Sleep analysis is an important diagnostic tool for sleep disorders. However, the current manual sleep scoring is time-consuming as it is a crude discretization in time and stages. This study changes Esbroeck and Westover's [1] latent sleep staging model into a global model. The proposed data-driven method trained a topic mixture model on 10 control subjects and was applied on 10 other control subjects, 10 iRBD patients and 10 Parkinson's patients. In that way 30 topic mixture diagrams were obtained from which features reflecting distinct sleep architectures between control subjects and patients were extracted. Two features calculated on basis of two latent sleep states classified subjects as "control" or "patient" by a simple clustering algorithm. The mean sleep staging accuracy compared to classical AASM scoring was 72.4% for control subjects and a clustering of the derived features resulted in a sensitivity of 95% and a specificity of 80%. This study demonstrates that frequency analysis of sleep EEG can be used for data-driven global sleep classification and that topic features separates iRBD and Parkinson's patients from control subjects.