Wahkyn area is presently under active subsurface exploration pursuing a three-tier drilling programme: exploratory, reconnaissance and stratigraphic. Exploratory boreholes are being drilled in the Wahkyn North and South blocks along both banks of the Wahblei river to establish subsurface continuity of the mineralization and to prove the reserves. Data from some of the boreholes are very encouraging and indicate the possibility of defining an ore body comparable to that of the Domiasiat area. Reconnaissance and stratigraphic drilling being carried out in the surrounding areas, covered by the Upper Mahadeck sediments and in the southern plateau region, have also encountered uraniumiferous Lower Mahadeck sediments at depth, and these blocks will be developed by exploratory drilling in future.


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**First occurrence of araucaroid wood from Pondicherry Formation (Late Cretaceous), Pondicherry, South India**

*Araucaria* (the monkey puzzle tree) is at present restricted to New Caledonia, New Guinea, eastern Australia, Chilean-Argentine, Cordilleran and Brazil. Fossils, attributed to *Araucaria* (wood, cone, and pollen grains) are however, known from Mesozoic sediments of northern and southern hemispheres. In India most of the araucaroid fossil woods described so far are from the Deccan Intertropical sediments (Late Cretaceous), though one wood has also been reported from Neogene rocks of West Bengal.

The small piece of fossil wood (10 cm long and 4 cm broad) was collected from 3 km north of Pondicherry (79°45' Long. and 12°1' Lat.) on the way to Auroville by unmetalled road. The strata from which the fossil was collected, according to Sastri *et al.* belch to Pondicherry Formation. The Pondicherry Formation in Cauvery basin (Figure 1) occurs between the Upper Ariyalur (Late Cretaceous) at the base and Eocene rocks at the top, and both are unconformable with the Pondicherry Formation. This formation is roughly 230 m thick and comprises shale, sandstone and limestone. The sandstone is coarse, loose and yellowish. The fossil wood was collected from this unit. Banerji on the basis of foraminifera assigned a Late Cretaceous age to this formation.

The collected fossil wood is nonporous with distinct growth rings forming prominent zones and is separated by a band of wood tracheids. The early wood zone is roughly 300-400 μm thick, the rays in transverse section are 3-7 tracheid cells apart. Tracheids are nearly 6-7 per mm², and more or less polygonal in shape. Rays are 15-20 per mm², 2-30 cells high, and filled with dark substance.

Ray parenchyma cells are absent. Pits are present on tangential walls of the tracheids, and are 5-10 μm in diameter, and the walls of the tracheids have 1-2 alternate pits. Wood parenchyma has not been observed. Cross field pits in the radial walls are circular, generally one in each cell. Resinous canals are absent (Figure 2).

The fossil wood described here closely resembles *Araucarioxylon keri*.
ense (Trivedi and Srivastava)⁴, recovered from the Deccan Intertrappean sediments near Mohgaon-Kalan, in the presence of one-celled thick rays, cells with only one circular field pit in each ray cell. Besides, the number of rays per mm² (6-7) in both the specimens is also more or less the same. For these reasons, the collected fossil wood has been placed under A. keriense (Trivedi and Srivastava)⁴.

The occurrence of araucaroid wood in the Pondicherry Formation is the first of its kind. Podocarpaceous woods have been reported from Tiruvakkari (Miocene-Pliocene) by Ramanujam¹,²,³,⁴. As many as six araucaroid woods have been recorded from the different Deccan Intertrappean sediments. The Deccan

Figure 1. Geological map of Cauvery basin showing the locality from where the fossil wood was collected.

Figure 2. *Araucarioxylon keriense* (Trivedi and Srivastava). a, Transverse section of wood to show early and late wood (×120). b, T.L.S. of wood showing uniseriate xylem rays (×1200). c, R.L.S. of wood showing ray parenchyma (×1200). d, Tracheidial araucaroid pits (×1200).
volcano-sedimentary rocks have been dated as Late Maastrichtian[17-19]. On the basis of similarity between the Pondicherry and Deccan Intratrappean woods, it seems plausible that they belong to the same age.

The wood anatomy of extant Araucaria is hardly distinguishable from Agathis, another member of Araucariaceae. Thus the fossil wood detailed here should be attributed to Araucariaceae. It is not prudent to attribute Araucarioxylon to extant Araucaria. From the fossil record it is observed that Araucariaceae was widely distributed in India during the Mesozoic and shows its maximum development during the Early Cretaceous. Its extinction at the terminal Cretaceous (Maastrichtian) is an important factor to be reckoned with. Perhaps the movement of India from south to north did not provide a suitable climate for the group to continue. The volcanic episode at the terminal Cretaceous and above all the emergence of angiosperms as a virulent group could possibly have led to its near extinction in India.


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ISRO satellites escape unscathed after the Leonid meteor shower

Earth passed through the meteoroid storm associated with comet 55P/Tempel-Tuttle, with peak of storm on 17 November 1998 between 1930 hr and 2040 hr UT. The phenomenon was studied from various angles. The precautions taken by other space agencies and satellite operators were also noted. Based on these, the following strategy was finalized to protect our satellites (5 INSATs, 4 IRSs and 1 SROSS):

- Satellite controllers were put on alert at both MCF and ISTRAC. Operational teams were augmented with experts.
- Solar panels of INSAT-2D and 2C were off by 10° to make them parallel to the Leonid storm vector.
- The redundant bus subsystems were reconfigured for the event.
- Power buses of the satellites were de-parallelled, gyros were put on (to measure attitude disturbance rates, in case of a problem) and RCS systems were configured to avoid spurious pulsing and at the same time enabling easy operations in case of a contingency.
- The payloads, transponders in the case of INSATs, and imaging payloads in case of IRSs, were put off between 1730 hr and 2300 hr UT. The disruption in service was minimal.
- Redundant systems of IRS were kept off. Retarding potential analyser payload of SROSS C2 was operated in a campaign mode to study the effect of meteoric storm in ionosphere. The data is under analysis.

The planned preparations were executed on a countdown mode. The health monitoring of the satellites was carried out continuously by the operational teams. Leonid meteor showers did not have any perceptible effect on any of the ISRO satellites.

Post-storm observation reports have indicated that the peak had occurred earlier than predicted and the peak was spread over a longer time period. The Zenithal Hourly Rate (ZHR) reported during the time of the storm peak was much less compared to the ZHR noticed during a similar storm encounter in 1966.

All the satellites were normalized to pre-storm conditions by 0400 hr UT on 18 November. An additional alert was maintained till 20 November and there were no anomalous observations.

All satellites of ISRO are safe and the spacecraft health reported as normal after the storm. Satellite operating agencies across the world have reported no damages to their satellites. However INMARSAT had reported a minor soft temporary glitch in one of the INMARSAT-2 backup satellites following the Leonid meteoroid storm.