

Application of synchrotron-radiation X-ray tomographic microscopy (SRXTM) to visualisation of petrified wood samples

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The petrified wood, known from many locations in the World, has been formed through interaction of fallen and buried wood with its environment. The formation processes have lasted thousands or millions of years. The petrification process involved several interactions between organic matrix components of wood and environmental solutions consisting of several different inorganic/mineral substances such as silica, calcium carbonate, calcium phosphate. The final effect is unusual because three dimensional replicas of wood have been created with well preserved cell microstructures (see Fig. 1).

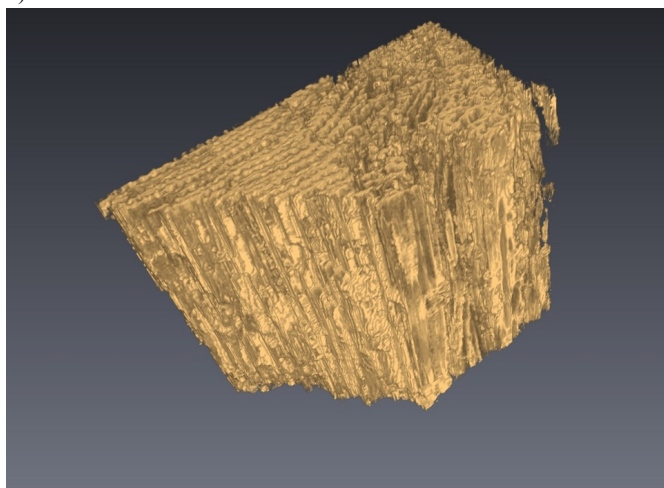


Fig.1. Micro-tomography picture of well preserved petrified wood from Dunarobba.

The present work involves synchrotron based X-rays micro-tomography studies of two different petrified woods originating from Dunarobba (central Italy) and from Republic of South Africa. Analyses were made at X-rays Tomographic Microscopy localized at TOMCAT beamline at Swiss Light Source synchrotron at Paul Scherrer Institut (PSI). This method perfectly permits to visualize the localization and distribution of phases in the saved cell and tissues (Figure 2).

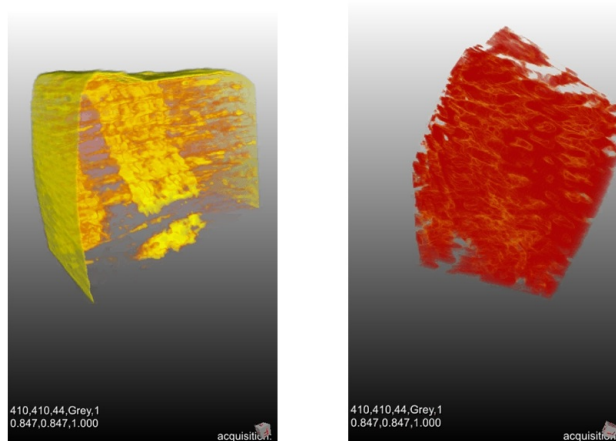


Figure 2. Distribution of detected main phases in petrified wood from Republic of South Africa. The left image illustrate the localization of calcite (Calcite) and right apatite (Apatite), respectively, in the mineralized wood tissue.

The present results demonstrate the excellent possibilities of high-resolution X-ray Tomographic Microscopy (TOMCAT) approach in petrified and mineralized wood studies. Microtomography can help in understanding of the successive stages of the petrification process, namely, of the infiltration of solutions and crystallization of inorganic compounds in organic wood matrix. The method may be successfully used for studies of artificial petrification and impregnation processes and in related processes of material processing.

