



Indo-French Centre for Groundwater Research

www.ifcgr.net



at

CSIR-National Geophysical Research Institute, Hyderabad

India: NGRI (www.ngri.org.in)

France: BRGM (www.brgm.fr)

1999: Important Events in the Indo-French Collaboration

March: **Indo-French Workshop on Water Science & Technology**

Sept: **An Indo-French Collaborative project on HRH** (First project in the field of water Science from IFCPAR) **funded by the IFCPAR started**

Nov: **Indo-French Centre for Groundwater Research (IFCGR/CEFIREs)** was inaugurated in Hyderabad by **Dr. V. Courtillot**, the then Dir. of Research, Min of Research & Technology, France

STRUCTURE OF THE IFCGR

From NGRI:

**Aquifer Modeller
Geophysicist
Hydrogeologist**

From BRGM:

**Aquifer Modeller
Geochemist
Hydrogeologist**

Steering Committee & Scientific Council

Objectives of the Centre

to increase scientific and technological cooperation between India and France in the field of water resources management

- to carry out collaborative research in the field of groundwater resources management
- to enhance interaction in a daily execution of scientific projects
- to organize workshops, exchanges of doctoral and postdoctoral fellows, training of young researchers between India and France, as well as short duration exchanges
- to jointly use information and data as well as state of the art knowledge

Scientific objectives of the Center

Developing tools/methodologies for the long term management (quantitative/qualitative) of water resources in Hard-Rock aquifers

- Catchment scale approach
- Importance of HR aquifers in India
- Groundwater overexploitation



IFCGR



Facilities at IFCGR

Field equipment

Geophysics: Electrical and Electromagnetic methods

Hydraulics: water level recorders, flow-meter, pumps,

Survey: Differential GPS, HH-GPS

Hydrochemistry: field testing kits, various ion meters

Office

Modeling (MARTHE) and Geostatistics software

Decision Support Tool for Groundwater Management

GIS

Computer room



Indo-French Centre for Groundwater Research: **IFCGR**



IFCGR Funds

Self-financing from BRGM and NGRI

Running costs, some research activities

Research Projects (with co-financing from BRGM and NGRI)

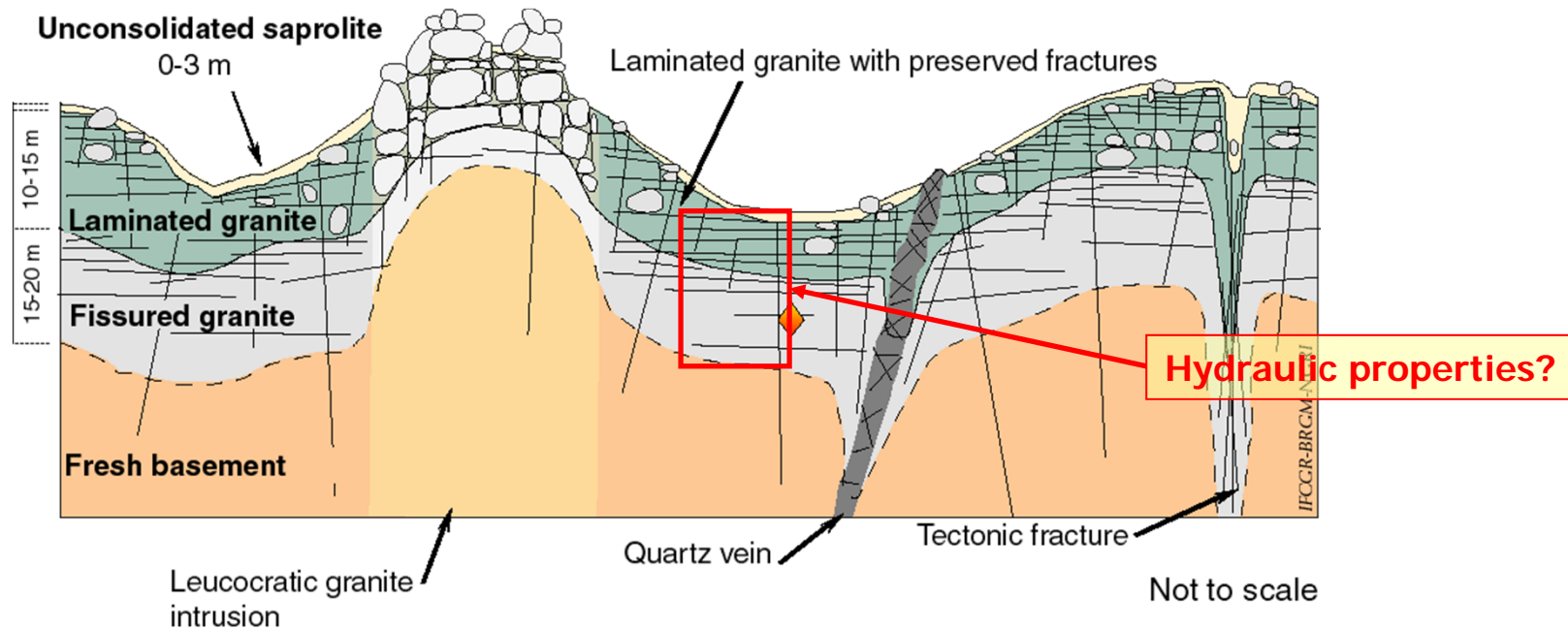
Example: EC-funded project SUSTWATER, SAPH PANI
CEFIPRA, ANR etc

Other funding

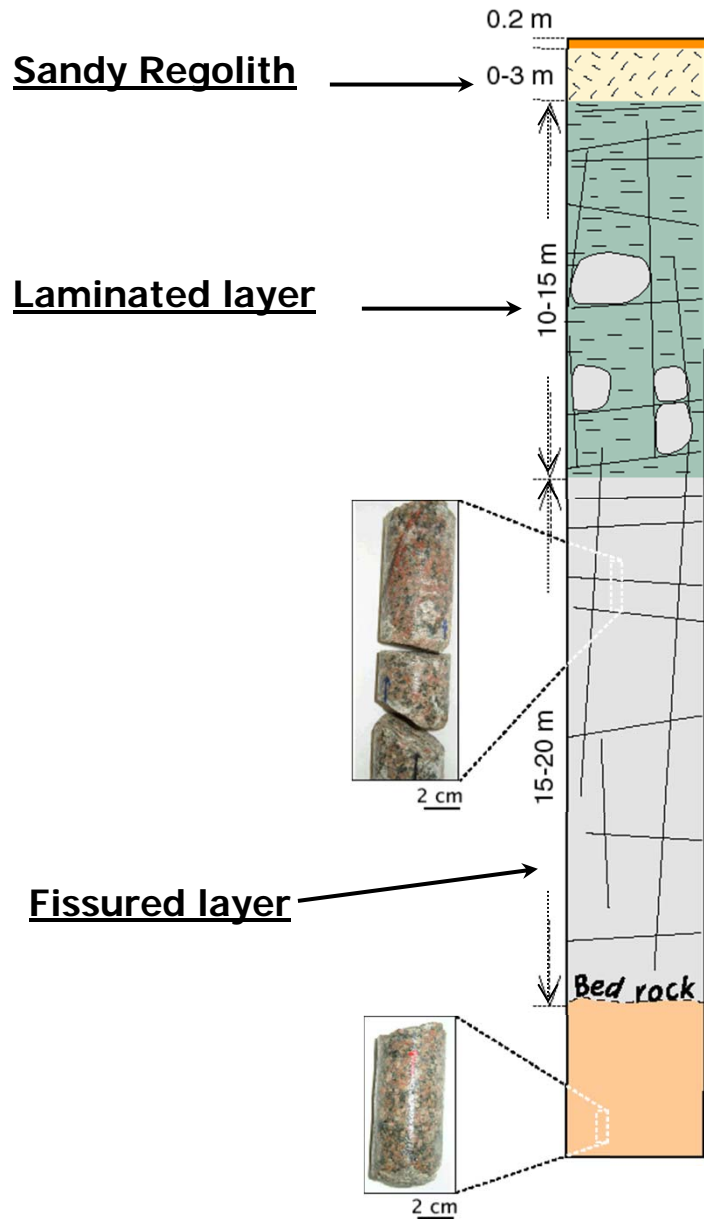
Ministry of Foreign Affairs, France and DST/CSIR, India:
mobility programs (travel costs)

Salient Scientific
Achievements at the
IFCGR

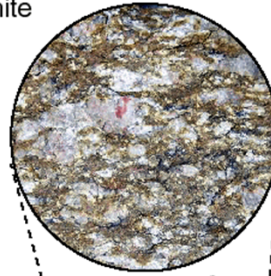
Maheshwaram weathering model...



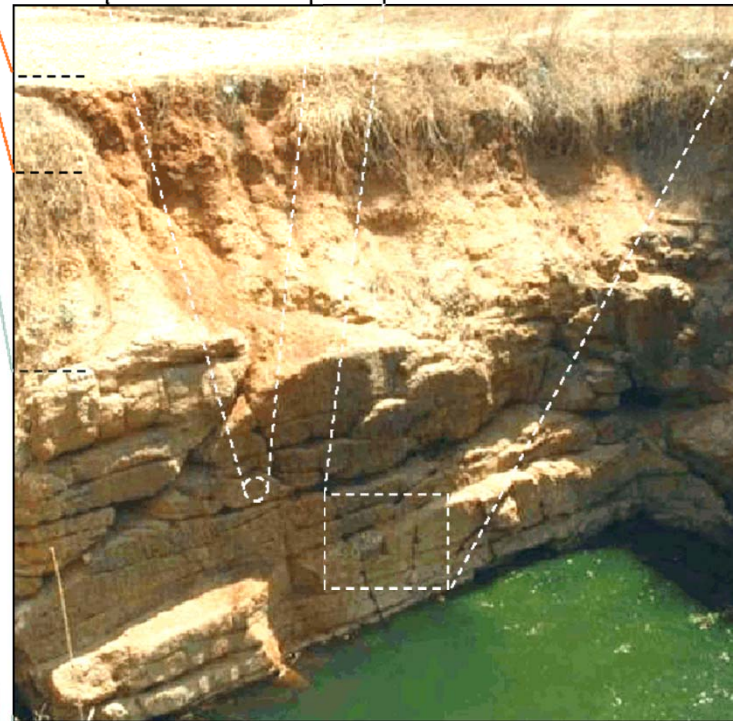
A complete hydrogeological set-up in Hard Rock Aquifers



Detail of the laminated granite



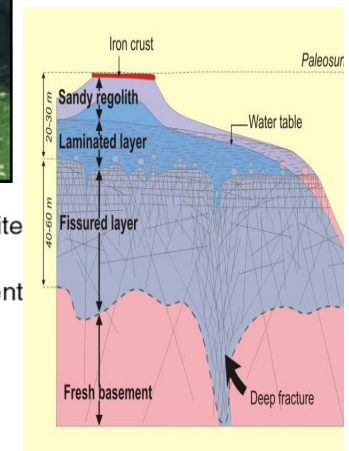
Laminated granite with preserved fissures



Saprolite (Isalterite)

- Red soil
- Unconsolidated saprolite
- Laminated granite with preserved fissures
- Fissured granite
- Fresh basement

Classical model



The latest version of DST-GW 1.1



DECISION SUPPORT TOOL FOR GROUNDWATER SCENARIOS UNDER VARIABLE AGRO-CLIMATIC CONDITIONS

Impact of changing cropping pattern and artificial recharge solutions on groundwater level

Hydraulic Model Calibration

Step 1:
Groundwater budget
components

Groundwater Budget
Computation (results)

Step 2:
Calibration of the
Hydraulic Model

Rainfall & Recharge

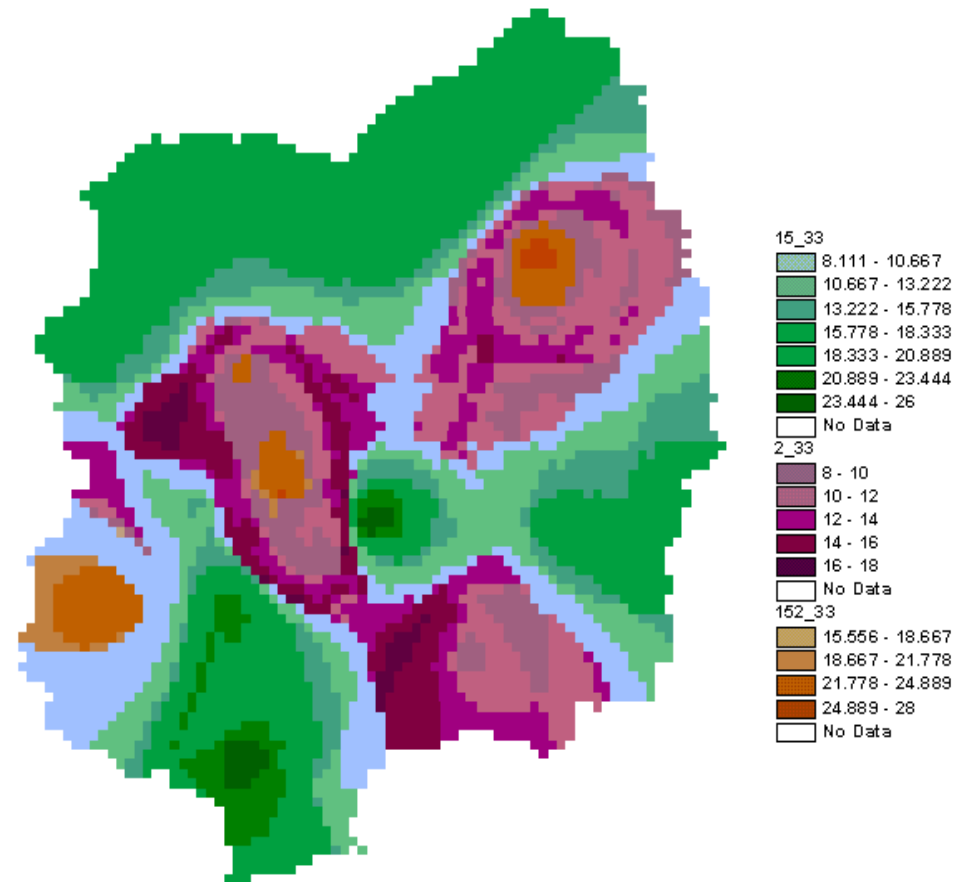
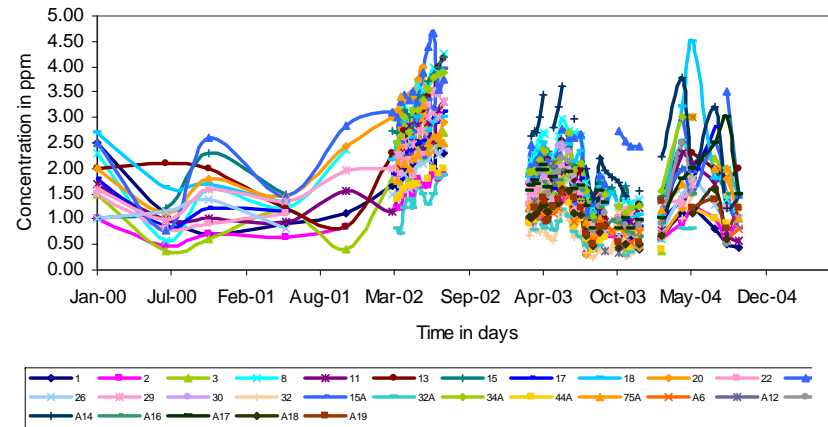
Simulations

SCENARIOS CREATOR

About
DST

developed by BRGM & NGRI
Indo-French Centre for Groundwater Research
BRGM & NGRI all rights reserved

Groundwater Quality: Fluoride Vulnerable zones



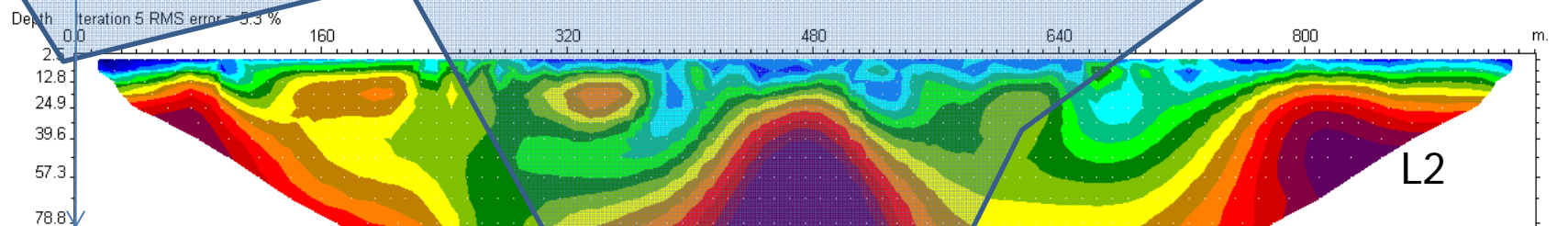
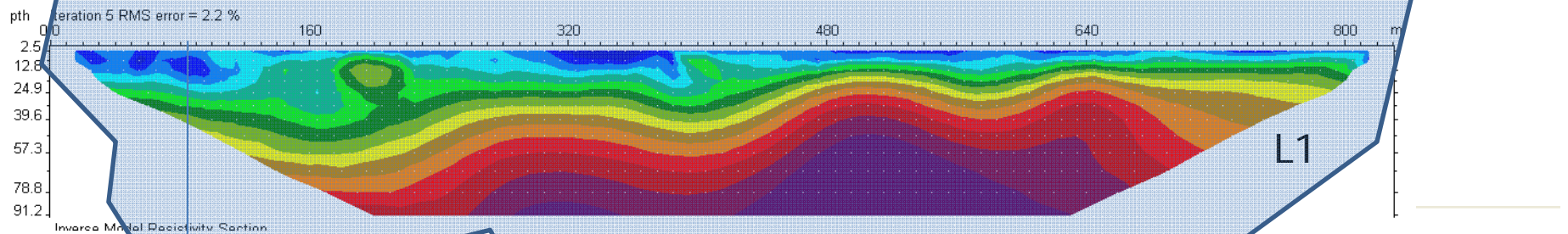
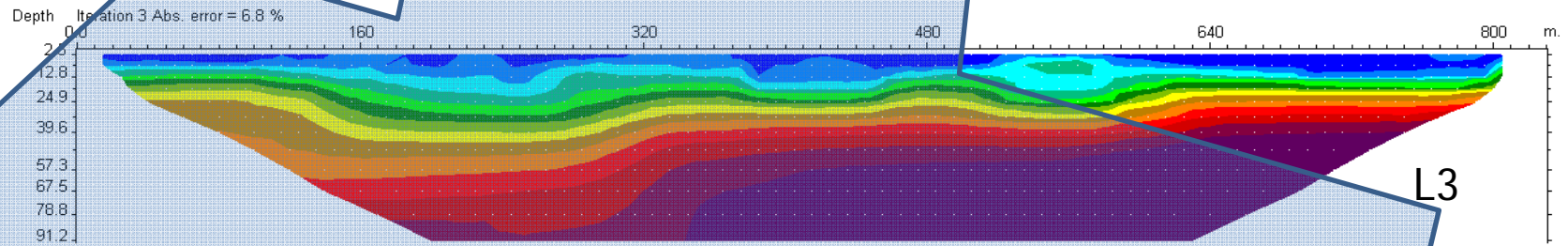
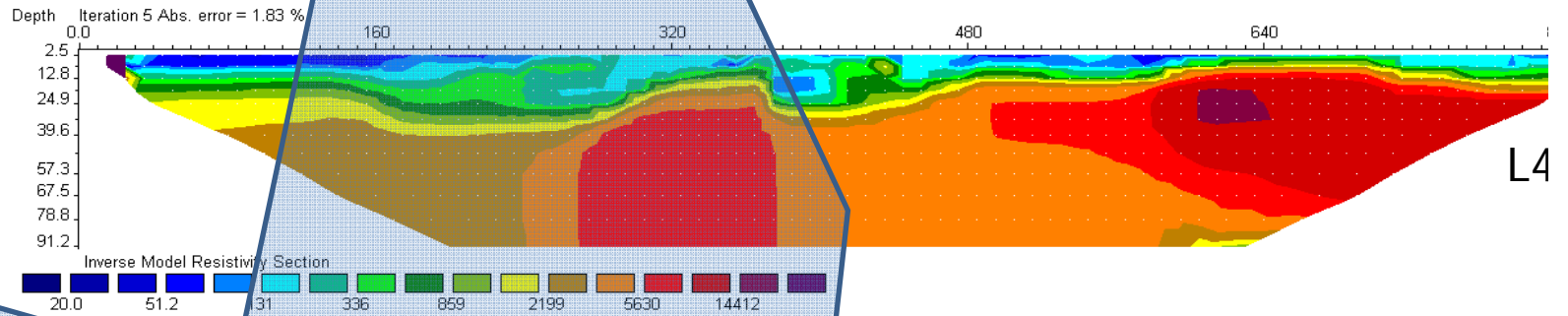
International Experimental Hydrogeological Park



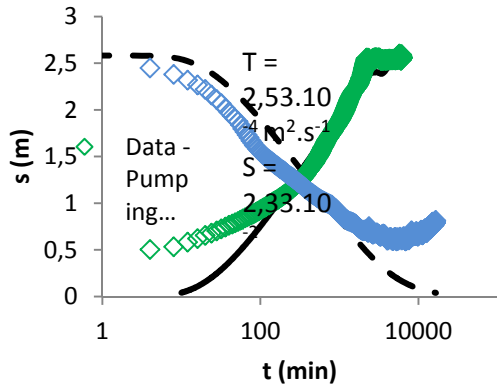
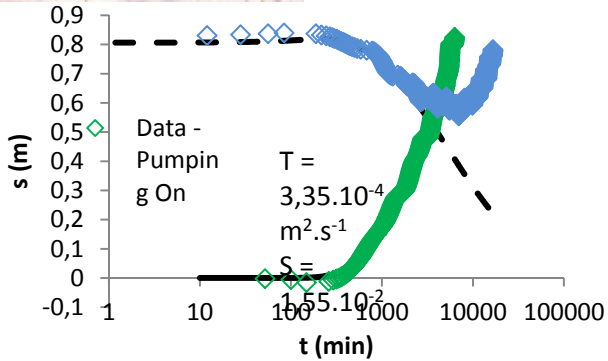
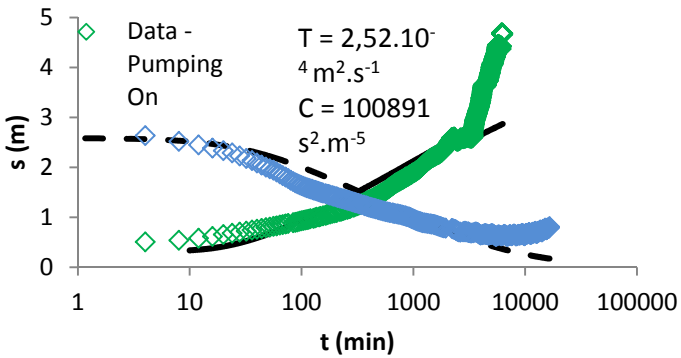
Under **SORE H⁺** Program



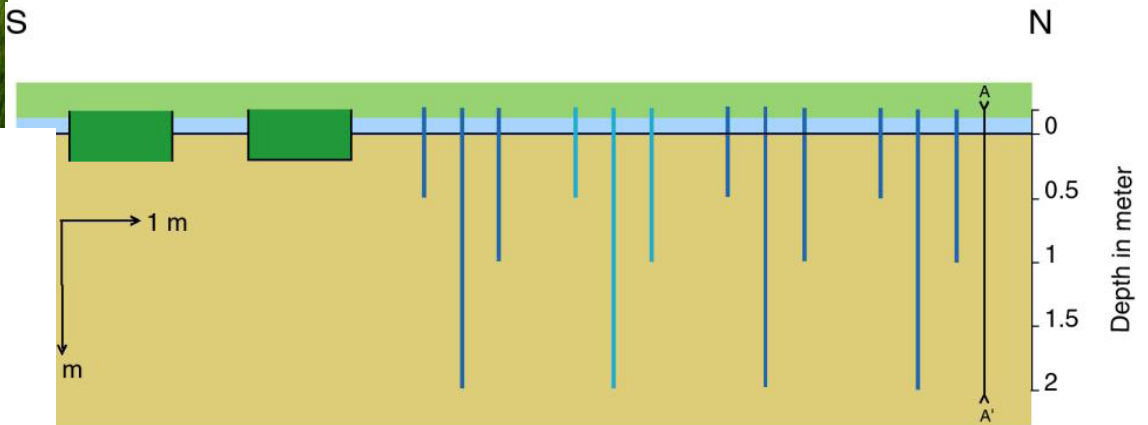
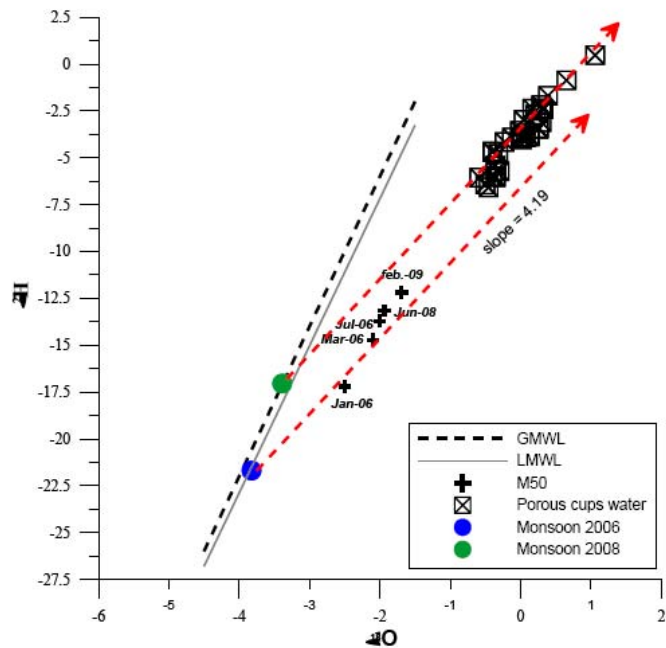
Geophysical Model



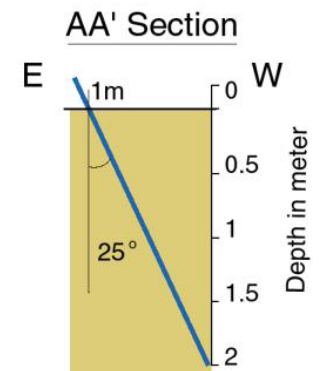
Hydraulic Tests



Application of Isotopes in Estimating Fluxes & Segregation of two monsoon rainfalls: Sponsored by IAEA



- Soil
- Rice
- Water
- Lysimeter without bottom
- Lysimeter with bottom
- Suction cups
- Tensiometers



Workshop to the farmers – Maheshwaram (APgov, Unicef)



Publications: > 55 Joint + 30 others

Water Resources Research

Hydrological Processes

Hydrogeology Journal

Journal of Hydrology

Environmental Geology

Applied Geophysics

Current Science

Geological Society of India

Geosciences & Hydrosciences etc

**+ Several
Chapters in Books**

**+ Representation
in a number of
Meetings and
Conference**

Eric Servat, W. Najem, Christian Leduc and Ahmed Shakeel (Eds.) "**Hydrology of the Mediterranean and Semi-Arid Regions**", IAHS publications No. 278, Proc. of International Conference on groundwater, Montpellier, 498p, France, April 1-4, 2003 (ISSN 0144-7815).

Ahmed, Shakeel., R. Jayakumar and S. Abdin (eds.) **Groundwater Dynamics in Hard rock aquifers** - including sustainable management and optimal monitoring network design, **Capital Publishing Company**, 2006. 265p (ISBN 81-85589-25-9), International Publication by **Springer**

Hydrogeology Journal (HJ) Editors select NGRI's paper as Editor's Choice for the year 2011

"The effects of geological heterogeneities and piezometric fluctuations on groundwater flow and chemistry in a hard-rock aquifer, southern India"

by Perrin, Jerome; Ahmed, Shakeel & Hunkeler, Daniel

Doctoral Theses:

Awarded: 10 (2 by the French Students)

Continuing: 11 at various stages (1 French)

AWARDS:

• **International Prize for Water Sciences for 2004:**

Awarded to S. Ahmed at Cannes Water Symposium

• **National Mineral Award (Groundwater) for 2006:**


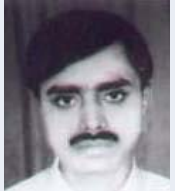




Awarded to S. Ahmed by the Min of Mines (India)






Major Recognitions:





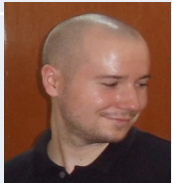
▪ Establishment of South-Asian Regional Working Group on Hard Rock Hydrogeology from IAH

▪ IFCGR's work included in the UNESCO's G-WADI program to be published in WWAR

Ph.D. Theses from IFCGR, Hyderabad

S. No.		Name (Mr./Ms.)	Title of thesis	Reg. Year	University	Remarks
1		C. Engerland France	Hydrology of crystalline rocks with significant weathered thickness under monsoon climate: Hydrological study of two watersheds in Andra Pradesh, India.	1999	UPMC, Jussieu, Paris, France	Awarded, 2002
2		D. Kumar, India	Conceptualization and optimal data requirement in simulating flow in weathered-fractured aquifer for Goundwater Management.	2000	Osmania university, Hyderabad, India	Awarded, 2004
3		D. De Condappa, France	Study of the water flow through vadose zone on a watershed scale in hard rock aquifer systems: Application to recharge of Maheshwaram aquifer.	2001	Univ. of J. F., Grenoble, France	Awarded, 2005
4		S. Chandra, India	Contribution of Geophysical properties in estimating Hydrological paramters in aquifers	2003	BHU, Varanasi.	Award awaited 2006
5		F. K. Zaidi, India	Characterisation of fractured crystalline rock aquifers through geological and hydrogeological methods	2003	AMU, Aligarh	Awarded 2006
6		T. Arora, India	Geophysics nd Geostatistics: An Intergrated approach for characterzing and monitoring the unsaturated zone.	2004	Osmania University, Hyderabad,	Awarded in 2008

S. No		Name (Mr./Ms.)	Title of thesis	Reg. Year	University	Remarks
7		S. Atal, India	Development strategy and risk management of excessive fluoride bearing hard rock aquifers.	2004	Osmania University, Hyderabad	Degree Awarded
8		D. Purushotham India	Integrated hydrogeological and Environmental investigation for groundwater characterisation of hard rock terrain in Maheshwaram watershed, R R Dist.AP	2005	Osmania University, Hyderabad	Degree Awarded
9		A. N. Bhat, India	Optimization of groundwater monitoring network using geostatistical methods	2005	AMU, Aligarh	Degree Awarded
10		H. H. Khan, India	Assessment of groundwater contamination from distributed sources of pollution in hard rocks	2005	Osmania University, Hyderabad	Degree Awarded
11		V. Zapu, India	Assessing groundwater quality in Granitic aquifers: vulnerability of contamination under the impact of climate changes	2007	Osmania University, Hyderabad	In progress
12		E. Nagaiah India	Geological and Geophysical signatures of Zeolite cavities (filled with water and dry) in the Deccan	2007	Osmania University, Hyderabad	In progress

S. No		Name (Mr./Ms.)	Title of thesis	Reg. Year	University	Remarks
13		Sarah India	Evaluation of groundwater renewability under polluting environment and determining its Indicators for planning and management.	2009	Osmania University Hyderabad	In Progress
14		Mehnaz Rashid India	Analyzing Groundwater Balance Components through Geospatial Techniques and Assessing Uncertainties in their Estimation	2009	Osmania University, Hyderabad,	In progress
15		Farooq Ahmed Dar India	Water Resources Assessment in two contrasted karst regions of India	2009	Hyderabad University, Hyderabad	In progress
16		P Raghvender India	New Look into hydrodynamics of hard rock hydrogeology	2011	Osmania University	In progress
17	?	Tarun K Gaur India	Modeling multilayered aquifer for optimal pumping of contamination free groundwater	2011	Osmania University	In progress
18		Nicolas GUIHENEUF France	Solute Transport Study in fractured crystalline rocks under tropical condition	2011	Univ. of Rennes-I France	In progress

S. No		Name (Mr./Ms.)	Title of thesis	Reg. Year	University	Remarks
19	?	Deepa Negi Kapardar India	Spatial distribution and temporal variation of Nitrate contamination in groundwater and its impact on the land-use	2012	Osmania University Hyderabad	In Progress
20	?	Nazish Rana India	Understanding the hydrodynamics of artificial recharge and simulating its impact on groundwater resources.	2012	Osmania University, Hyderabad,	In progress
21	?					

Projects:

EU: SUSTWATER (Partners: BRGM, Charles Univ., IWMI, NGRI)

SAPH PANI (20 partners in Europe and India)

SARASWATI (NGRI was accepted by EU but not by DST)

AMRITA, ECOROCK, FLUORINDIA, JAL & ARIDE *were not successful*

CEFIPRA

Groundwater Management in Weathered-Fractured Aquifers

Application of MRS to Hard Rock Aquifers

Application of Space Technology: GRACE

Solute transport in crystalline hard rocks

Hydrogeology of Karst Aquifers

ANR

MOHINI & SHIVA

UNESCO Monitoring Fluoride Contamination

Others: IAEA

SORE H+

IWMI

Bayer BioScience Pvt Ltd

CSIR-NGRI's In-house Projects

Collaborations:

International:

IWMI, ICRISAT, UNESCO, UNICEF, IAEA

India:

APGWD, APRDD, CGWB, IISc, IITD, Univ., APFAMGS etc

France:

ENSMP, IRD, LEGOS, Univ., INRA, CNRS

Czech Republic: Charles University, Prague

EUROPE: A large number of Organizations

Scientific Exchange Visits:

Both at Scientists as well as student levels

IJCRR Celebrates its 10th Anniversary in November 2009



Representation at IAEA, Vienna

during September 2011



October 12, 2011 :

Prof. Vincent Courtillot, IPGP, Paris, France visited IFCGR during Golden Jubilee functions of the CSIR-NGRI and discussed the progress and expressed his extreme satisfaction on the progress



January 17, 2012 :

A four member **delegation from CNRS**, France led by Ms. Pham. Director of the International Relation, visited IFCGR and appreciated the progress of the IFCGR. They have also suggested a number programs where CNRS could collaborate with IFCGR.



Visit of Dr. Jenifer Clark, Embassy of France, Bangalore during Sept, 2012



Future Plans (Strategic)

Establishment of an
International Hydrogeological
Park

IFCGR's Contribution to the
proposed Indo-French Water
Institute or LMI

Future Plans (Long term)

- **Up-scaling the findings to regional aquifers for application in the larger areas with development of user friendly Groundwater Management Decision Support Tool**
- **Analyzing the quality of the groundwater, simulating contaminant transport and preparing groundwater protection zones**
- **Improving the methodologies for groundwater balance: Application of Space Technology**
- **Hydrogeological & hydrochemical behaviors in Basalt (Deccan Traps) and Karst aquifers**

Future Plans (Project-wise)

- Solute transport processes in the fissured zone of hard-rock aquifers using the EHP test site (ongoing PhD thesis Nicolas Guiheneuf).
- MAR & SAT under Saph Pani
- Impact of agriculture-related contaminants on groundwater resource (proposal to be submitted to ANR, INRA collaboration?)
- KGWater
- Multi/Zonal DST including groundwater quality, surface water-groundwater interactions (percolation tanks, canals, etc.)
- AQUIM-INDIA:
- Use of geophysics for tracer tests monitoring