

SPWLA India Chapter organizes a Geological Field Trip – A Tryst with Deccan Volcanism – for its Members

It was an altogether different experience for the petrophysicists and logging engineers of Mumbai when they undertook a one day geological field trip under the auspices of SPWLA India chapter, on the 24th of February 2024. The field trip, covering volcanic and volcanoclastic exposures and outcrops along the suburbs of Mumbai, was arranged with the help of Department of Earth sciences, IIT Bombay. Dr Hetu Sheth, professor of igneous petrology and volcanology at IITB, along with Dr Anmol Naik, a post-doctoral research scholar, lead the team of 30 odd members on a magnificent journey where events dating back to ~65 million years were explained with the help of present day remnants preserved by Mother Nature. The geology of Mumbai is predominantly volcanic, with mafic (basalt, dolerite), intermediate (andesite) and felsic (rhyolite) products co-existing on the seven islands that are linked together by reclaimed land. The sites for the field work were so chosen that a few of these important rock cut exposures or outcrops could be covered in a day.

The participants were all eyes and ears as the Professor explained in detail the Deccan continental flood basalt (CFB) volcanism and Western offshore basin formation. The field trip began at the Sanjay Gandhi National Park which houses the famous Buddhist heritage site of Kanheri caves. Units of pillow lava in the form of lobes and tubes resembling giant ginger rhizomes are exposed in the dry bed of the Dahisar River, within the park. “These pillow lavas were formed during the late stage of Deccan volcanism in a subaqueous effusive phase”, explains Dr Sheth. He went on to explain how the pillows with smooth surfaces branch out by interconnecting pillow tubes which are fed by large pillow lobes. The pillow lava exposure at SGNP could serve well as a geo-heritage site as not many occurrences of pillow lavas are recorded in CFB provinces.

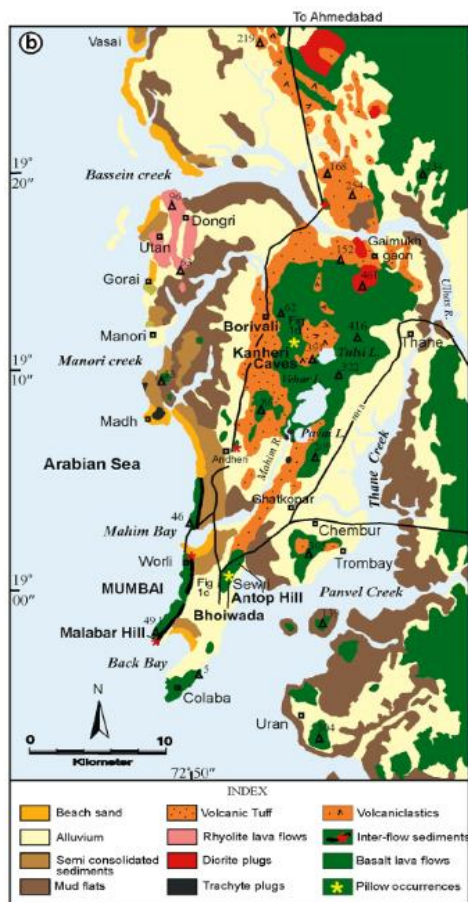


Fig 1: Geology of Mumbai



Fig 2: Pillow Lava exposure at SGNP

The pillow lavas are conformably overlain by a ~160m thick volcanoclastic rocks of Kanheri, further above in the SGNP campus. These subaqueous erupted pyroclastic rock units are home to a number of rock-cut caves and monuments that were excavated from 3rd to 11th century AD. The faculty members explained the nitty-gritty of pyroclastic units within the rock-cut caves and structures by showing the grain size classification of ash, lapilli, blocks and bombs in the increasing order of size. Cutting across the pyroclastic sequence, the team could witness curvi-linear dykes or lava sheets.



Fig 3: Rock-cut cave showing volcanic bomb and blocks



Fig 4: Curvilinear extrusive body or advancing lava sheet

A short trek downhill, the team could witness outcrops of basaltic rocks where secondary mineralization in cavities were observed. A massive dolerite dyke within an essentially trachyte province was another stop-over inside the national park.



Fig 5: Secondary mineralization within cavity



Fig 6: Massive Dolerite dyke exposure along Dahisar river

From SGNP, the team proceeded to Uttan-Dongri area where abandoned quarries had exposures of columnar jointed rhyolites and volcanic ash deposits. Dr Sheth explained in detail to the queries raised by young geoscientists regarding the compositional aspects and cooling rates of basalt, rhyolite and trachyte. He further demonstrated how it is possible to measure the flow dips (lava) from the dips of the well-developed columns of rhyolites.



Fig 7: Volcanic ash deposits overlain by columns of rhyolite



Fig 8: Some samples collected by the team



Fig 9: Team members posing for a group photo inside an abandoned rhyolite quarry

For the participants, the knowledge gained in the process was invaluable and were able to relate it to the work they were doing day in and day out with the electro logs of Western offshore Assets and Basin. The field trip ended on a positive note to explore further as learning is always a continuous process.

Earlier in the day, ED-Chief Logging Services and President, SPWLA India chapter Shri. SK Singhal flagged off the field trip from 11 High, ONGC Campus. Taking the initiative in organizing the field trip, he reiterated the need for getting field acquaintance for geoscientists as any interpretation should explain a geological condition. Thanking profusely the faculty members from IITB, he acknowledged their support in making the field trip interactive and also handed over participation certificates to the members at the end of the trip.