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JOENSUUN
YLIOPISTO

APPLIED PERIOD

Institute for Forest Growth, Albert-Ludwigs University, Freiburg, Germany

(October 2nd to December 10th)

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By
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Content

- Weekly Activities
- Inventory works in the IWW demonstration plots
- Excursions
- Scientific project

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Weekly Highlights

- Conference on growing valuable broad-leaved species (VALBRO)
- Diameter measurement and future crop tree selection in IWW demonstration plots
- Seminar on European research networks
- Excursion at Johanniskreuz, Breisach and Wolfach
- Scientific project

Diameter mesurement in Kaiserstuhl

Ring width mesurement

Inventory Works in iww demonstration plots

Diameter measurement

- Diameter measurement at Kaiserstuhl and Mooswald.
- This was just routine work to develop diameter after five years.

Selection of future crop tree

- Selected trees should be in good quality and structure.
- Spacing between trees.
- The crown density.
- The management objectives
- The fertility of the area

Diameter measurement at Kaiserstuhl

EXCURSIONS

- Gundlingnen, Rhine Valley, Germany; valuable wood production with cherry.
- Breisach, Rhine Valley, Germany; valuable wood production within agroforestry systems.
- Alsace, France; mixed broad-leaved forest.

Gundlingnen, Rhine Valley, Germany

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EXCURSIONS

- Johanniskreuz; Valuable Oak production area.

- Wolfach; Single tree selection system.

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SCIENTIFIC PROJECT
ON
Identification of Growth Zone Boundaries and Density Pattern of Teak (*Tectona grandis*) from Evergreen Zone of Ghana

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Objectives

• To describe the density profile of *Tectona grandis* from the pith to the bark.

• To find a characteristic density signal which indicates the growth zone boundary.

• To describe the density pattern at the ring boundary.

• To compare the above parameters with trees from the Transition zone of Ghana.

Hypothesis

•There is intra-annual density variation that can be used to identify tree ring boundaries in *Tectona grandis* from the evergreen zone of Ghana

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Materials

Stem Disks of Teak (*Tectona grandis*) have provided by Kenneth Anyomi, it was collected from plantation forest of evergreen zone of Ghana.

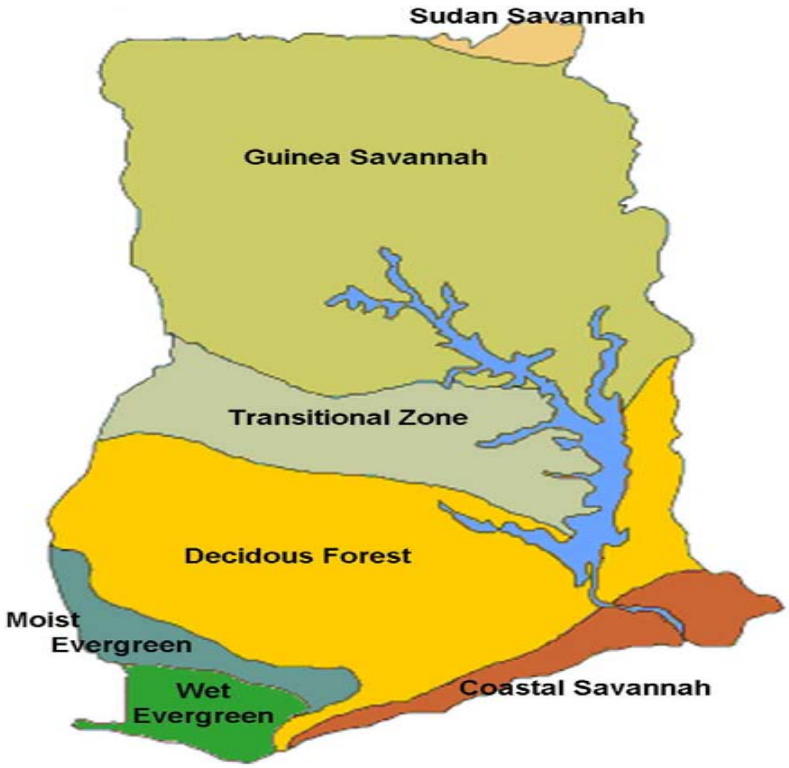
Methods

Ring width measurement

Increment width was measured by using ring width measurement systems and growth zone boundaries were identified by visually.

Density Measurement

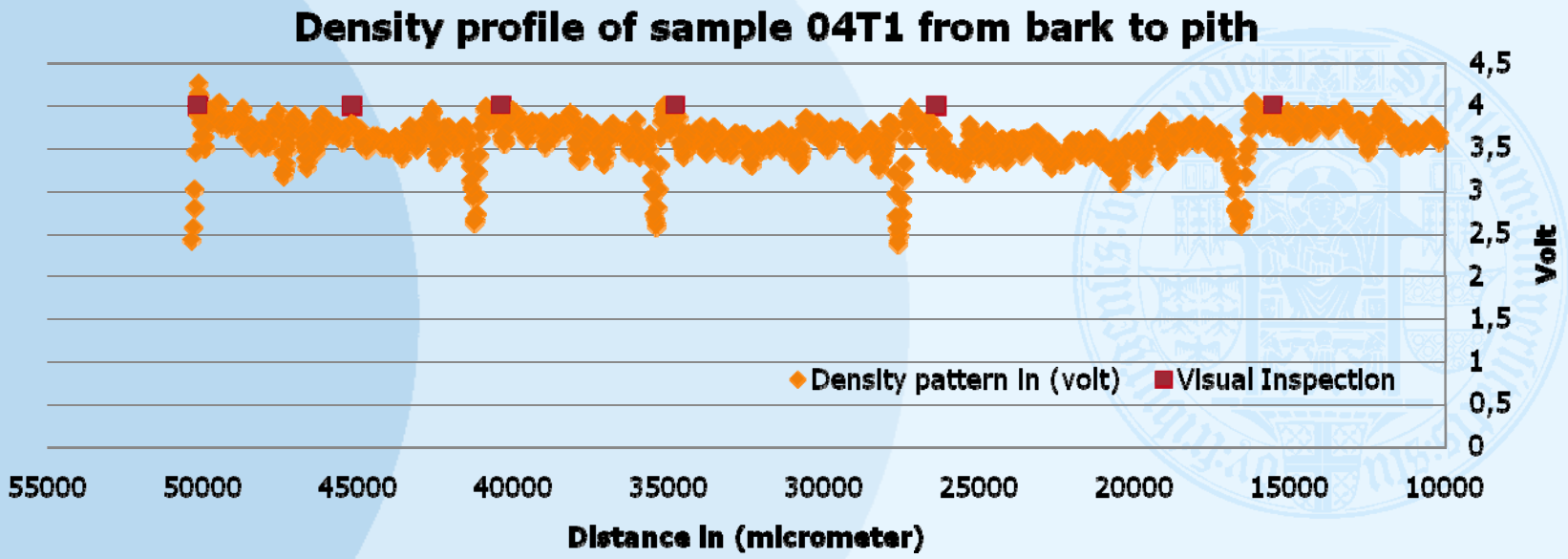
After measuring increment width, all the samples were brought under High-frequency Densitometer (Schinker et al, 2003) for measuring density. The density measurement followed same radius that was used in case of visual identification.

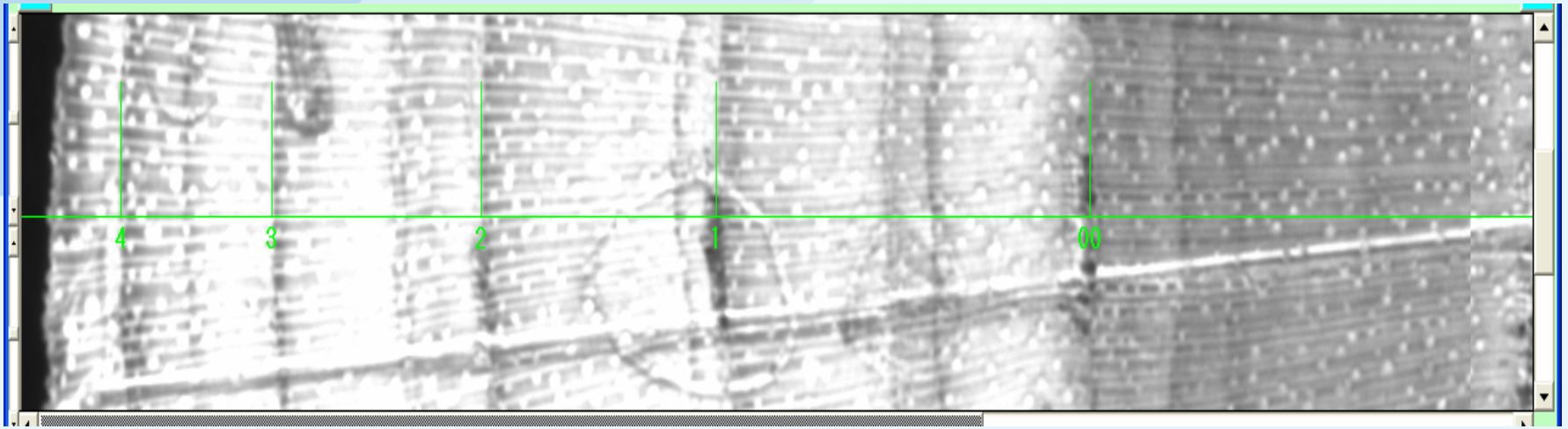


High frequency densitometer

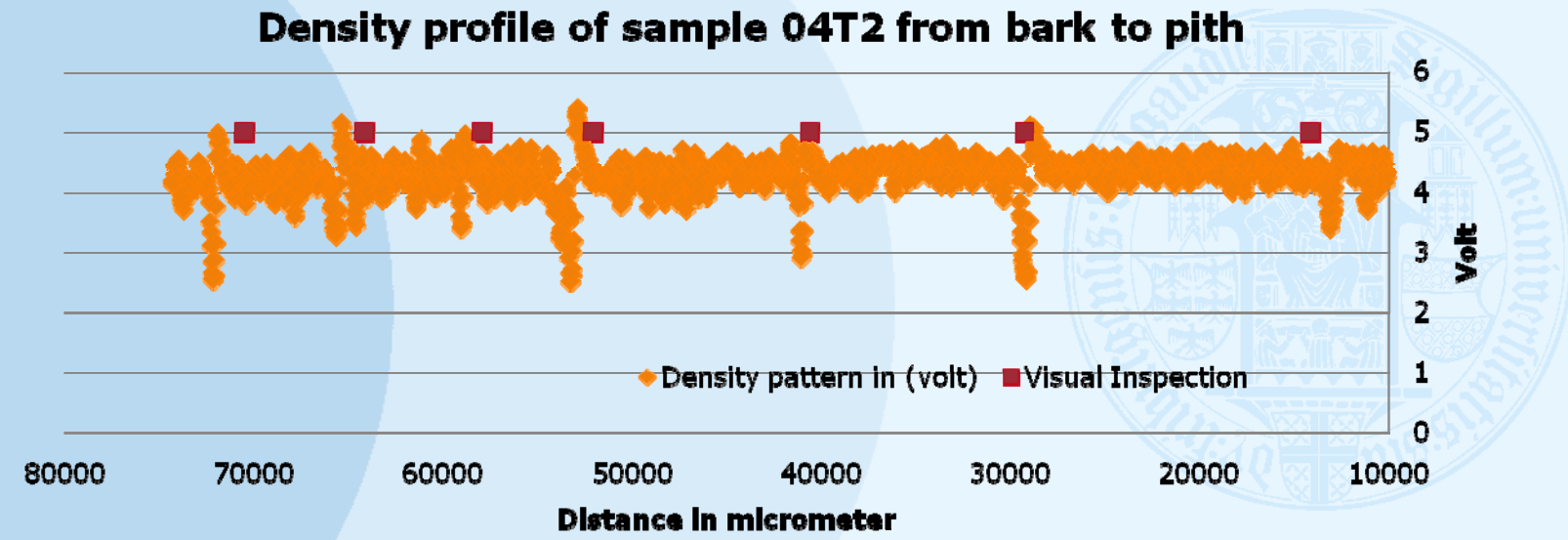
Tree ring measurement system

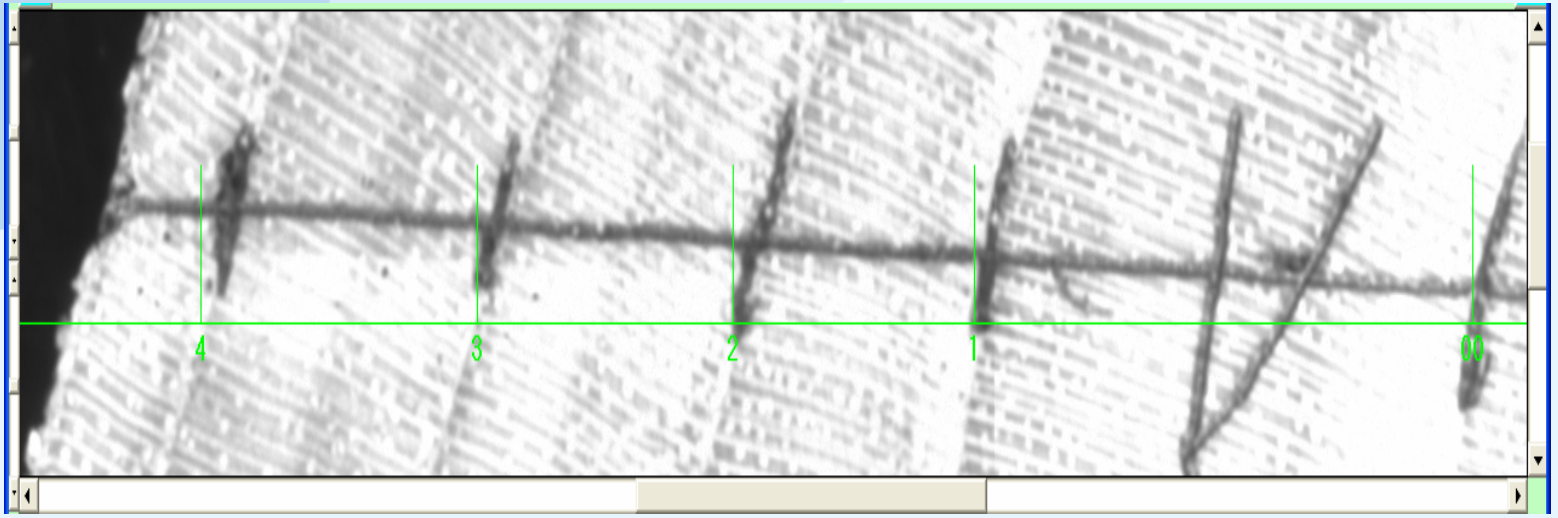
RESULT AND DISCUSSIONS



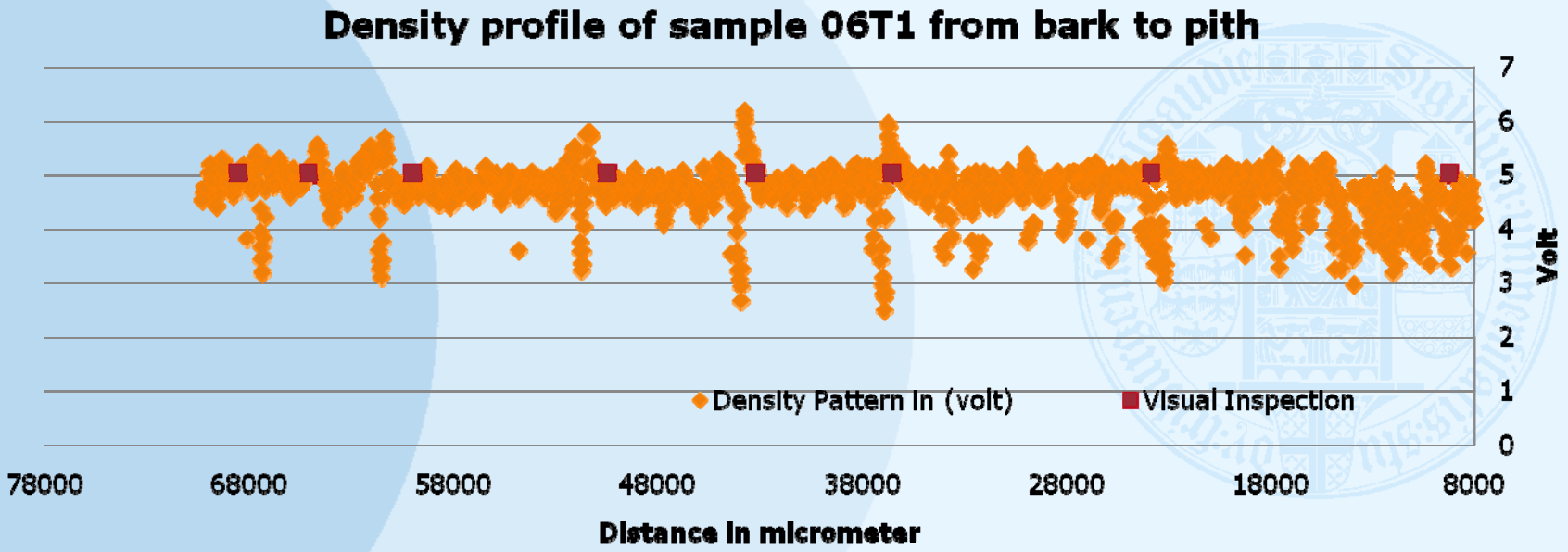


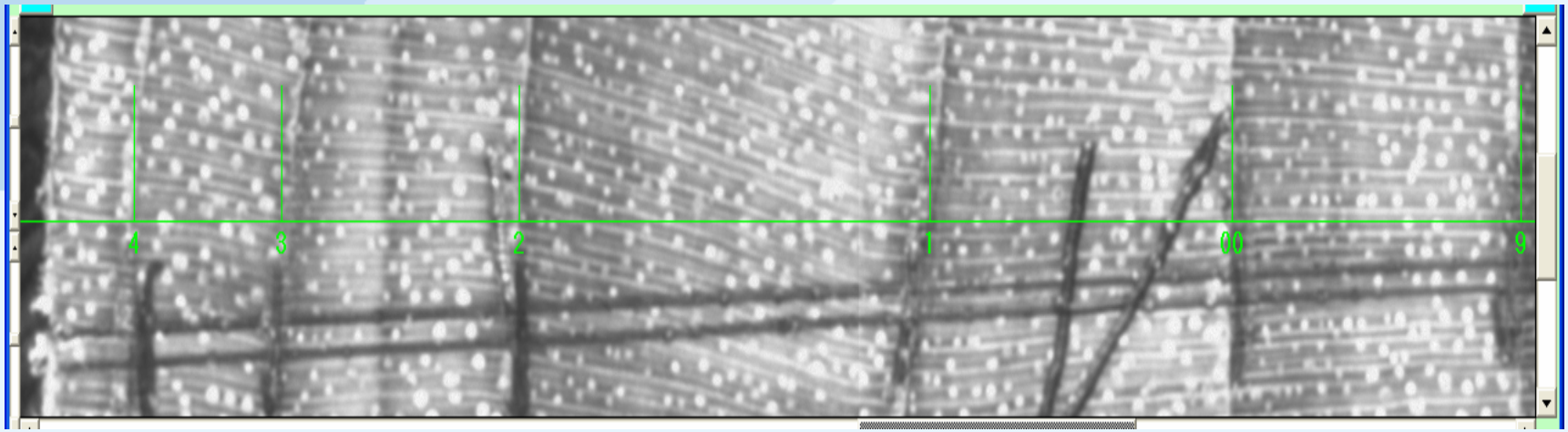
Period of growth (1998-2004); 6 years; Maximum density: 4.25 volts, Minimum density: 2.40 volts



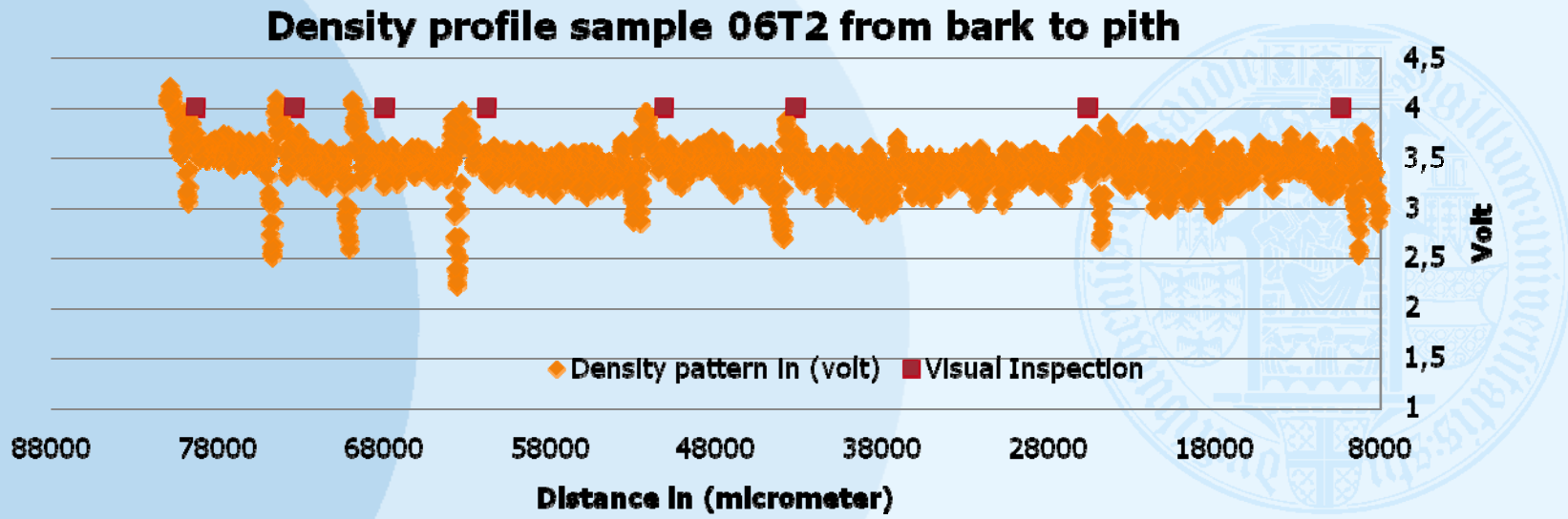


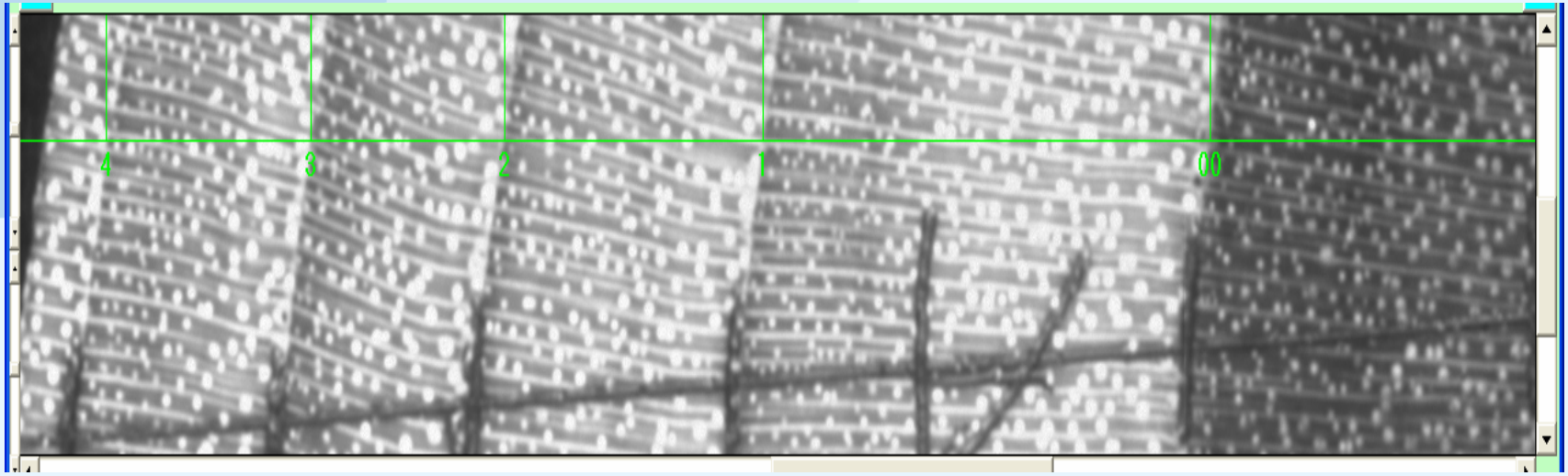
Period of growth (1997-2004); 7 years; Maximum density: 5.396 volts, Minimum density: 2.49 volts



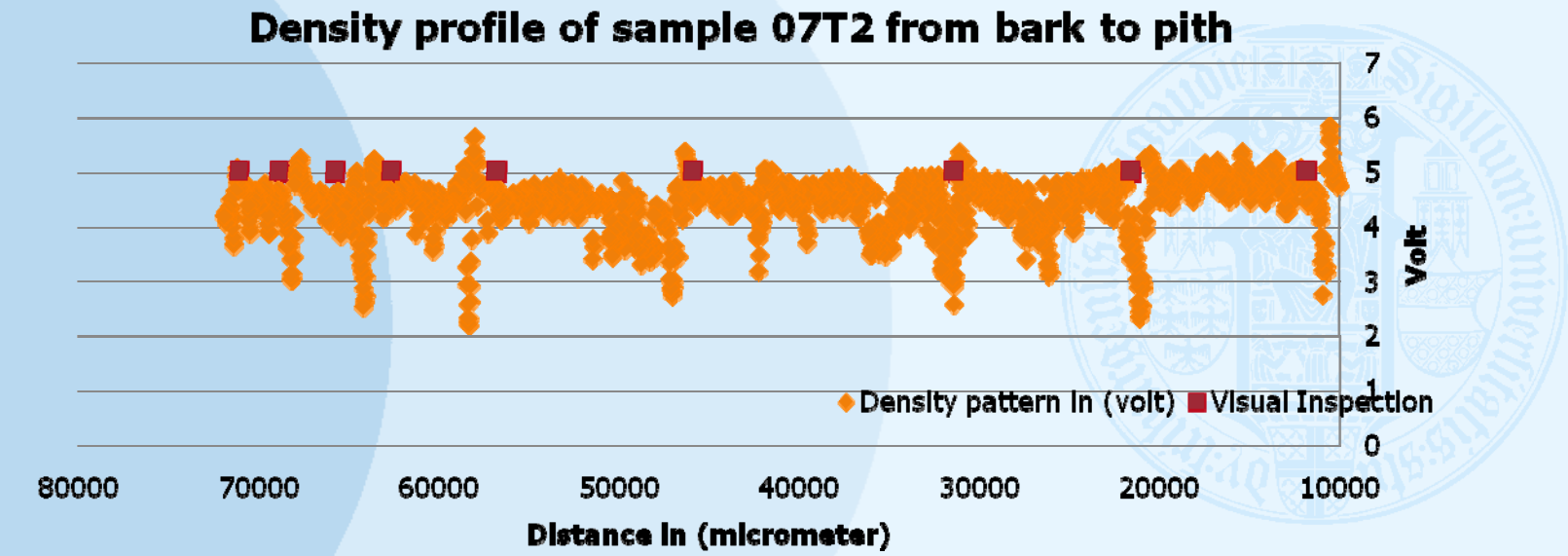


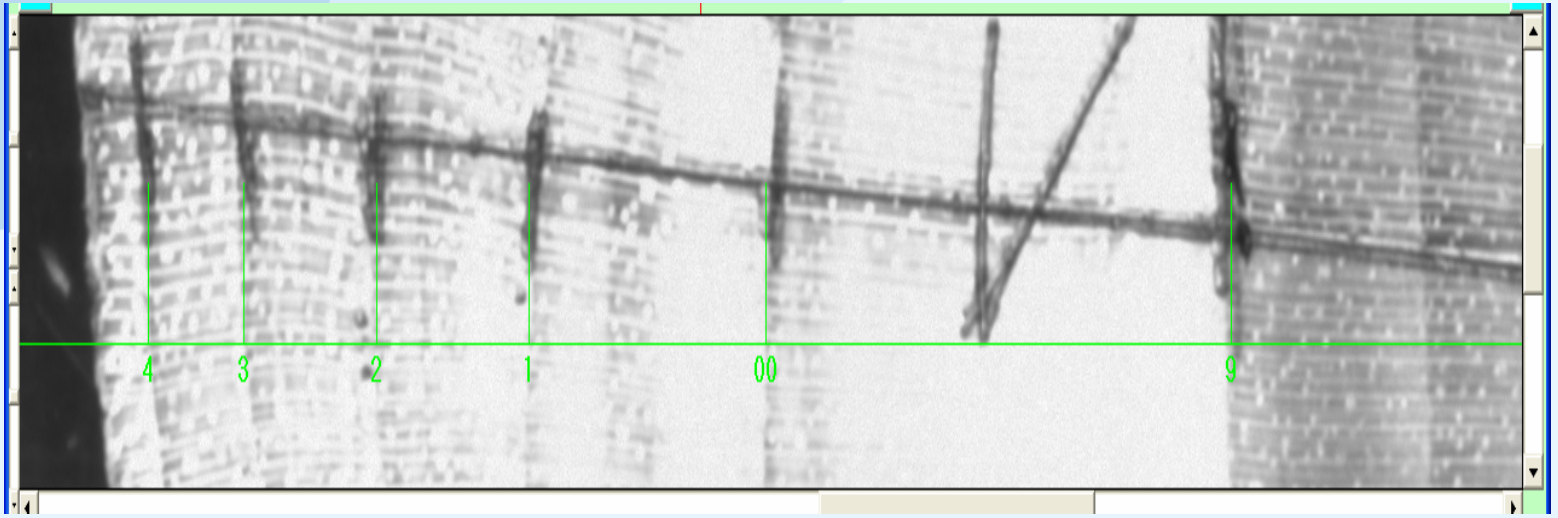
Period of growth (1996-2004); 8 years; Maximum density: 6.162 volts, Minimum density: 2.483 volt



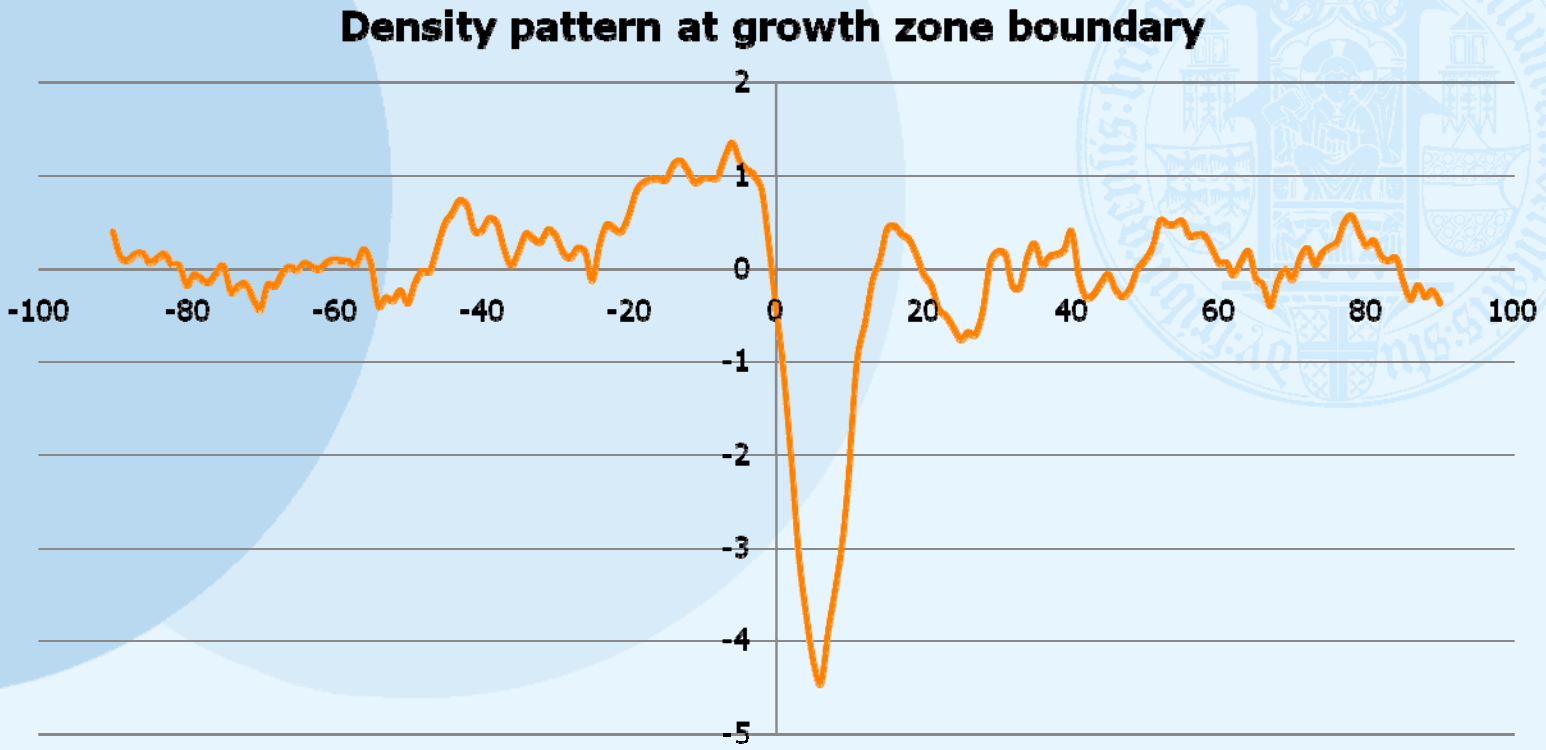


Period of growth (1996-2004); 8 years; Maximum density: 4.202 volts, Minimum density: 2.256 volts

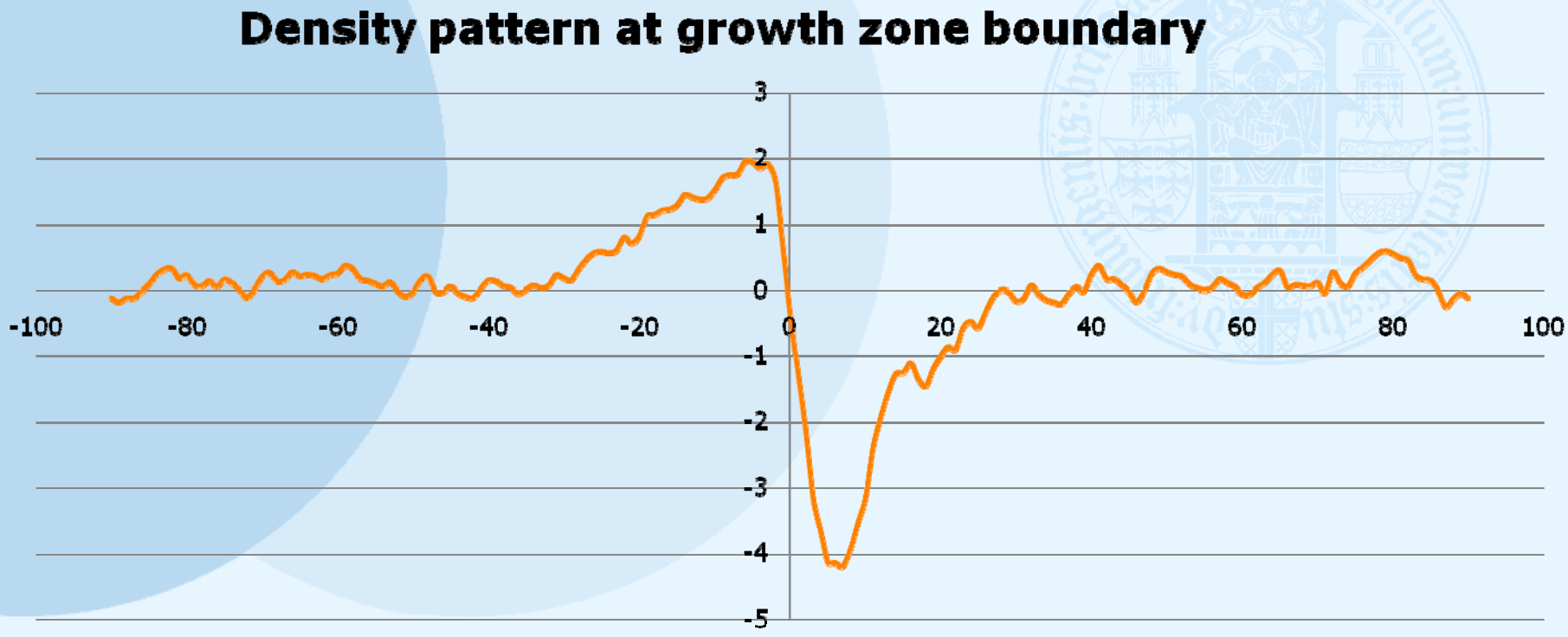




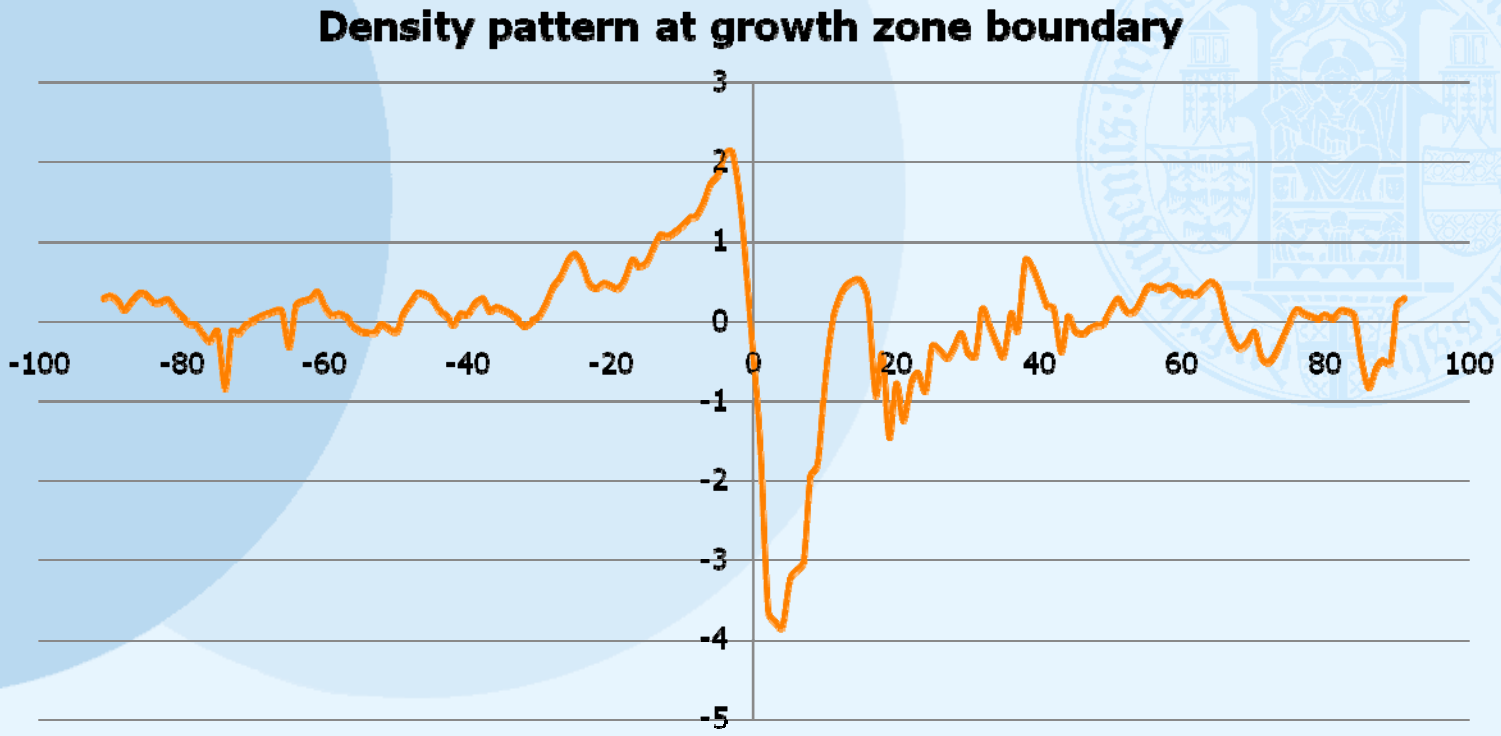
Period of growth (1995-2004); 9 years; Maximum density: 5.847 volts, Minimum density: 2.202 volts



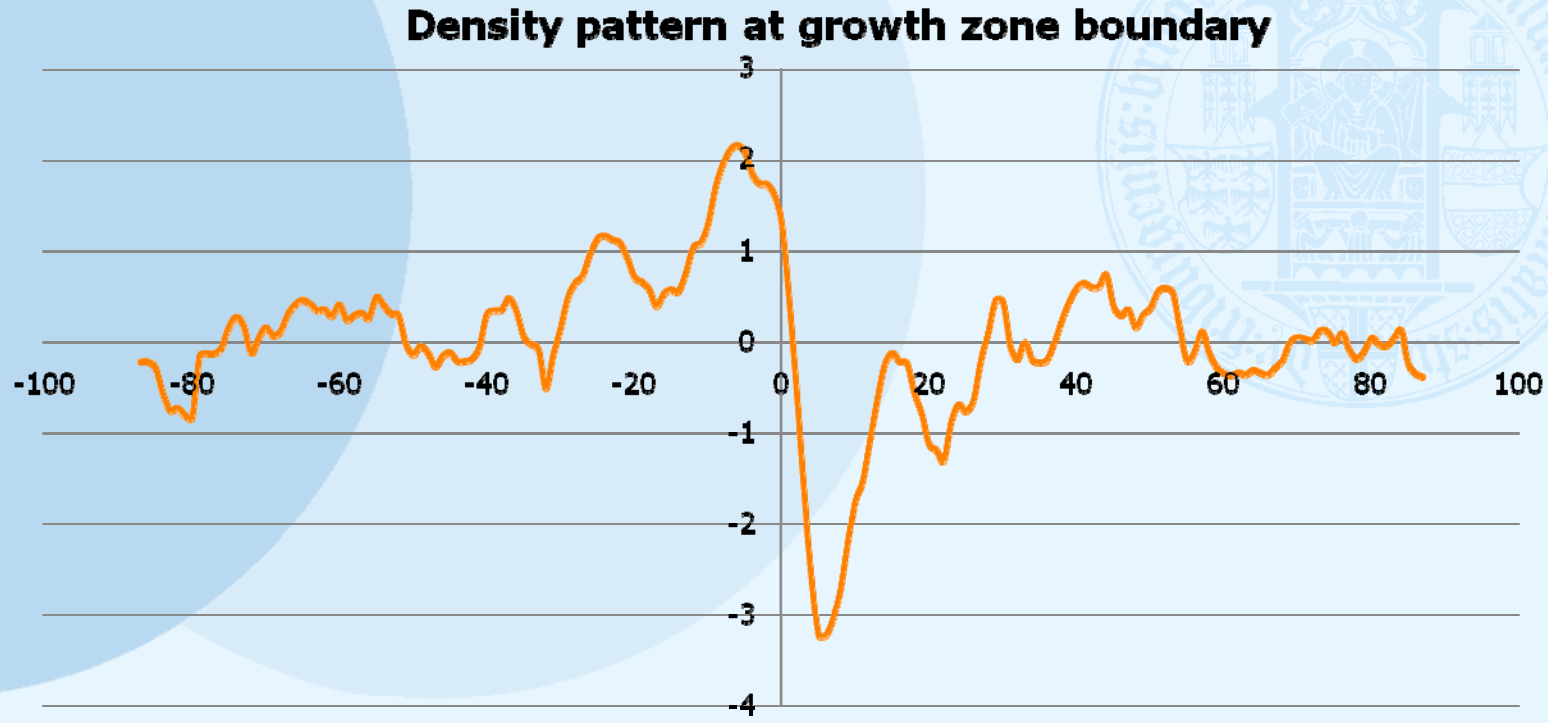
Normalized sample 04T1



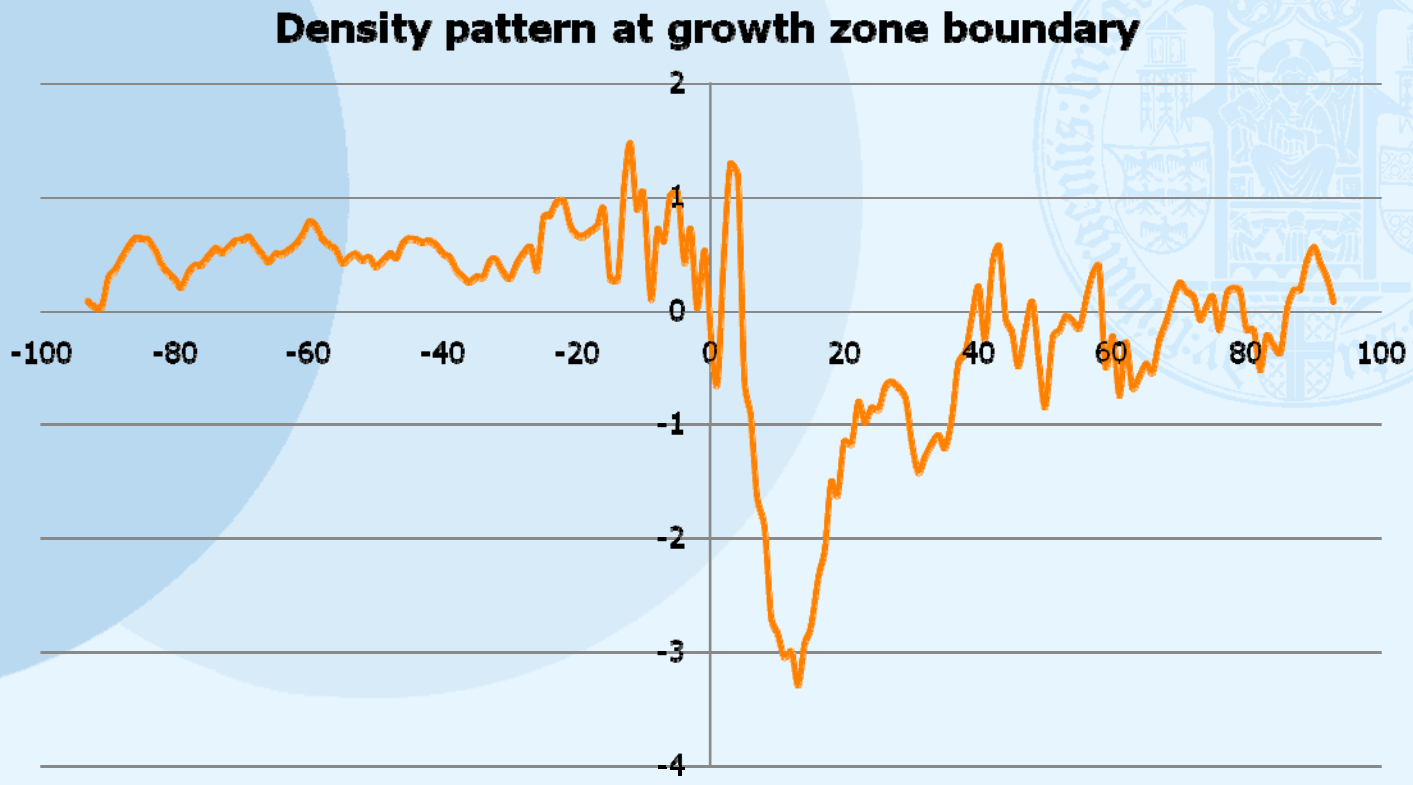
Normalized sample 04T2



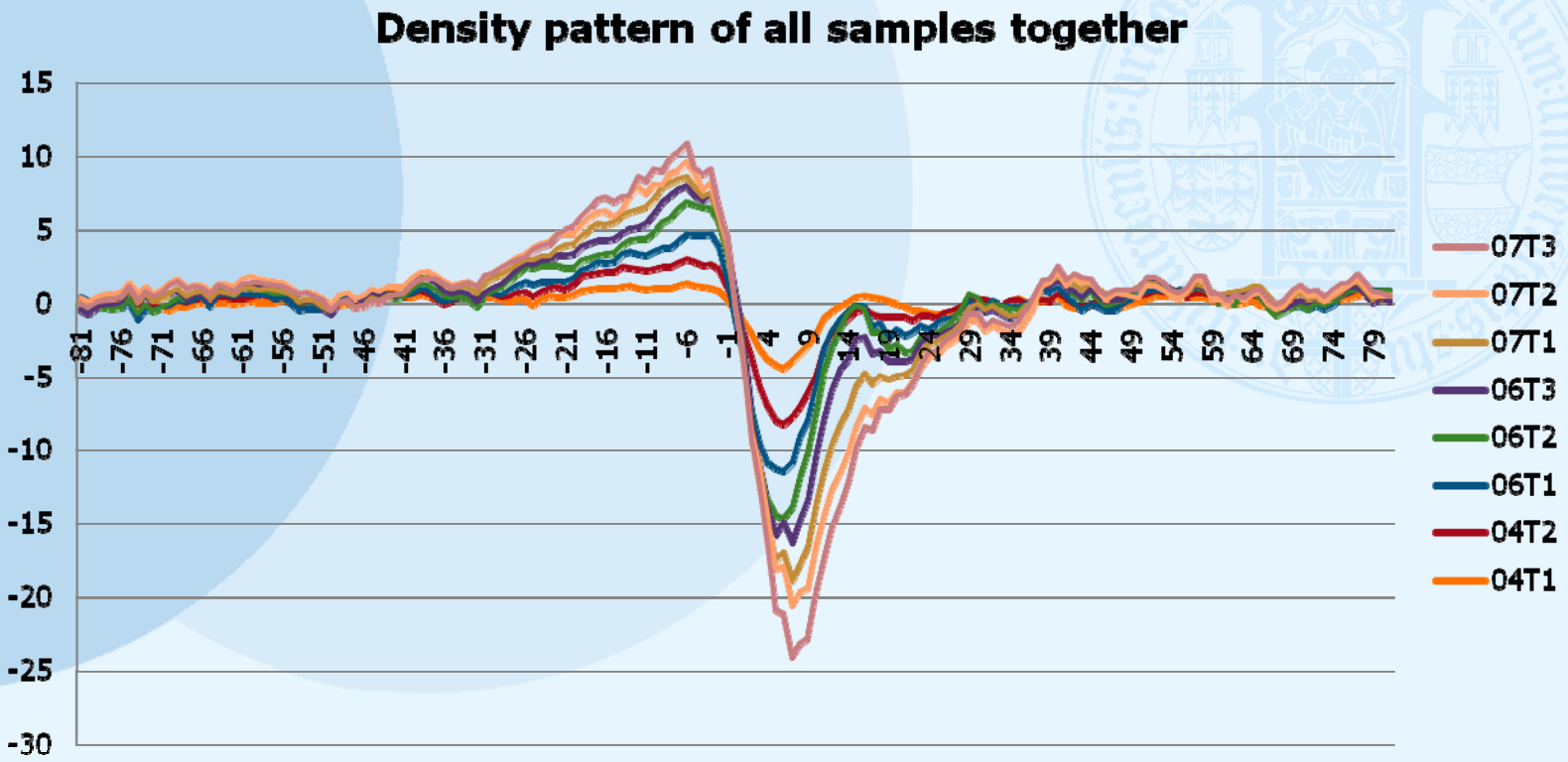
Normalized sample 06T1



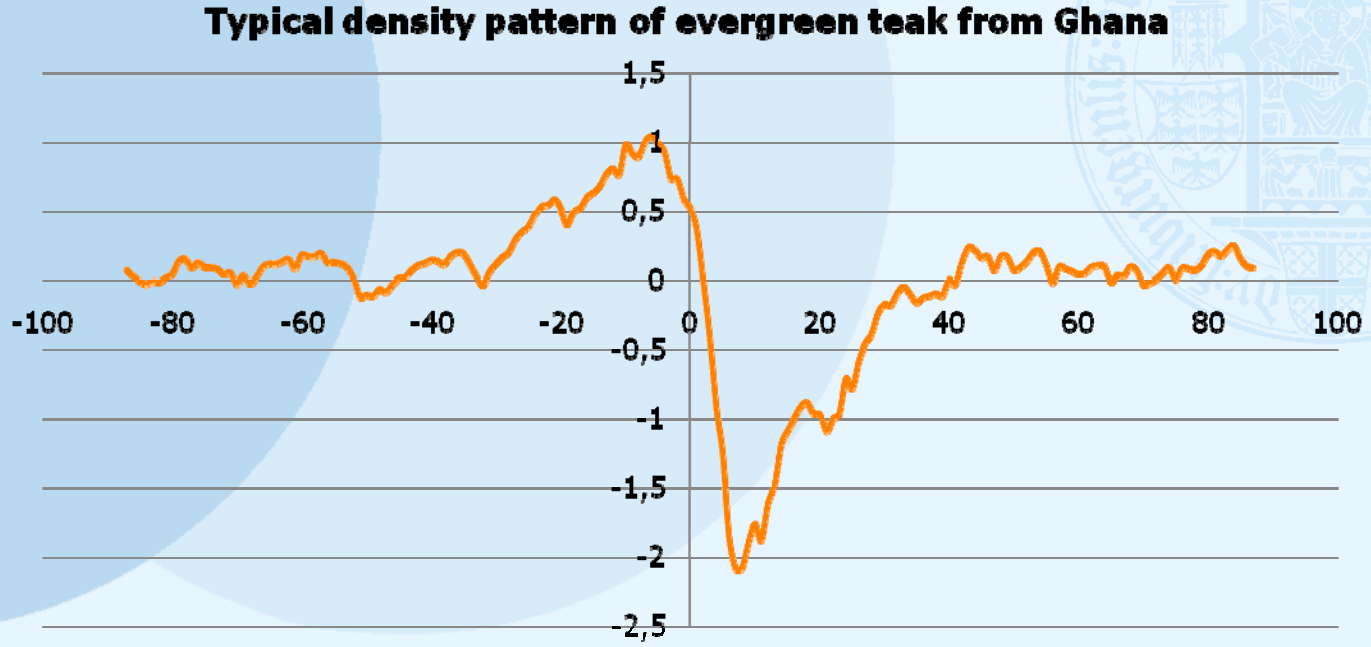
Normalized sample 06T2



Density profile of sample 07T2

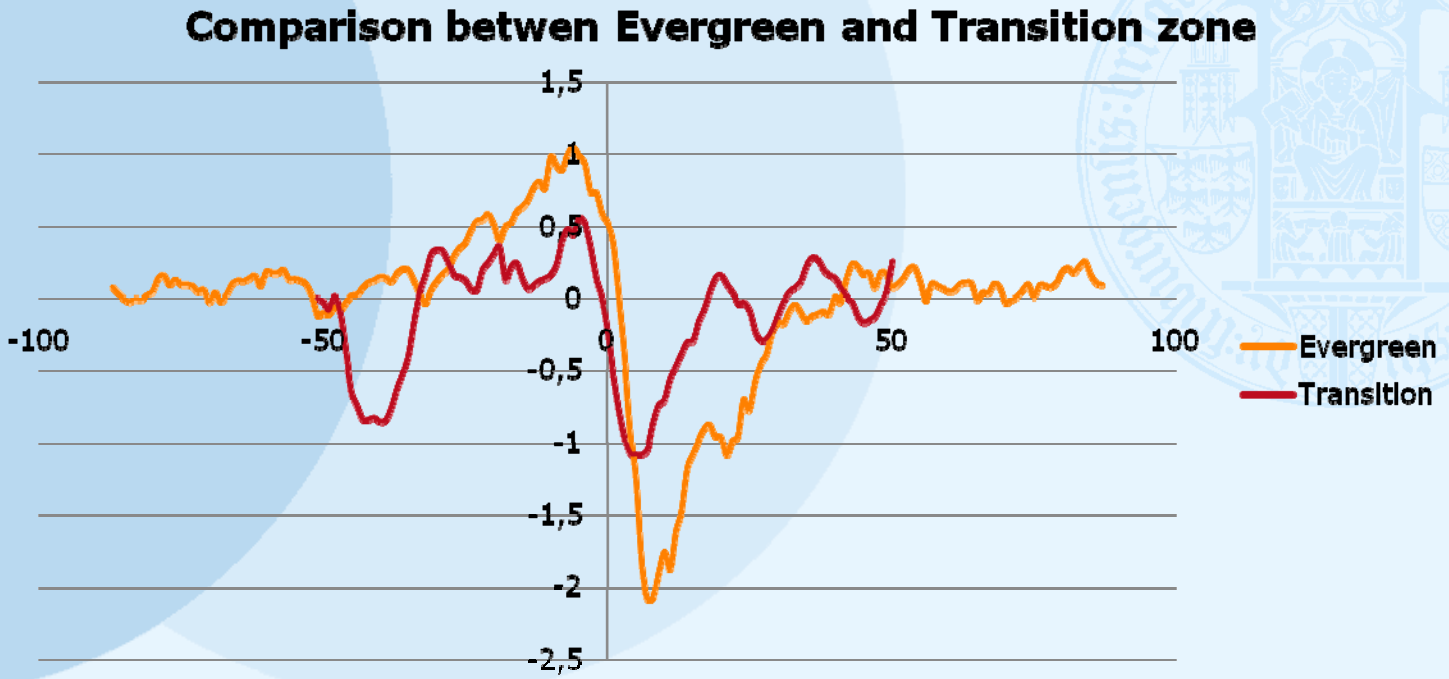


Normalized values of all ten samples together



Average normalized values of all samples

❖The ring width associated with wider late wood and comparatively narrower early wood. This is really typical for most of the ring porous species (Wheeler 1987; Priya & Bhat 1997, 1998).



Density profile comparison between evergreen and transition zone of Ghana

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Summary of the Project

- Density profile of Teak (*Tectona grandis*) from evergreen zone of Ghana analyzed successfully.
- High frequency densitometer has found powerful and effective tool for growth zone identification, however visual inspection also very much necessary, because species like Teak (*T. grandis*) has so many false rings.
- Density variation between early and late wood also found significant for identifying tree ring boundary.
- There is sharp density decrease from high density late wood of one growing season to the low density early wood of following growing season.
- Density pattern and visual inspection found more similar from nearby pith than towards bark.
- Highest and lowest density found at growth zone boundary.
- More research necessary by using more samples which will cover most of the area of Ghana.

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References

Martin G. Schinker, Norbert Hansen & Heinrich Spiecker, 2003, High-Frequency Densitometry – A New Method for the Rapid Evaluation of Wood Density Variotions, IAWA Journal, Vol. 24 (3), 2003: 231–239.

Priya, P.B. & K.M. Bhat. 1997. Wood anatomical changes associated with insect defoliation in juvenile teak. IAWA J. 18: 307–313.

Priya, P.B. & K.M. Bhat. 1998. False ring formation in teak wood and the influence of environmental factors. Forest Ecology and Management 108: 215–222.

Wheeler, E.A. 1987. Anatomical and biological properties of juvenile wood in conifers and hardwoods. 41st Annual Meet. FPRS, Louisville, Kentucky.

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Thank
You!