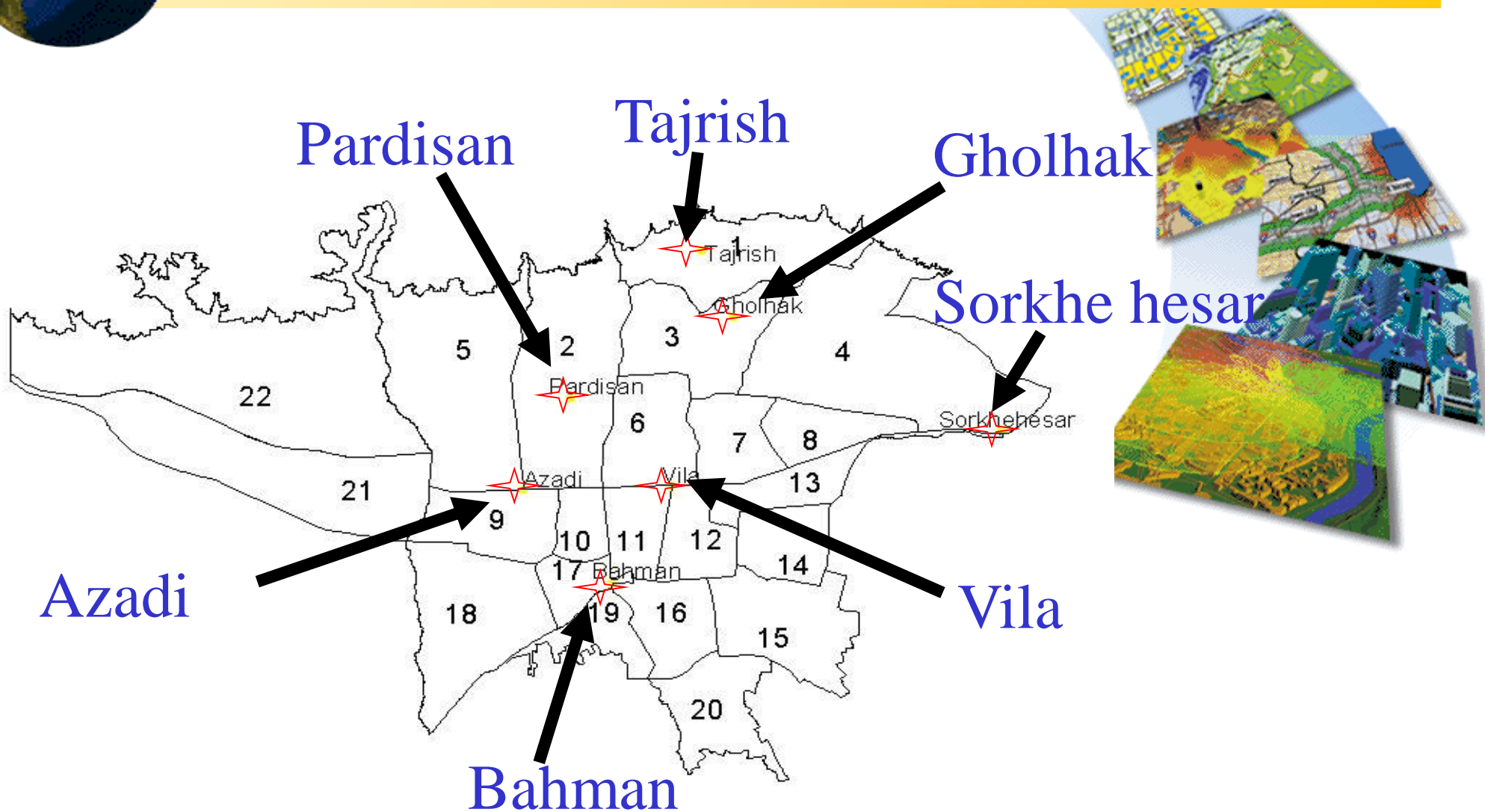
Introduction

- Tehran is the capital of Iran
 - area about 700 Km².
 - Mountains surround North and East of the city.
 - The average of rainfall is 230 mm





Air Pollution Monitoring Stations in Tehran



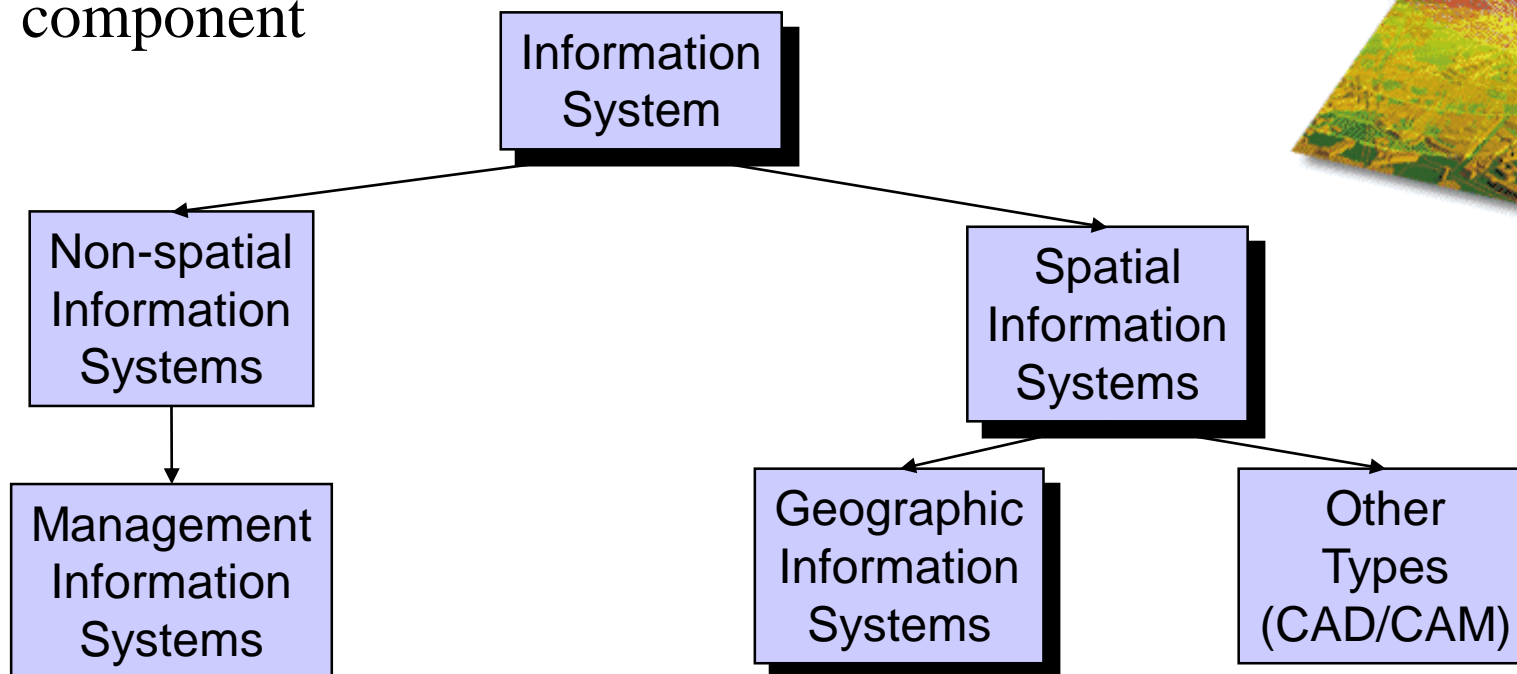
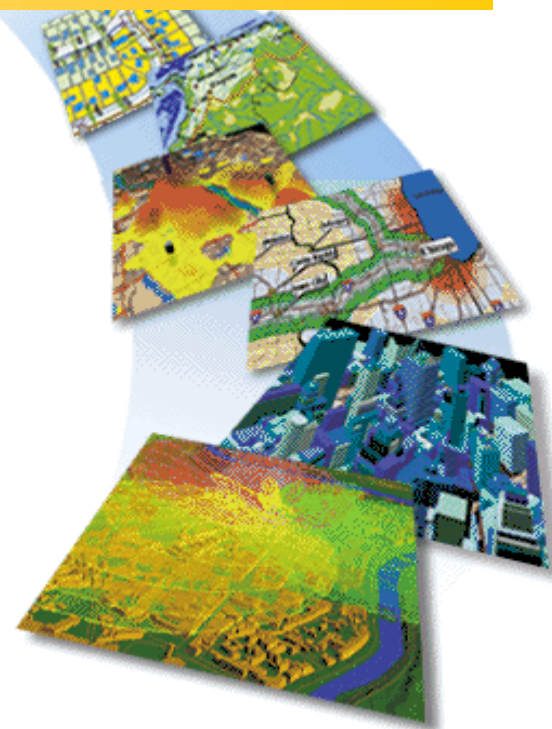


GIS

⚡ Geographic Information System

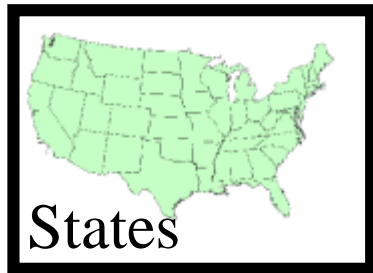
⚡ **GIS** is a system of computer software, hardware and data, and personnel to help, manipulate, analyze and present information that is tied to a spatial location

⚡ Estimates are that 80% of all data has a spatial component





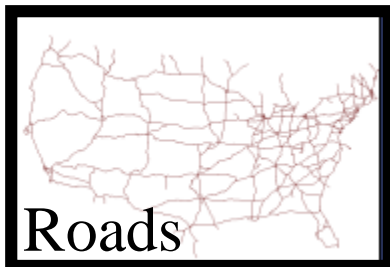
Rivers



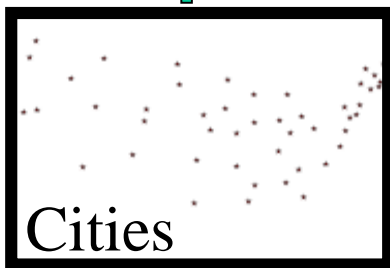
States



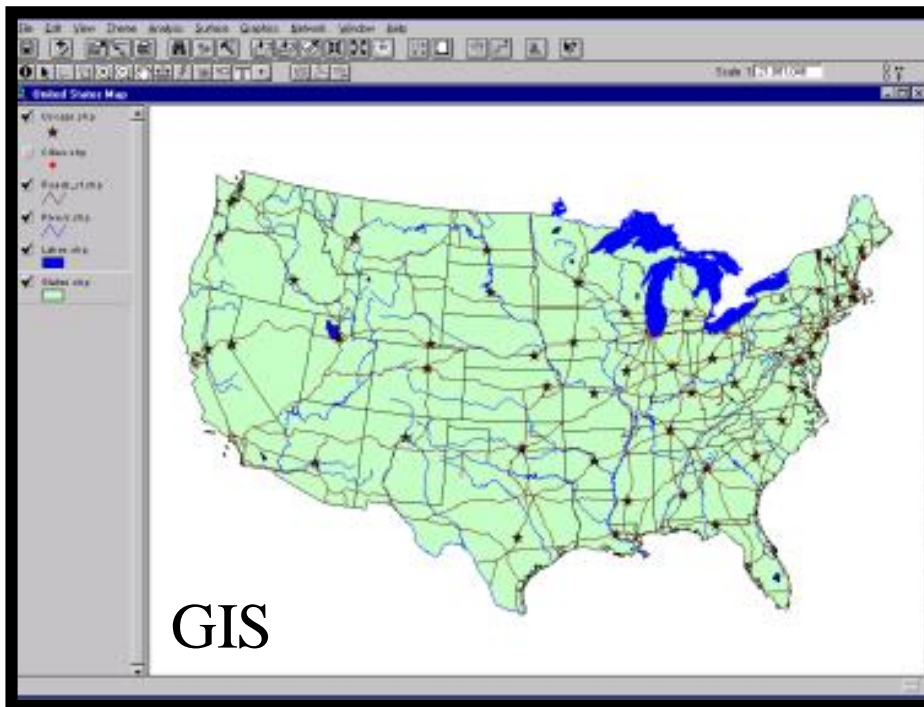
Lakes



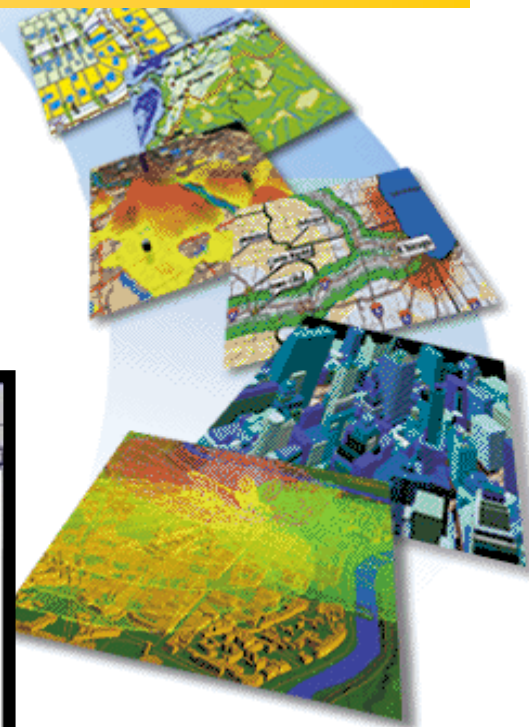
Roads

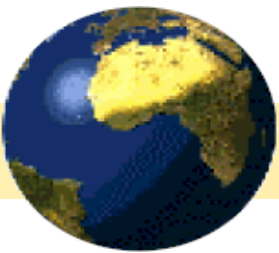


Cities

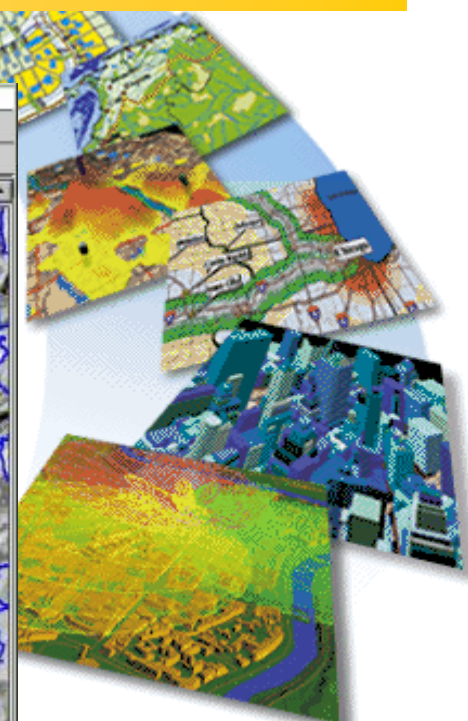
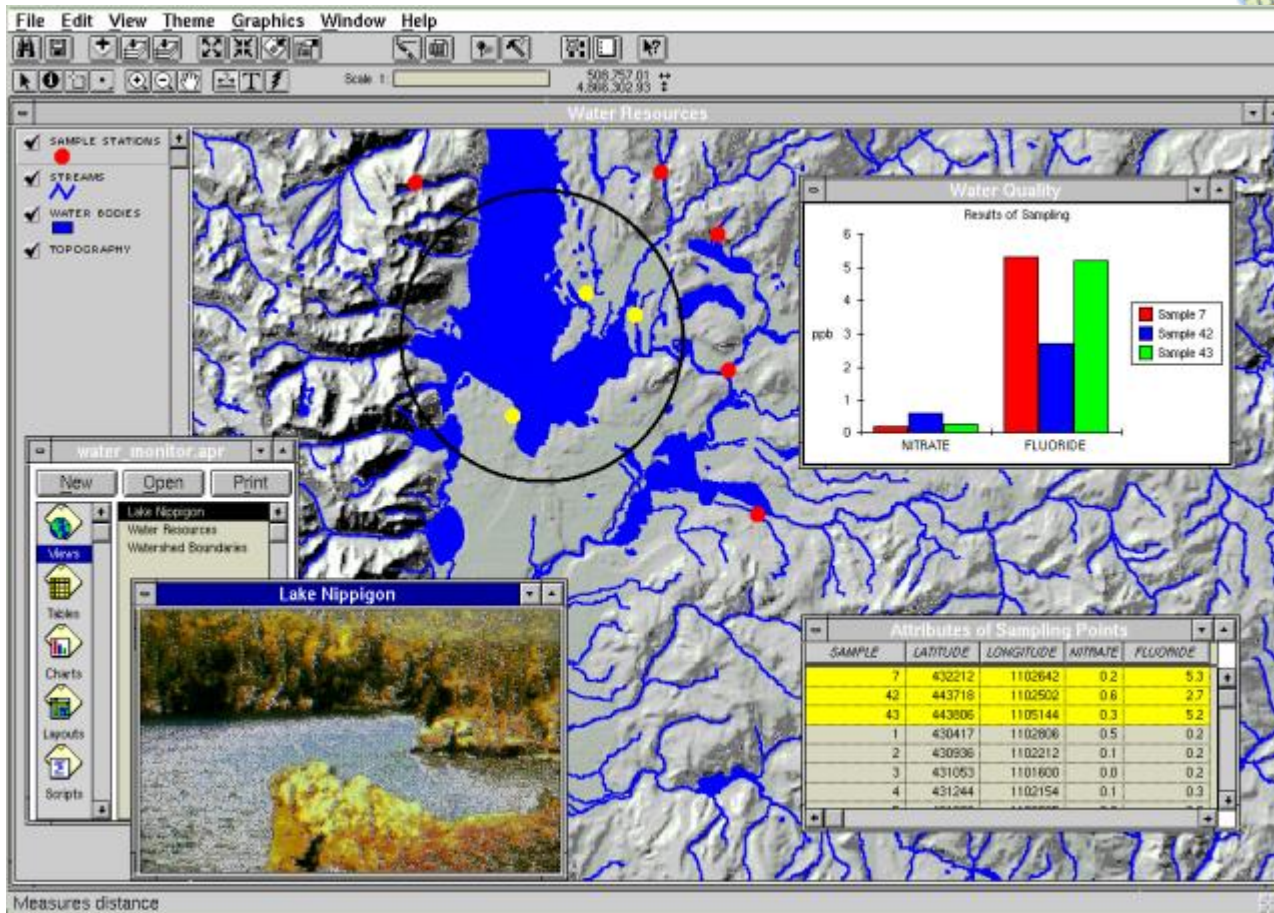


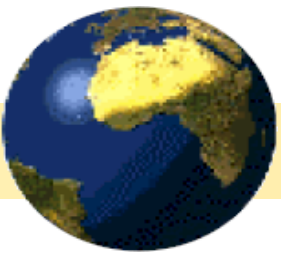
GIS





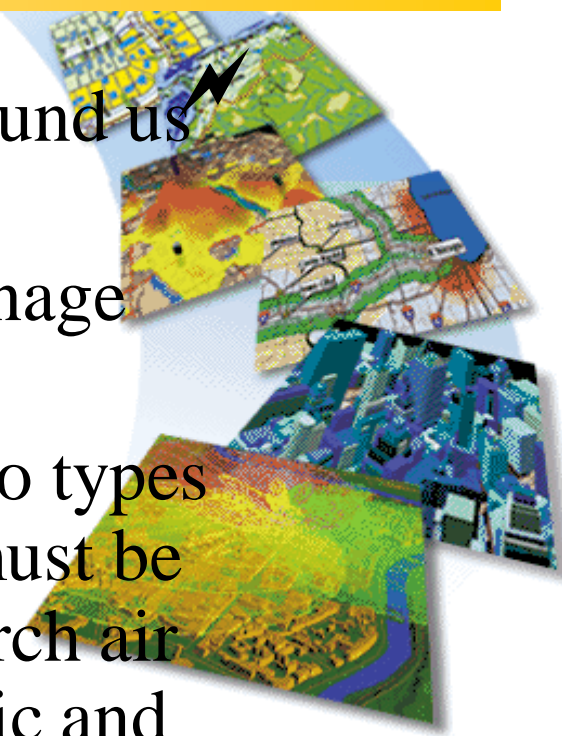
Combining Various Display Methods

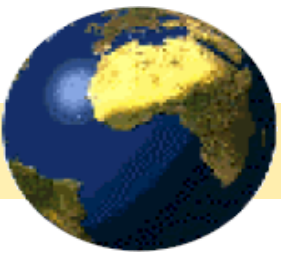




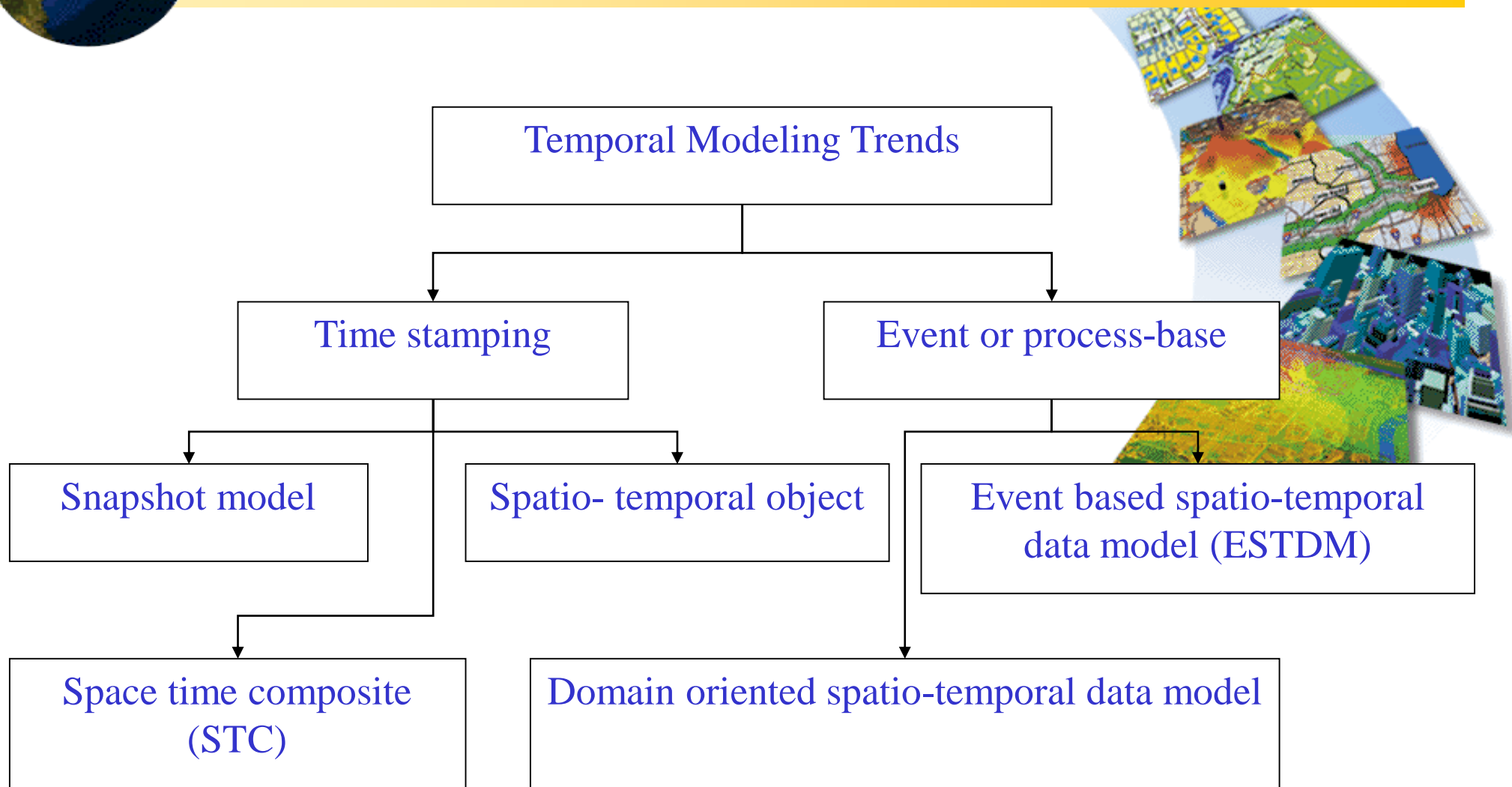
Temporal GIS

- ⚡ We live in a dynamic world. Every thing around us changes at different rate.
- ⚡ A Spatio-Temporal GIS aims to process, manage and analyze spatio-temporal data
- ⚡ From temporality point of view, there are two types of information, **Static** and **dynamic**, which must be modeled under a temporal GIS. In this research air pollution **monitoring stations** are mostly static and the **value of pollutant** over the time is dynamic.





Temporal GIS

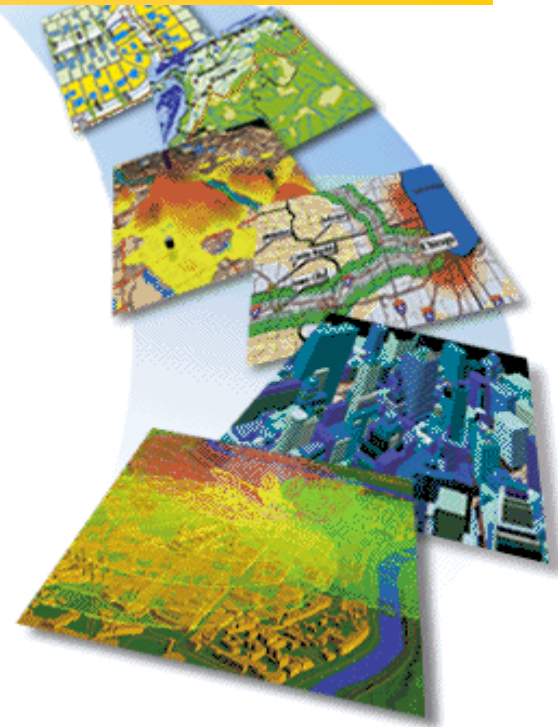




GIS in air quality management

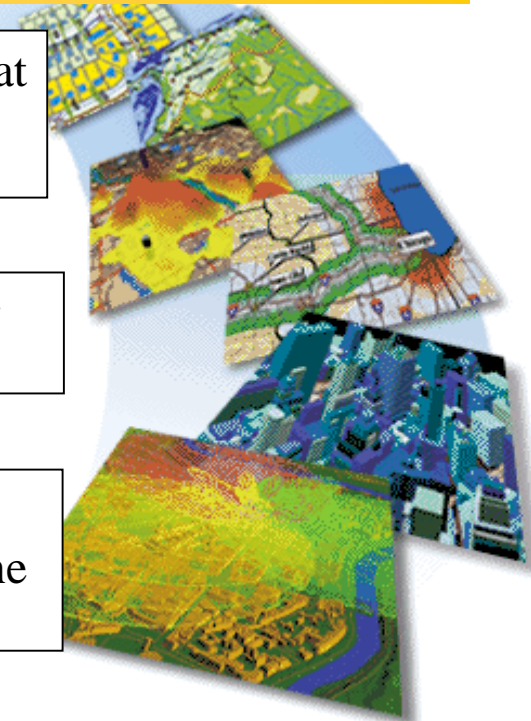
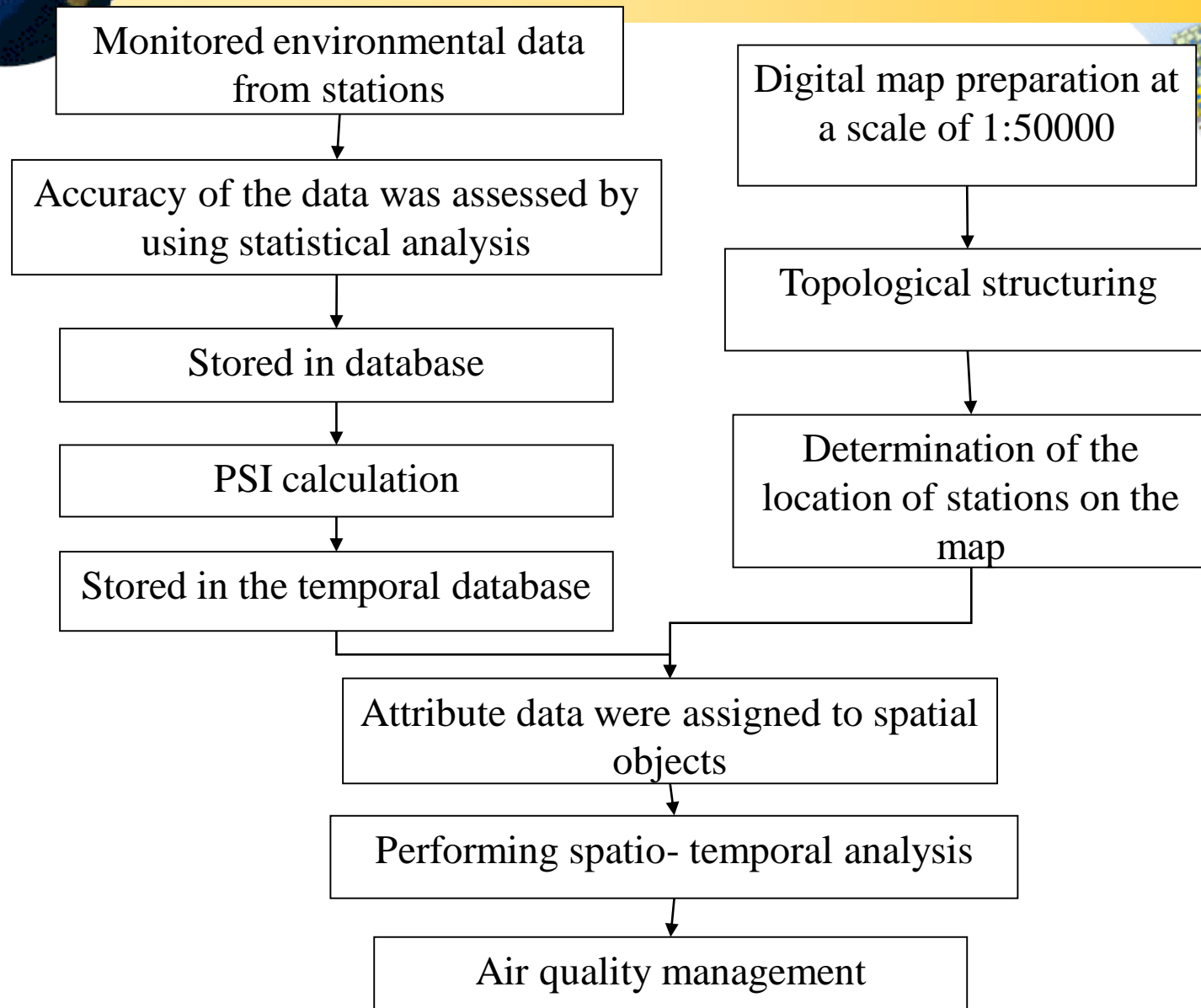
The capabilities of GIS for AQMS are as follow:

- ⚡ a) To locate the monitoring station
- ⚡ b) To develop geospatial air quality models
- ⚡ c) To develop spatial decision support system (SDDS).





Methodology





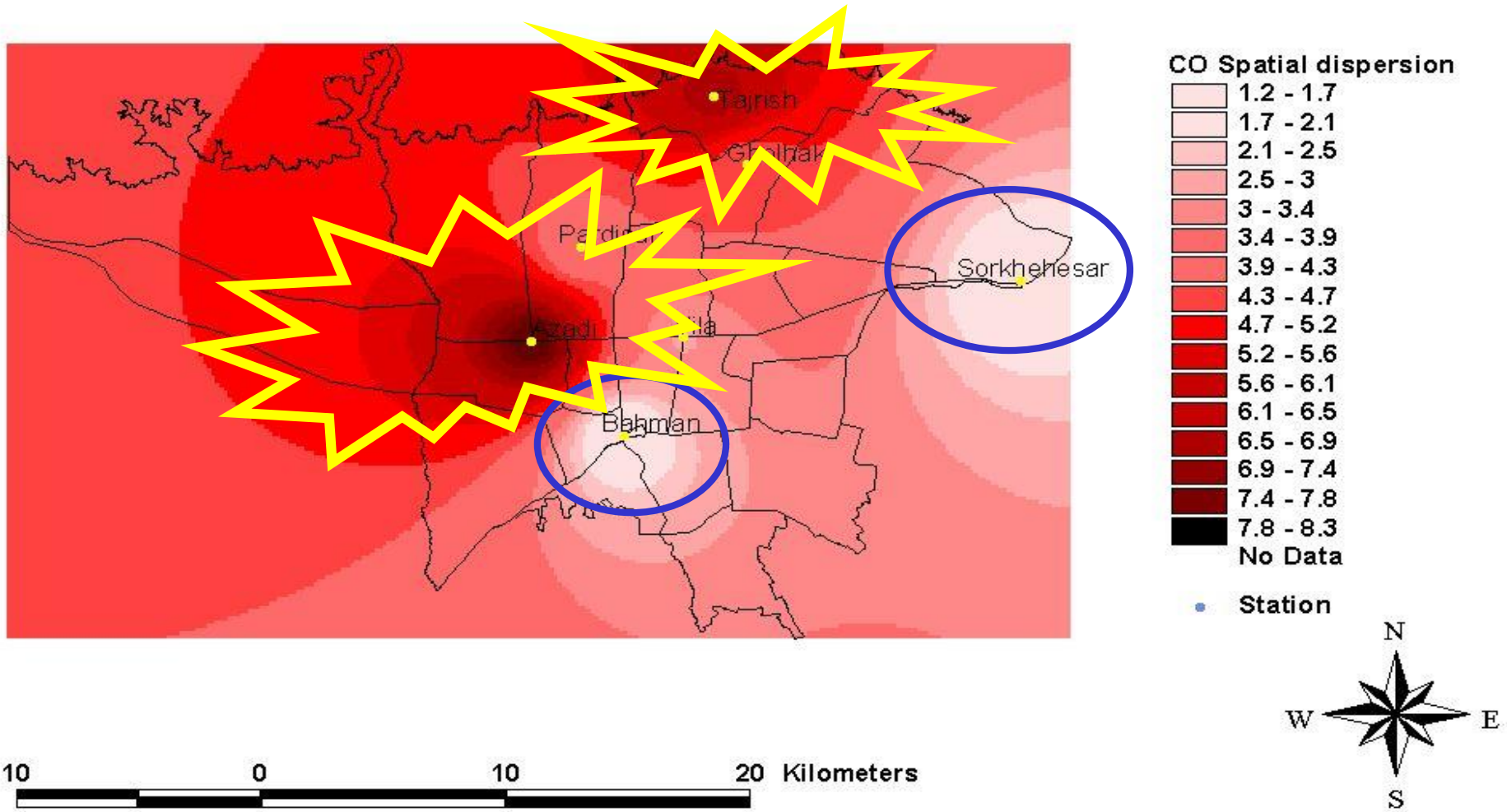
azadi2002.dbf

Date	Co	Psi_co	Psi_tsm	Nmhc	No	Nox	No2	Psi_no2
1	8.26456	97.29128	#DIV/0!	1.36788	0.20405	0.23255	0.03554	12.1632
2	7.87426	92.50412	#DIV/0!	1.71063	0.20637	0.22465	0.02927	10.1169
3	6.97026	81.93118	#DIV/0!	1.69601	0.15662	0.17302	0.02701	9.2683
4	6.50722	75.18008	#DIV/0!	1.02004	0.12754	0.14081	0.02571	8.7617
5	6.13639	70.80325	#DIV/0!	1.21295	0.11384	0.13394	0.03011	10.2757
6	6.29069	72.75838	#DIV/0!	1.56995	0.09895	0.12722	0.03656	12.5168
7	6.12039	71.19238	#DIV/0!	1.66747	0.12660	0.19151	0.07829	21.2114
8	7.07318	82.96036	#DIV/0!	2.11486	0.11729	0.16505	0.04776	16.2426
9	9.44889	109.85215	#DIV/0!	3.11364	0.18066	0.22519	0.04453	15.1448
10	9.49196	111.68989	#DIV/0!	3.45135	0.16514	0.20239	0.03751	12.7561
11	9.45572	112.53633	#DIV/0!	1.97595	0.05290	0.06921	0.02239	7.7521
12	7.92208	93.38824	12.42404	3.07012	0.15082	0.16673	0.01896	6.5184

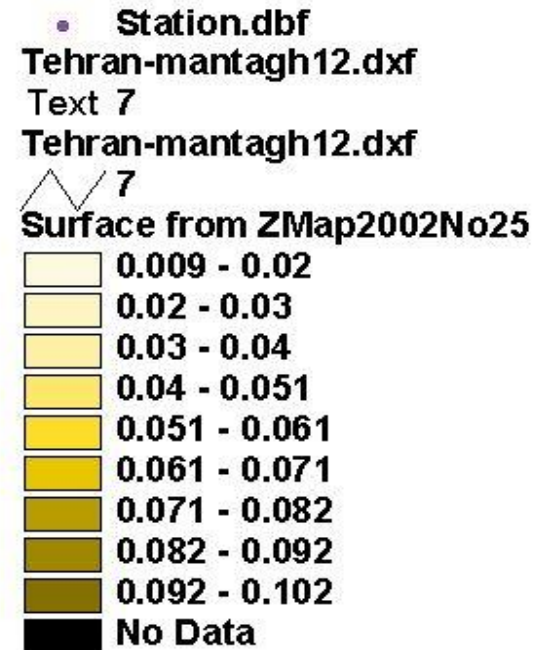
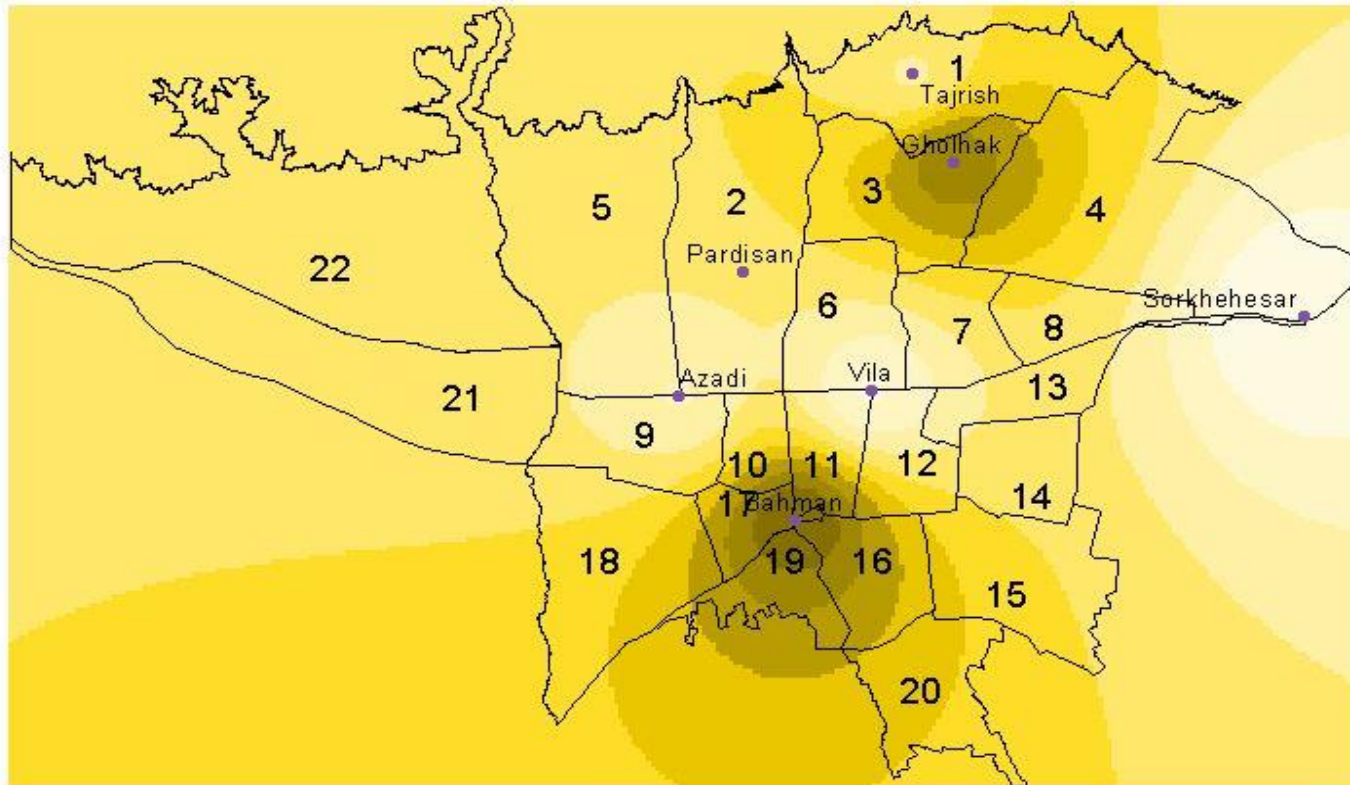


CO

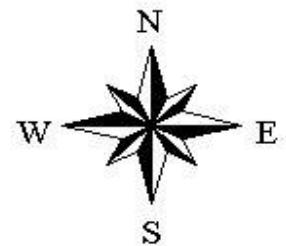
January 2002



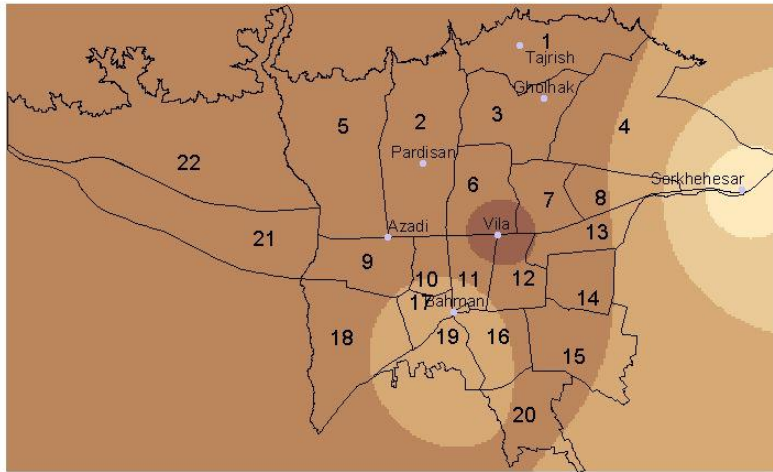
NO₂ (ppm) May 2002



10 0 10 20 Kilometers

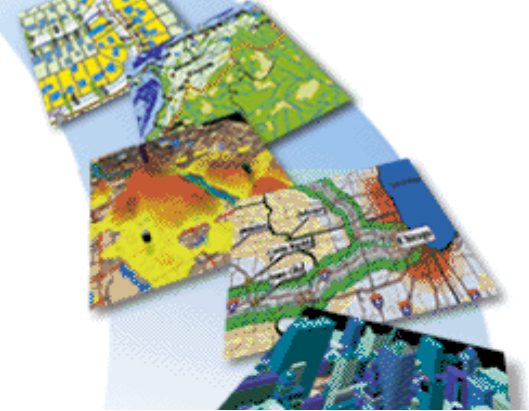
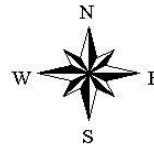


TSM January 2002

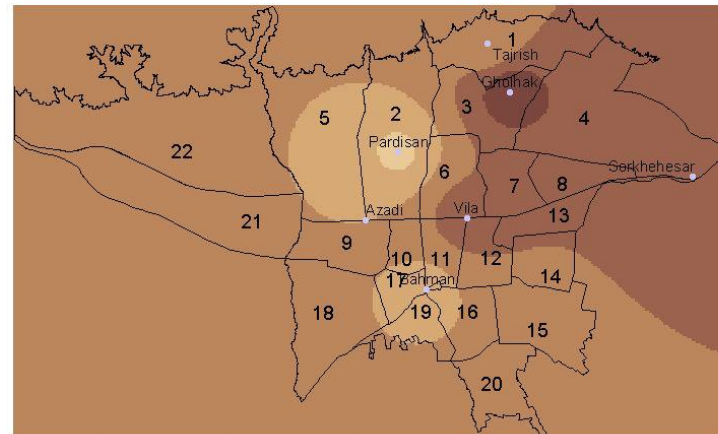


Station.dbf

Surface from ZMap2002Di

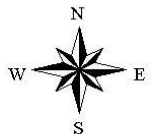
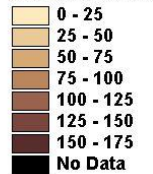


TSM June 2002

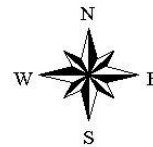
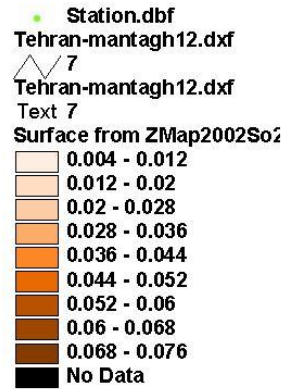
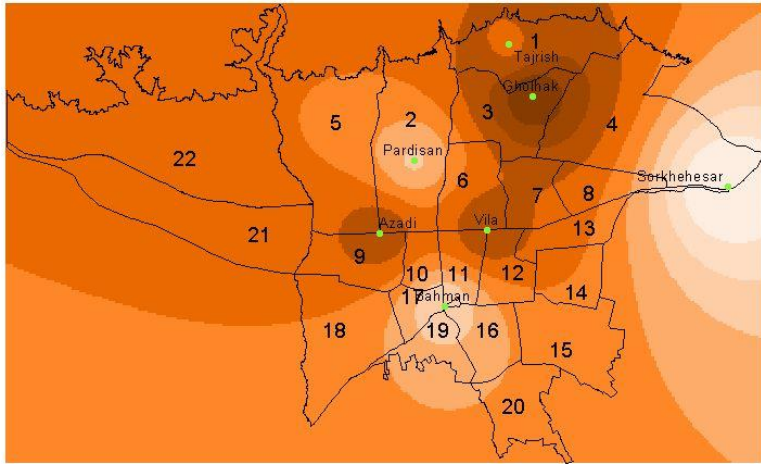


Station.dbf

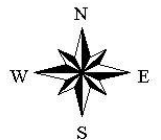
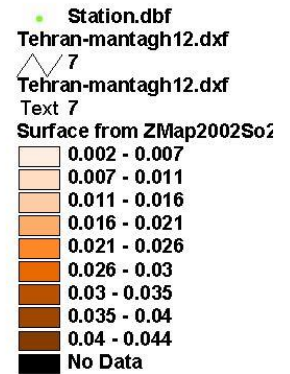
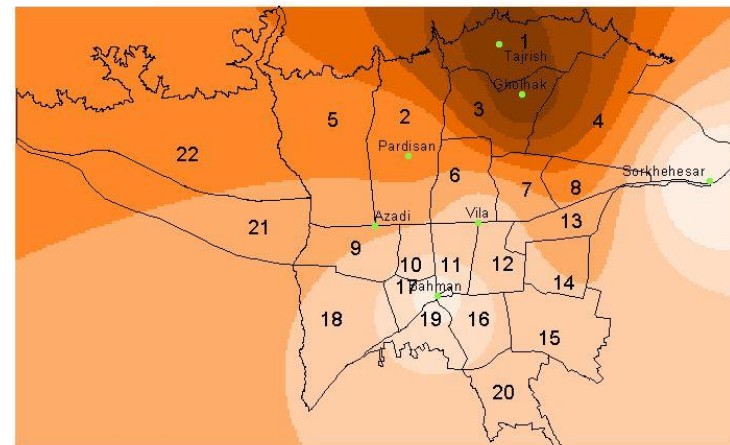
Surface from ZMap2002Di



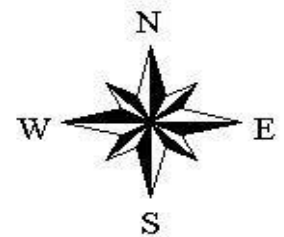
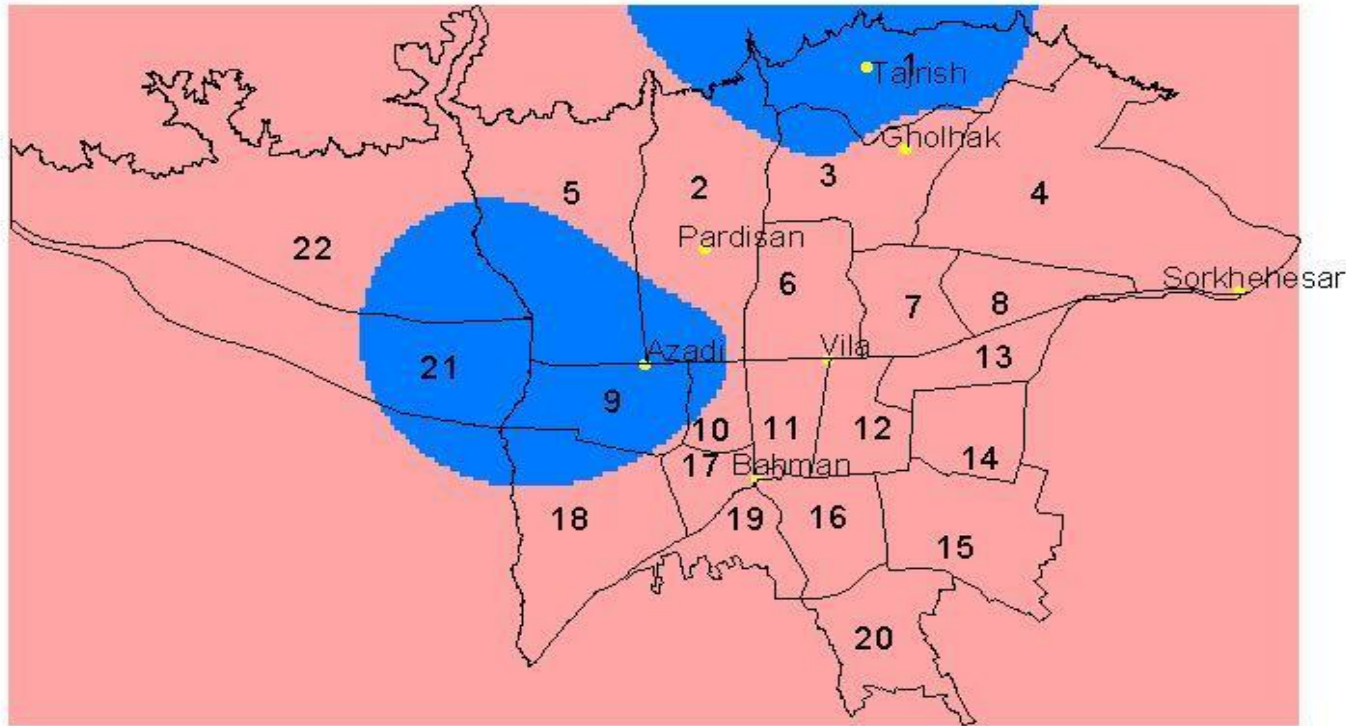
SO2 January 2002



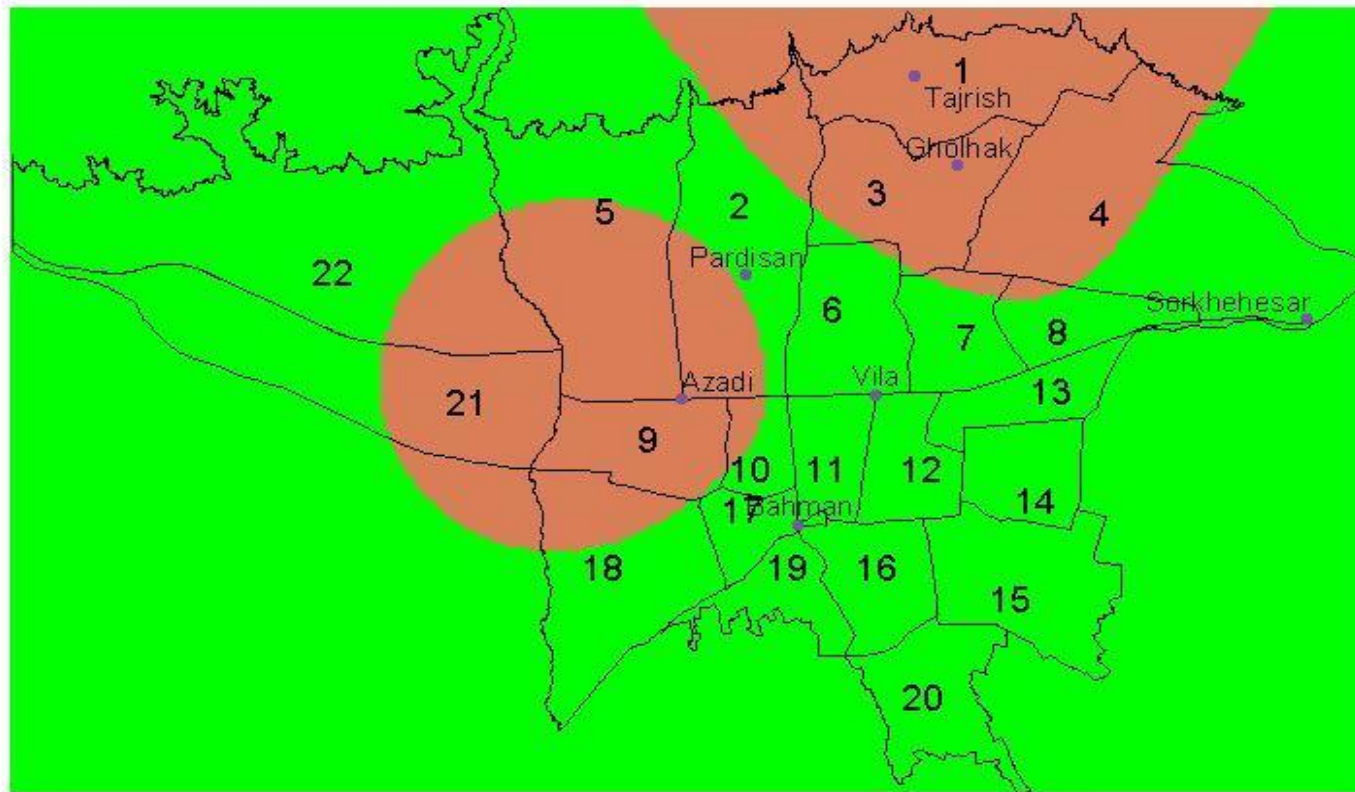
SO2 June 2002



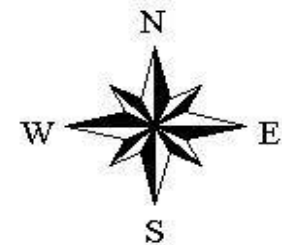
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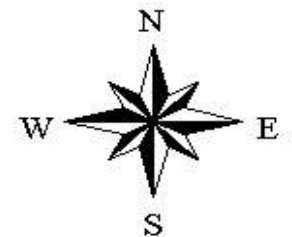
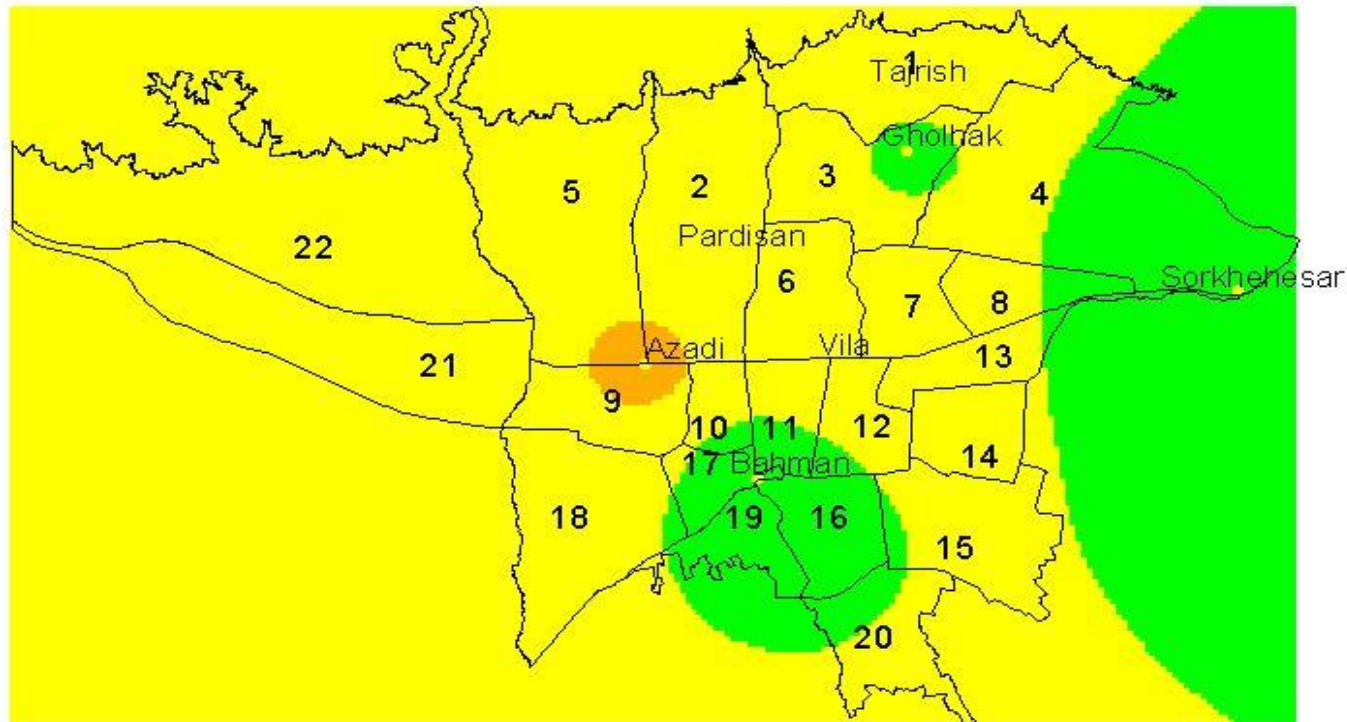
At least once, NO2 was higher than 0.05 in 6 months

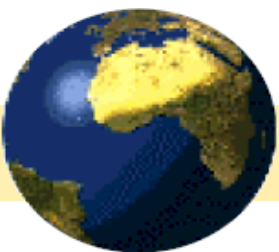


No in 6 month is higher than 0.05



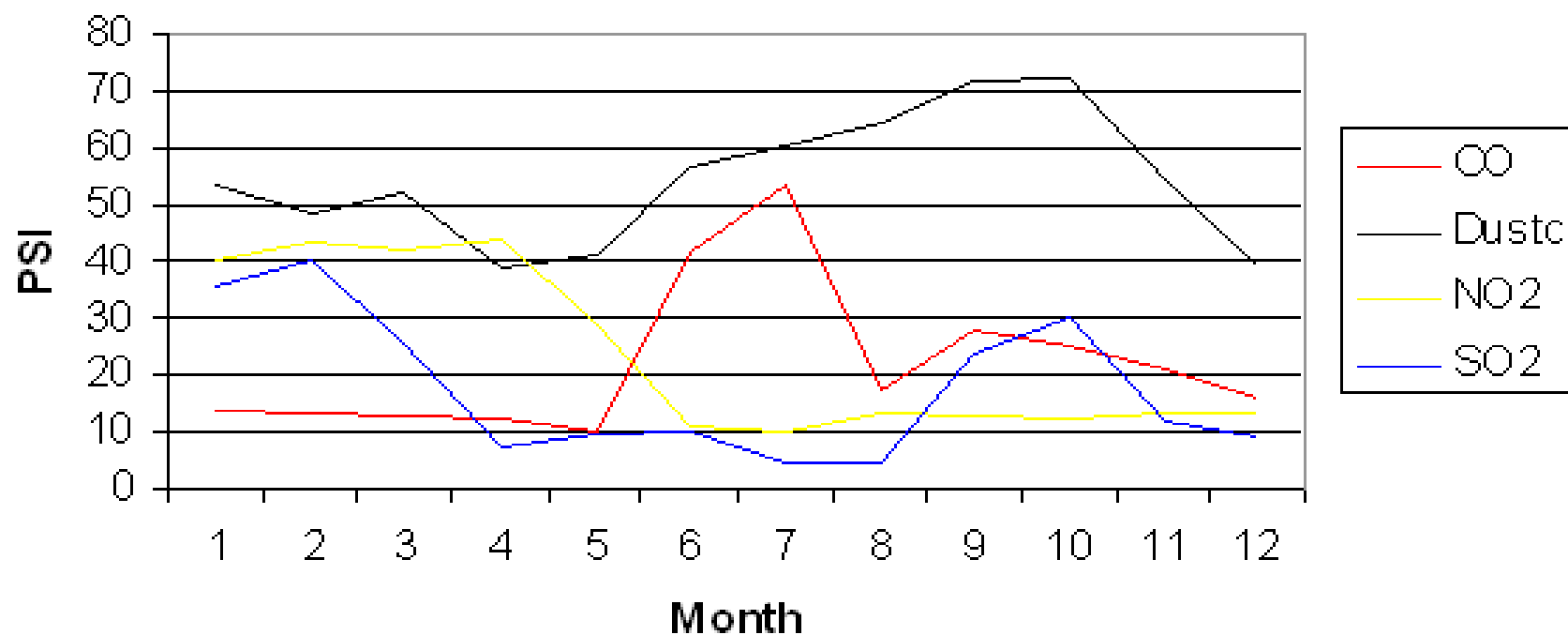
CO November 2002



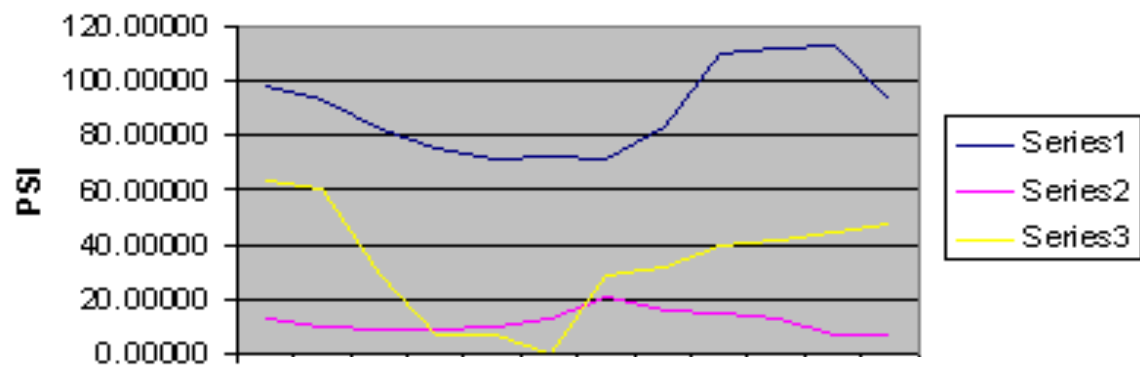


Chart

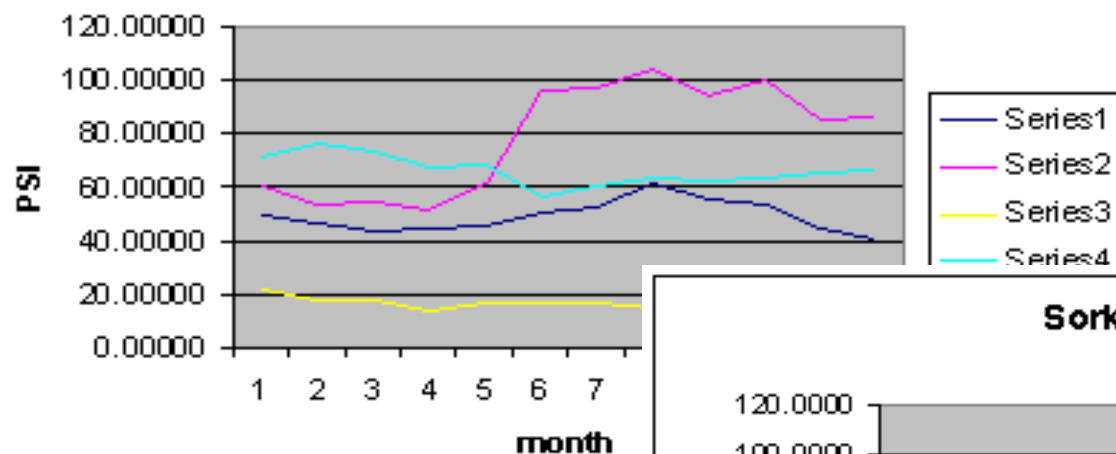
Bahman Station in 2002



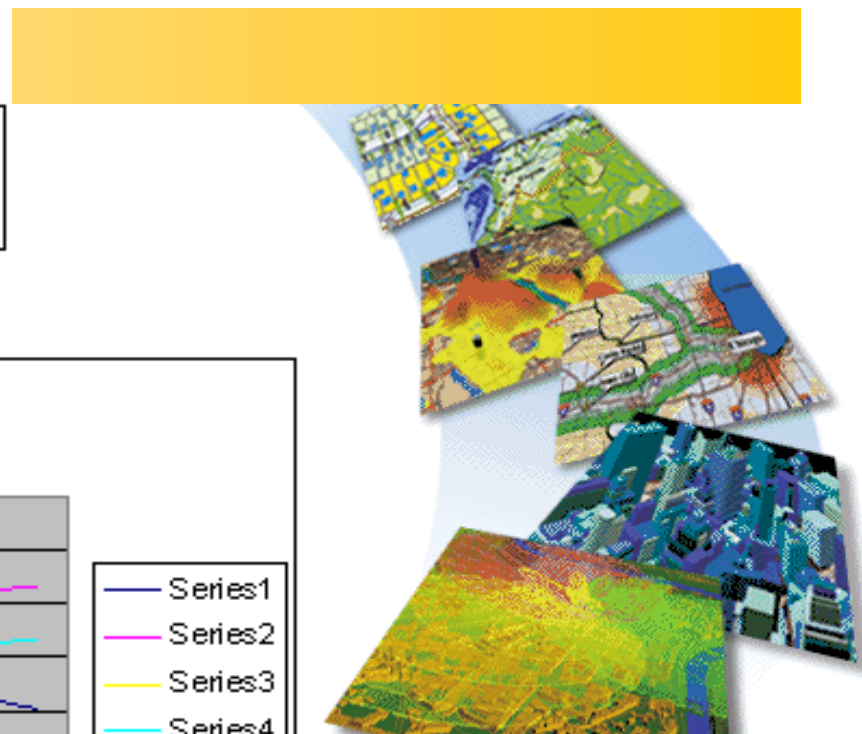
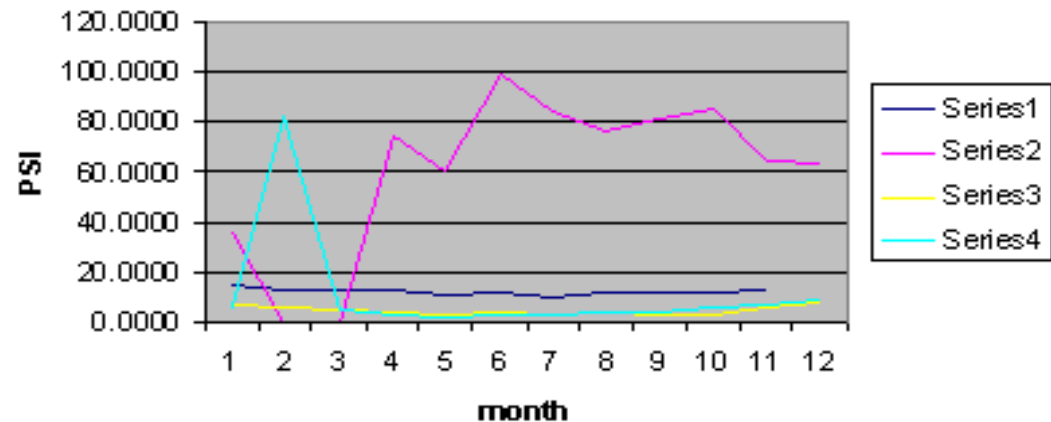
Azadi2002



Gholhak2002



Sorkhehesar2002





Conclusions and Future Directions

✦ GIS as EDSS environmental decision support system.

✦ can be useful as an alarm system.

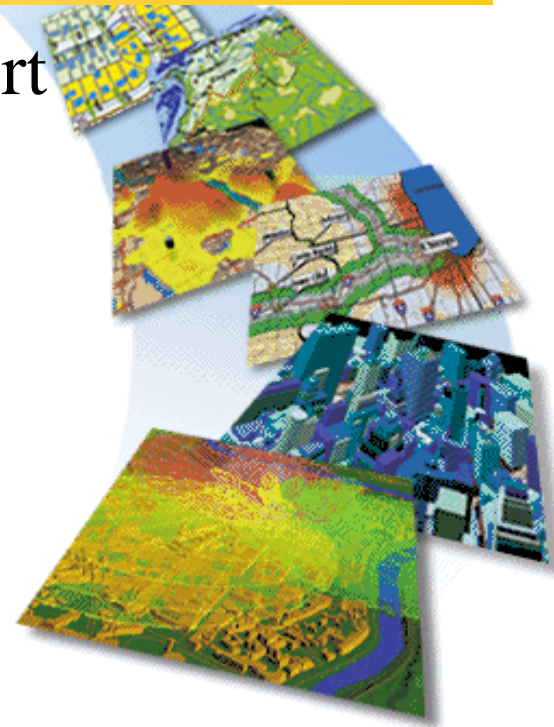
✦ Importance of Temporal GIS

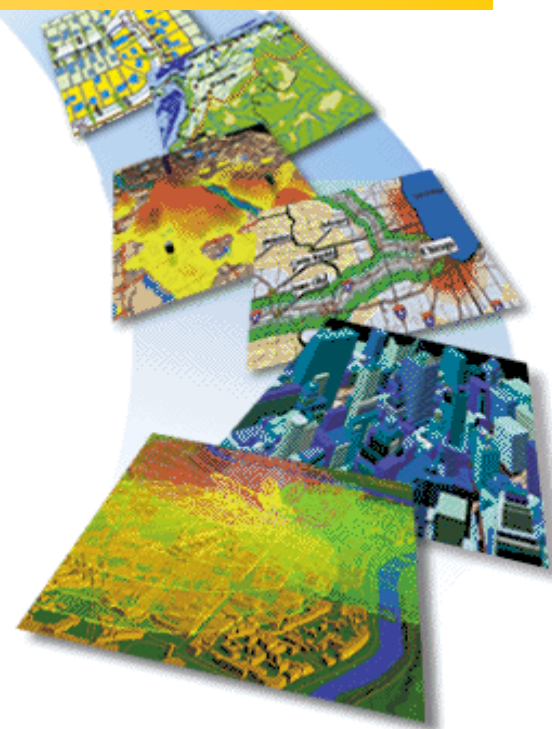
✦ Spatial analysis functions :

- overlay
- buffering
- pollution affected zones

✦ Trend pollutant value

✦ Topographic data, Land use, Climatologically, Geo-Spatial factor, DTM,...





Thank You !