In Western classical music, the structure of a piece is reinforced by the contrasting harmonic nature of its sections. The structural parts are characterized by the presence of certain chords or chord changes. A section that is harmonically stable may be followed by a contrasting section that feels unstable or tense. In the sonata form, for example, the unstable development part is located between the stable exposition and recapitulation phases. In this paper, we try to measure this kind of harmonic stability and present visualizations for such analyses. To this end, we propose novel features for quantifying tonal complexity and discuss their musicological implications. The features are based on statistical measures calculated from chroma representations of the music recording.

The characteristics of tonal complexity apply to different time scales. To illustrate this time scale dependence for the proposed features, we use hierarchical visualizations based on previously introduced scape plot representations. On a fine temporal level, tonal complexity is related to the character of chords or scales. For example, in a modulating transition phase, we usually find more complex chords than at the beginning of a piece. To analyze such differences, we study the feature values for isolated chords. Looking at a coarser level, the presence of modulations is an indication for a segment's complexity. In the sonata form, for example, the development usually contains several modulations. To account for this property, we calculate the complexity features based on a coarse resolution of the chroma features. For evaluation of this coarse-scale complexity, we analyze Beethoven's sonatas where we find higher complexity in the development parts.