

# FOD Interview

## In conversation with Dr. D. Chandrasekharam



Dr. D. Chandrasekharam is a professor in the department of Earth Science. He earned his MSc and PhD from the Department of Civil Engineering (Geology section was part of Civil Engineering department until it was spun off to form Earth Sciences department in 1982) of IIT Bombay. He joined the Institute as a faculty member in 1987 after having worked for seven years at the Centre for Water Resources Development and Management and Centre for Earth Science Studies. His research interests are in the fields of volcanology, hydro-geochemistry and geothermics. He served as the Head of the Department of Earth Sciences (2000-2003) and Centre of Studies in Resources Engineering (2002-2008). In addition to being an outstanding scientist, he is also well known for corporate leadership. He has served as independent director on the board of directors of ONGC, Western Coalfields Limited and Indian Rare Earths Limited. He is also a member of editorial board in Journal of Advanced Researches on Geology and Journal of Mineralogical and Petrological Science. He is also the chairman of Geosyndicate, a SINE incubated start-up, responsible for setting up the country's first geothermal company that initiated a process of setting up the first geothermal power plant in Andhra Pradesh, followed by one in Gujarat.

**KTree: You have more than four decades of association with IITB, first as a student and then as a faculty member. What are the major changes that you have observed, say between the 1970s and 1990s, and between the 1990s and now? ?**

**Prof. Chandrasekharam:** : In those days, we considered IIT only as a centre of excellence, and slowly, it built itself up as a brand, which is very good. The students back then, had a different attitude. And the bond between teacher and students was very strong in those days, which I think is less now a days. I used to help my teachers in my student days, but I find this has reduced. May be it is just a change with time, or maybe I am just getting old. The number of students has increased as well. In those days, we were just a batch of 5 students; this number has increased tremendously, so this might be one of the factors. Back then, we had a lot of student-faculty meets and interactions in the IIT Bombay staff club, but the other day when I went to the staff club, there was nothing there. The number of students has really shot up after the 1990s, especially girl students. Also a lot of development took place around the campus, which used to just be a jungle before. And the system itself changed a lot during this time.

**KTree: The Earth Sciences department has grown tremendously since the time when you joined the department as a faculty member. It is today highly regarded for its graduates and research activities. What in your opinion should be the most important priorities in future?**

**Prof. Chandrasekharam:** The rapid growth of the department actually started after the early 2000s. I became the Head of the Dept. in the year 2000, after which, we scouted for, and got really good faculty members. Once they came in, the growth began really rapidly. Earlier, only IIT Roorkee (which was University of Roorkee before) had a very strong Geology programme. And now, IIT Bombay has one of the best departments in the country. So I hope that it continues to grow at that rate. In the future, we should lay more emphasis on basic sciences. If you ask me, I think the future is going to be water and energy resources, and are going to dictate the economy. Geothermal energy will play a big role in the energy security of the country. So that is where our priorities should lie.

**KTree: You have had extensive interactions and partnerships with academicians around the world. What are some of the important commonalities and differences between them and IITB?**

**Prof. Chandrasekharam:** Global academicians get the freedom to explore, and so do we at IIT. And the good thing is that we used this freedom constructively, and didn't waste or misuse this freedom. And although we have less resources than other universities, we have been able to do an excellent job, which I think is noteworthy. The papers that we publish are of good quality, and have excellent citations, with respect to the resources and funding available to us. But as such, I don't see much difference in the way we work.

**KTree: You have been involved in research in different fields such as volcanology and geothermics. Please tell us about some of the interesting research findings, your recent research interests and your current priorities.**

**Prof. Chandrasekharam:** My PhD was in the field of Volcanology, I had interest in the barren volcano, with is a live volcano off the Andaman & Nicobar Islands. I was the national coordinator of this project which was funded by the DST, to lead a team of researchers and students to the volcano. The coast guards dropped us over there and left, and we had to camp at the base of that live volcano, which was a very frightening, and deadly experience. We were the first team to camp on the island, where people used to return by the evening, where we lived for 5 days. After that, I started exploring the field of geothermal energy. It is slightly related to volcanics.

**KTree: Is there a large research community working on geothermics? In places like the US, a significant portion of renewable energy is derived from geothermal sources. What are the opportunities in this field in India?**

**Prof. Chandrasekharam:** : I think geothermal energy is going to be the future, just like solar and wind energy. The earth's energy comes from two places - the sun and from inside the earth. And there are a large number of researchers working in this field, except in India. That's why we haven't been able to properly tap the geothermal source. I have therefore incubated Geosyndicate so as to commercialize the research. Countries like Iceland have almost completely shifted to geothermal from coal, and many other countries have a significant portion of their power generated from geothermal as well. Granite rocks, rocks that produce very high temperature, are available in India, and can be used. Similar technology is being developed in France. An MIT report from 2006 lists this area as one of the future sources of energy. This means that if you have granite in your backyard, you should be able to produce power for yourself. To tap geothermal energy, our company Geosyndicate has started projects in Andhra Pradesh and Gujarat. Geothermal energy can also be used for space heating. Germany has made it mandatory to use geothermal sources to heat or cool your house. Maybe we can have constructive government policies in this area to help this sector. The international community recognized me because of my work, and International Geothermal Association elected me to be in the Board of Directors, making me the first Indian to do so. I was also re-elected after my last term expired. My background in academics helped me a lot. .

**KTree: Your Company Geosyndicate was involved in the setting up of the country's first geothermal plant in Andhra Pradesh. What is the story behind this? Please also tell us of the current status and future plans of Geosyndicate.**

**Prof. Chandrasekharam:** IIT helped us a lot in the setting up our company. SINE had sent emails saying any professor wanting to start up, can approach them, and one fine day, I decided to apply. I could use my knowledge and research to create something new. And within two years of setting up this company, we took off. One day I got a call from the Secretary of Power, wanting me to explain to a delegation of people from various power companies, wanting me to explain to them what geothermal energy was all about. That was a very proud moment for me. In fact Geosyndicate was the first infrastructure company to be incubated in IITB, while most other companies incubated were goods and services and software related. Other than India, we have foothold in countries like Kenya, Saudi Arabia etc. as well. We have signed MoUs with some foreign companies, and have power purchase agreements with two state governments in India (Andhra Pradesh and Gujarat). Tariff talks are going on and we think we can deliver power at the cheapest rate, without subsidy, and are by far the best renewable resource. Also the land requirement is very low as compared to, say Solar PV. The work of land acquisition is being done and we will shortly start with the drilling work. We are also trying to use the heat energy at the bottom of oil wells, which is currently wasted, into a heat source for producing power. We also want to approach every state to explore their geothermal sector; talks with Jammu and Kashmir are in progress

**KTree: Did you ever think of quitting academics completely, and dedicating yourself to the company?**

**Prof. Chandrasekharam:** No, not really. I cannot separate my research and academics from the company. A lot of research input has gone into incubating and building this company, and my academics helped me a lot. I have written three books, one of which was written when I was based in Turkey. Such a vast amount of knowledge wouldn't have been possible without academics.

**KTree: There are frequent news reports on India's inability to harness its mineral resources resulting in negative impact on the country's economy. The poor performance in exploiting coal resources is well documented. You have been a member of the board of directors of Western Coalfields Limited. Can you share an insider view of the challenges faced in tapping these resources?**

**Prof. Chandrasekharam:** We have plenty of natural resources, and we must use them properly. As a geologist, I know what coal is and how the sector works. There are two things involved in coal mining. First - environment, second - land acquisition. Both of these take long amounts of time

**KTree: In addition to Western Coalfields Limited, you were also on the board of other blue-chip giants such as ONGC. How did this experience help to enrich your technical and academic activities at IITB? Please share some examples if possible.**

**Prof. Chandrasekharam:** These companies are entirely different in their workings. In a corporation, when the board meets, one has to get to a decision, but this is somehow not found in our Institute. In a corporation, sums of money involved are huge, and quick decisions are required. But in IIT, and academic circles, it is not so. It was a good learning experience, and helped me a lot. I got to learn how a huge public sector company works and governs its projects.

**KTree: You are among a handful of technical experts who serve on the board of major public companies in India. In your view, what steps should be taken so that more scientific experts can contribute to the leadership of these organisations?**

**Prof. Chandrasekharam:** There is a public company that mines for the radioactive mineral monazite. This they were extracting only from sand. They had a lack of geological experience and that's why they failed to explore other sources. When I went in, after my intervention, they have started exploring other options in form of mines in the state of Gujarat. The impact of having a technical expert on a decision making body is enormous. And this is a win-win situation for both, the Institute and the company. It helps the students in their placement as well. Otherwise, the businessmen will end up looking only at the balance sheets, and end up having no technology at all. The companies also signed collaborations with the department, and have used our labs etc. and the students get to use the generated data for their work.

**KTree: Please tell us about your family and your experiences living in IITB campus.**

**Prof. Chandrasekharam:** My wife is a PhD in atmospheric sciences, and was working before we came to Mumbai, and my son is a civil engineer and looks up to me, as we have similar fields. My daughter is married and lives in Bangalore. The IITB campus has just been gorgeous. We have had a fantastic time living here. You can't get tired of this environment. We really need to take care of the environment in the campus.

**KTree: What can be done further to promote the involvement of alumni with the Institute? Please also share your views about the important benefits of these interactions to the campus community.**

**Prof. Chandrasekharam:** The alumni are the backbone of this Institute. They have helped build this brand as well. All the alumni are at the top in their fields. The alumni have helped build this brand and should keep doing the fantastic work that they have been doing. I ask them to look back and see what they have achieved. Let the IITB flag fly high.

**KTree: What message would you like to convey to our alumni?**

**Prof. Chandrasekharam:** Work hard and help your alma mater grow. Our country and our Institute needs

smart people so that it can grow.