

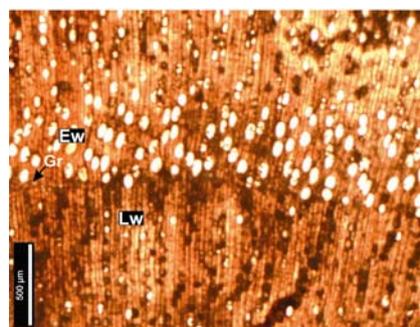
In this issue

Estimation of glacier ice thickness using GPR

Glaciers are reservoir of natural freshwater in the form of frozen ice. However remoteness, harsh climate and rugged terrain conditions of Himalayas restrict availability of scientific information for hydrological and climatic applications at regional and global scale. One of the key issues in Himalayan glaciology is glacier ice thickness. Ground Penetrating Radar (GPR) has recently emerged as a non-destructive technique for glaciological studies, in addition to subsurface geological studies. Radio waves can penetrate deeper through the glacier ice due to its low dielectric constant and gets reflected from the bedrock. However, GPR survey depends on many technical/logistic reasons restricting its utilizations in terrain like Himalayas. Singh *et al.* (page 68) use a multiple low frequency antenna to estimate the ice thickness of bare ice ablation zone of Chhota Shigri glacier, Himachal Pradesh, India. GPR surveying was done using 16 MHz frequency with 4 m gap between receiver and transmitter which was successively moved at 50 cm data-acquisition intervals along bare ice ablation zone of the glacier. Advanced processing of the raw data was carried out using RADAN software, developed by GSSI, for displaying, editing, processing and to generate the output. The bedrock reflection was distinctly observed and thickness of bare ice of 400 m survey profile along ablation zone varied from 110 to 150 m. A point reflector (hyperbola signature) and a linear non-bed dipping reflection (due to englacial heterogeneities) within subsurface ice were also observed. Volume of ice and water equivalent for surveyed ablation region were found approximately 0.0572 and 0.049 km³ respectively, using GPR data.

Oldest fossil of *Eucalyptus*

Shukla *et al.* (page 74) describe a fossil wood belonging to *Eucalyptus* L'Hérit of the Myrtaceae from the Deccan Intertrappean beds of Dindori District, Madhya Pradesh, considered as Late Maastrichtian–Danian in age. The fossil wood is from the Ghughua National Fossil Park (23°7'N : 83°37'E) situated at a distance of 13.5 km southwest of



Shahpura (23°11'N : 80°42'E) on the Shahpura–Niwas road. Using a combined matrix of morphological and molecular data, a phylogenetic analysis of the fossil wood was performed, along with modern eucalypt taxa to show the possible location of the fossil in the eucalypt group. This analysis based on the morphological data of 16 extant eucalypts and the present fossil indicates that the fossil wood belongs to the eucalypt group, closest to the *Eucalyptus* clade. Palaeobotanists are always concerned about the origin and centre of diversity of a genus/species. The absence of authentic fossil record from Australia before the Miocene and its presence in India during the Late Cretaceous raise a question on the widely held view of Australia being the original home of *Eucalyptus*. Although *Eucalyptus* fossils are also known from other Gondwanaland continents, this fossil wood is the oldest among them and supports its gondwanic origin.

Estimation of net photosynthesis in rice

Net photosynthesis rate (P_N) has an important role in controlling the ecosystem primary production and it is important to understand the relationships between P_N and other physiological and environmental variables to improve and develop the models for predicting plant growth and productivity. Remote sensing of leaf to landscape scales of crop physiology now provides an opportunity to integrate with leaf-level measurements and has immense potential for timely assessment of primary productivity and source–sink relationships. Vegetation indices (VIs) derived from spectral reflectance measurement from canopy offer important and convenient measures for the estimation of ecosystem variables (e.g. chlorophyll (Chl) content, leaf area index (LAI) and fraction of absorbed photosynthetically active radiation ($fAPAR$)) and makes the remote sensing data useful for quantification of productivity. Mamta Kumari *et al.* (page 55) present a study using two methods for gross primary productivity (GPP) estimation from the *in-situ* measurements during the growth cycle of rice with the objectives (1) to evaluate the relationship between ground-based chlorophyll-content and chlorophyll-related VI, (2) to evaluate the four kinds of VIs for net photosynthesis estimation and (3) to identify most suitable VI-based combination for GPP estimation following the Monteith logic (GPP as a product of LUE, $fAPAR$ and PAR). The author report measuring P_N at leaf level and use handheld spectral measurements to develop a leaf-level approach. The concept emphasized here will have strong bearing on the development of new approaches of GPP estimation with future hyperspectral satellite derived inputs.