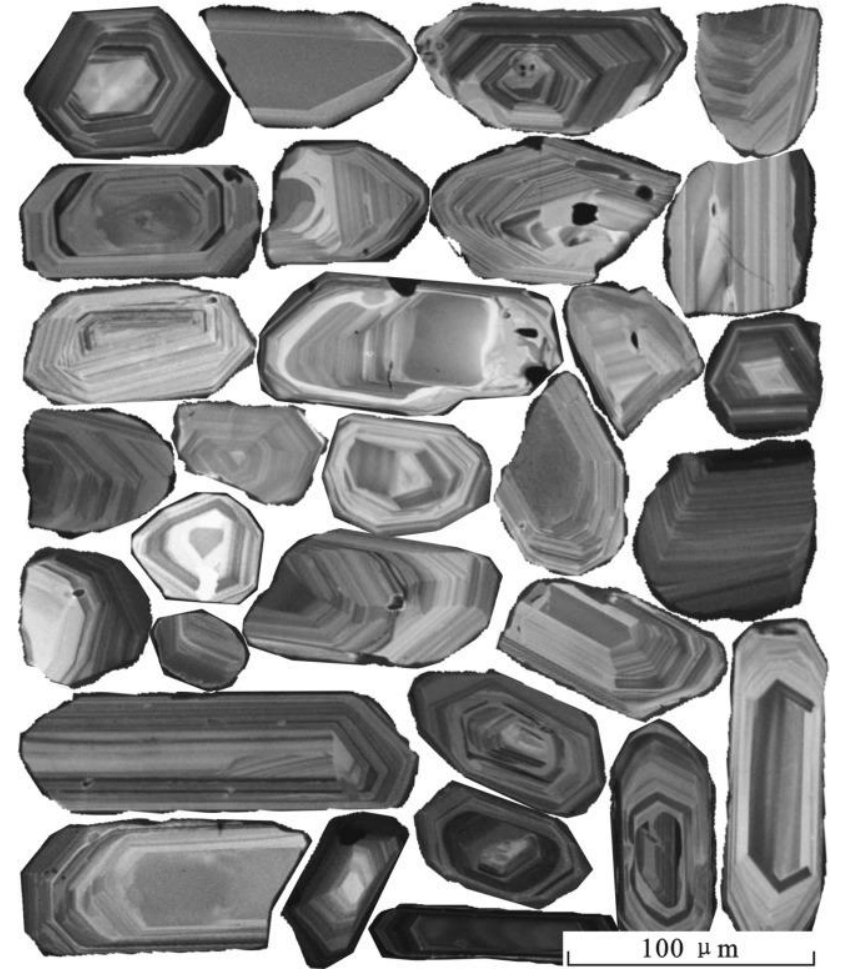
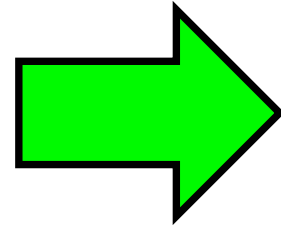


Module 1 Outline

- What is detrital geochronology?
- Learning Goal #1: Understand the basis for visual representation of detrital geochronology data
- How do we visualize detrital age distributions are calculated from numerical data?
 - Histograms
 - Probability Density Plots (PDPs)
 - Kernel Density Estimates (KDEs)
 - Cumulative Distribution Functions (CDFs)

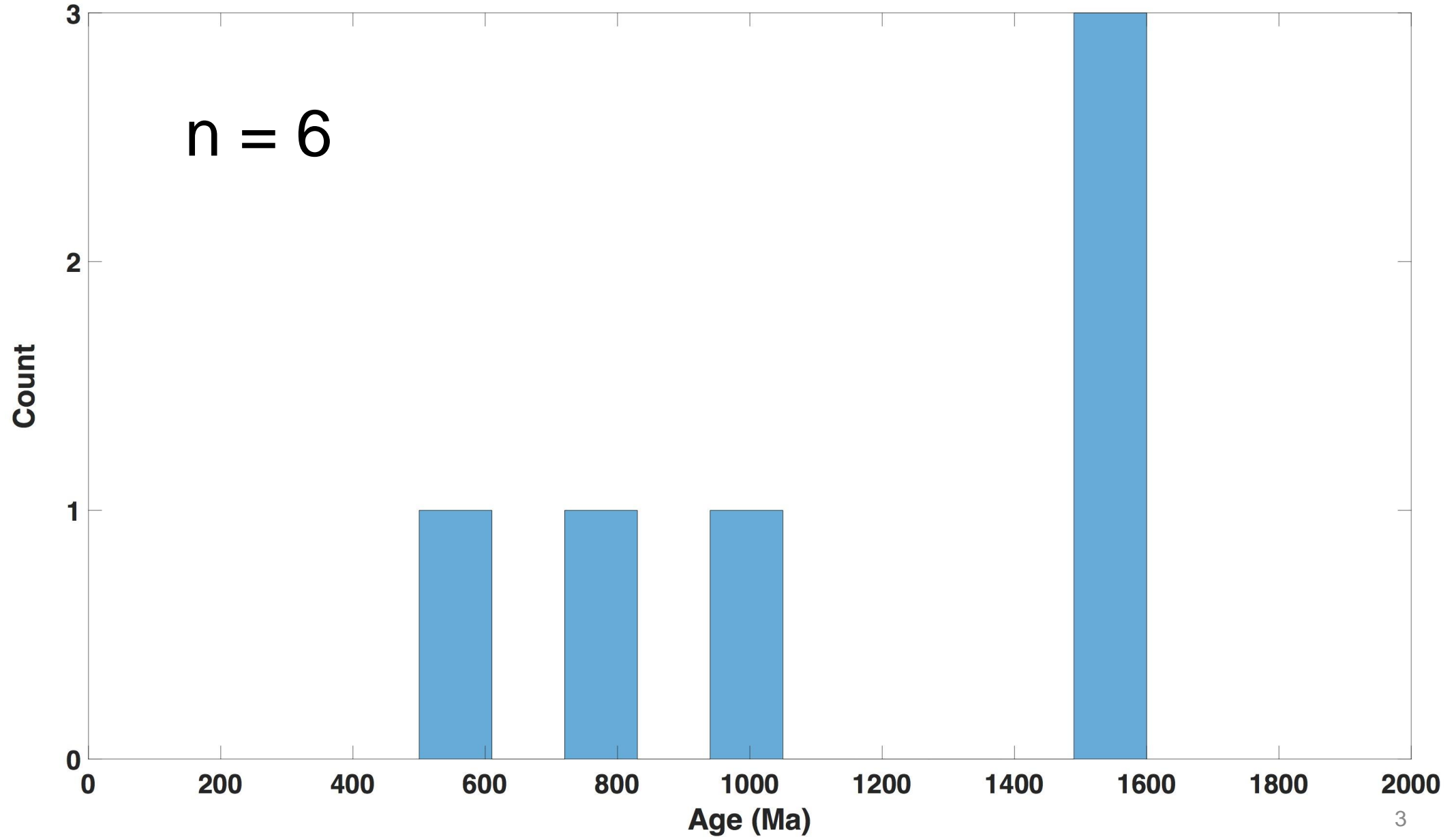
What is detrital geochronology?



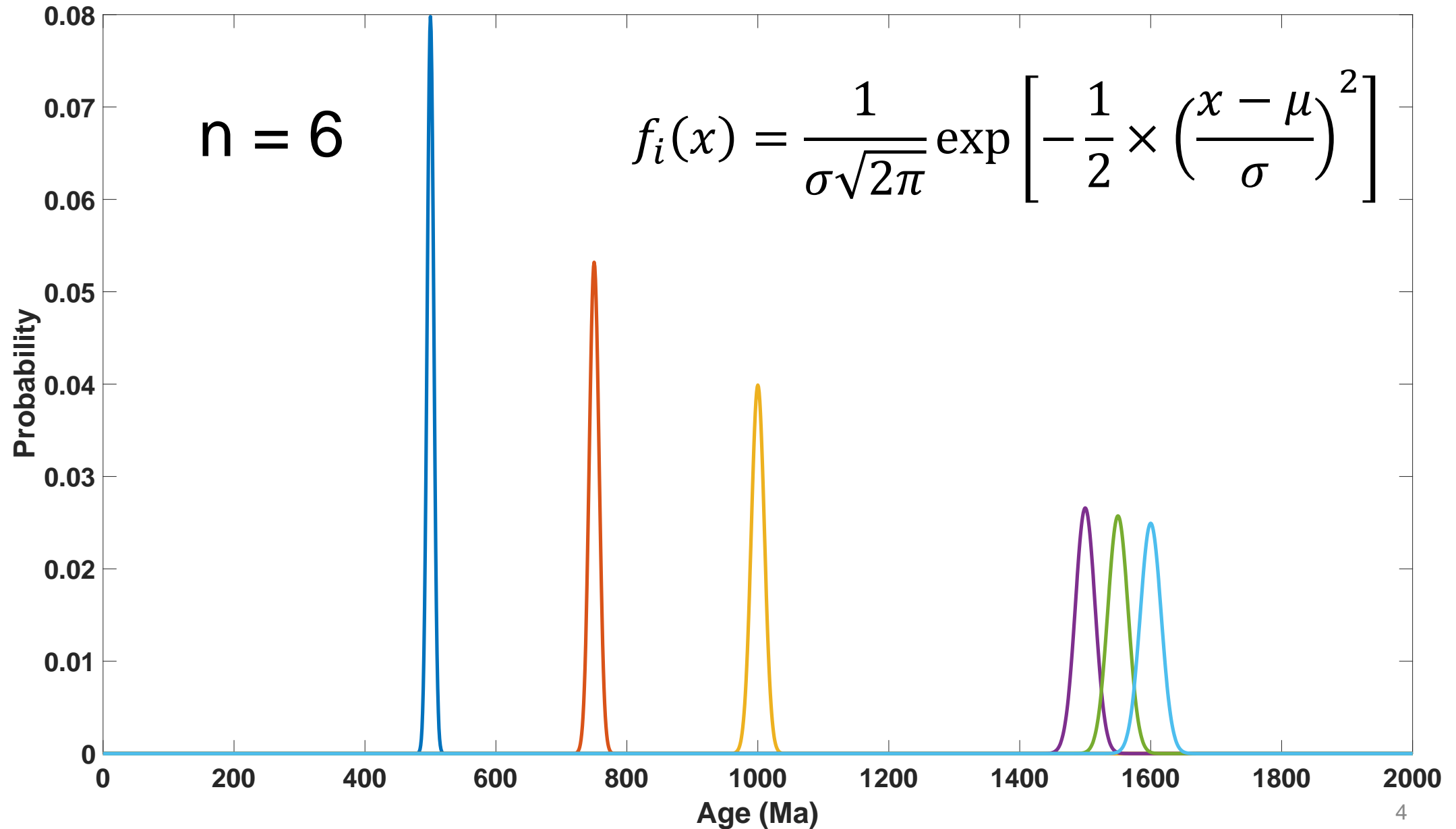
Zhong et al. (2017)

<https://www.eiscolabs.com/products/esng0036>

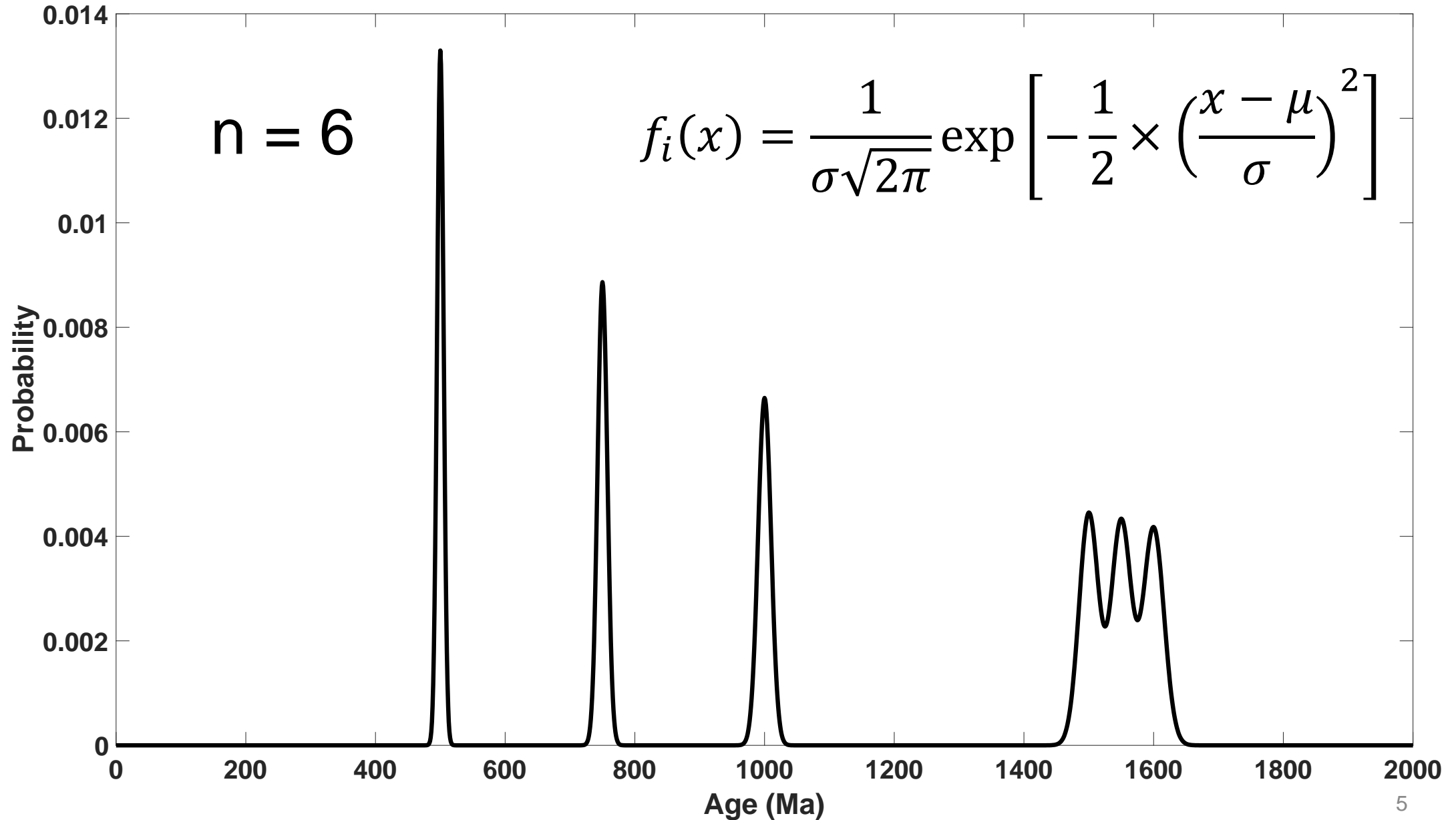
Age Distributions: Histogram



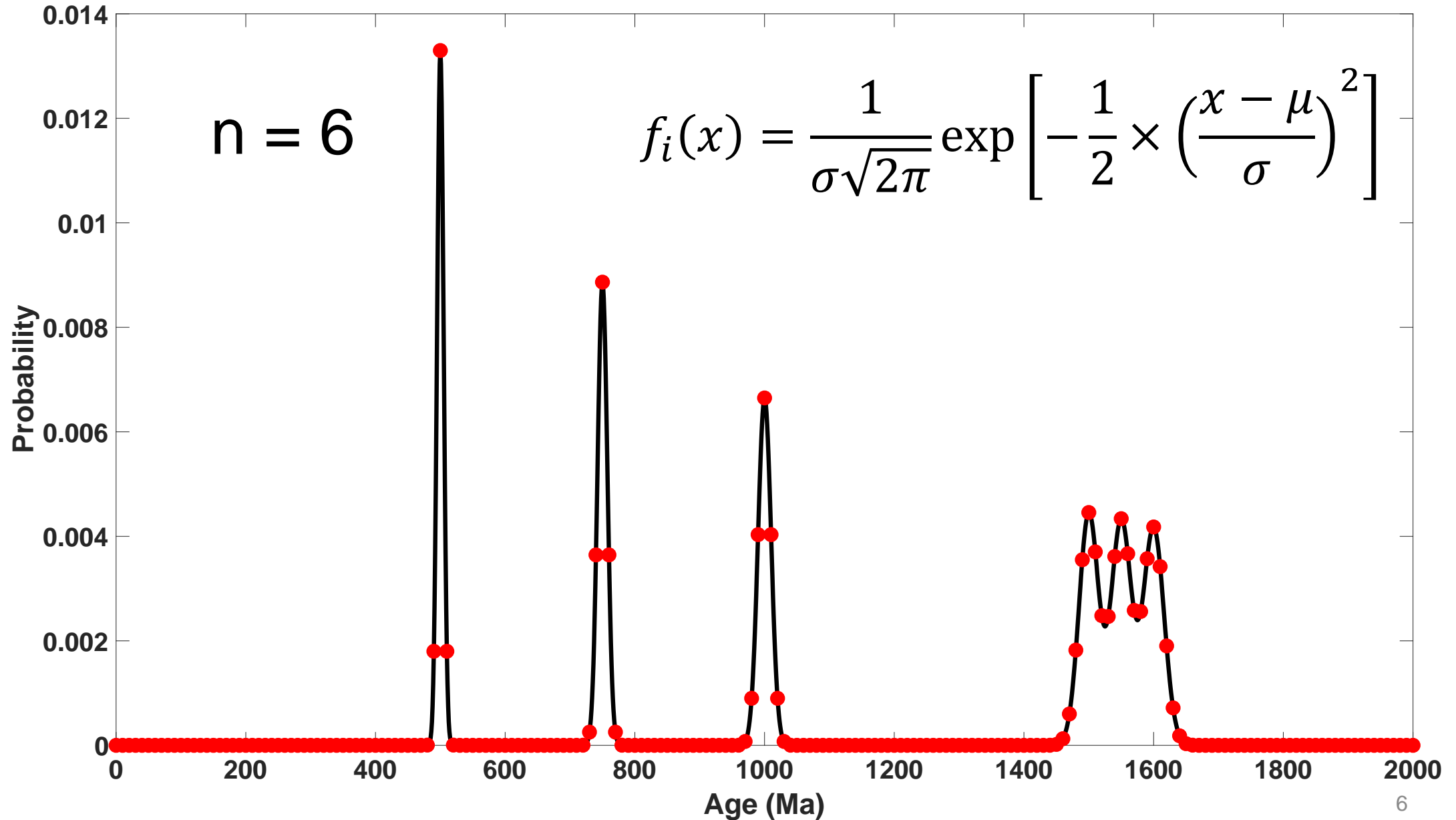
Ages Represented as Gaussian Distributions



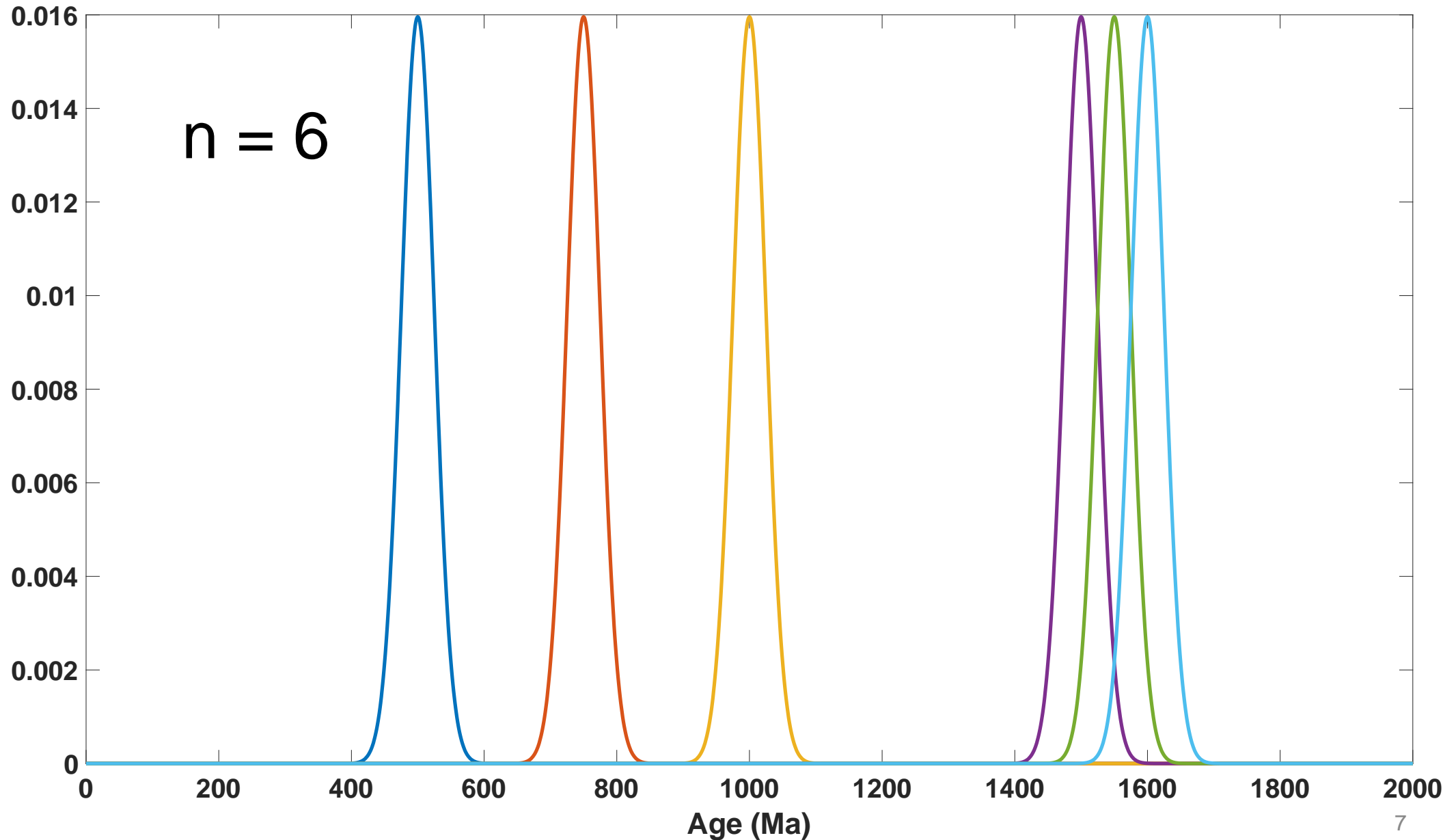
Probability Density Plot (PDP)



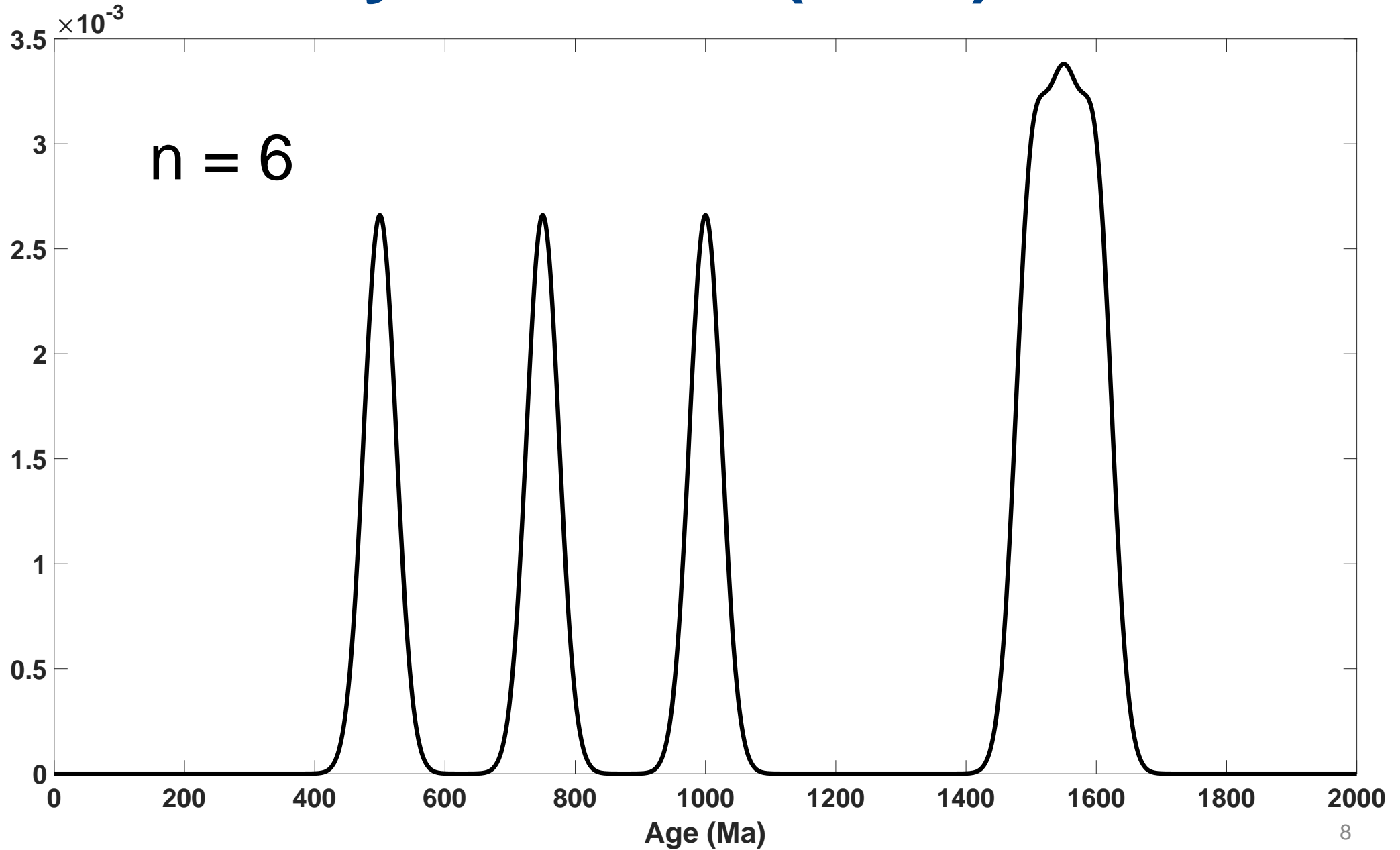
PDPs are Discrete Functions



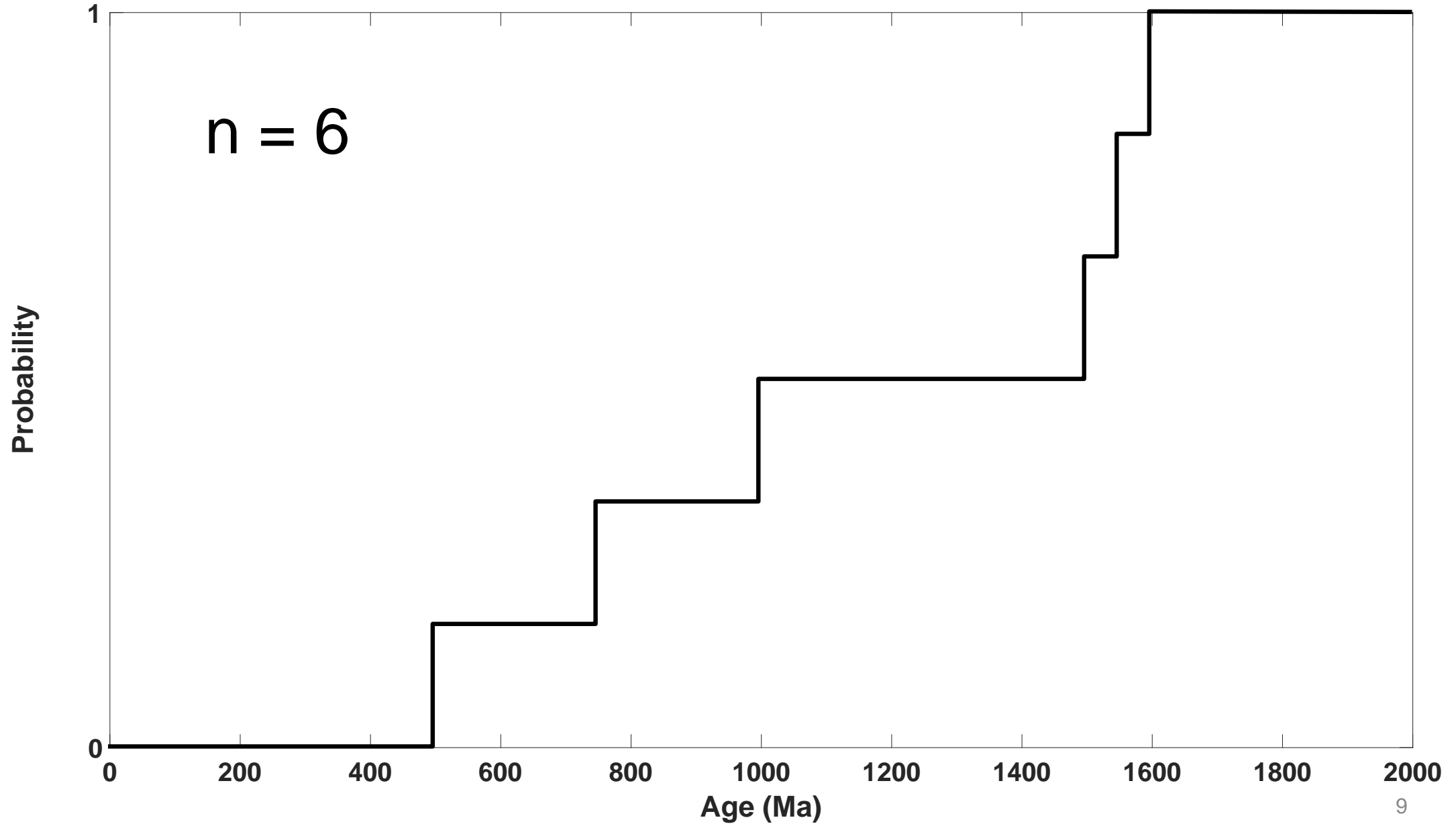
Gaussian Distributions with set Bandwidth



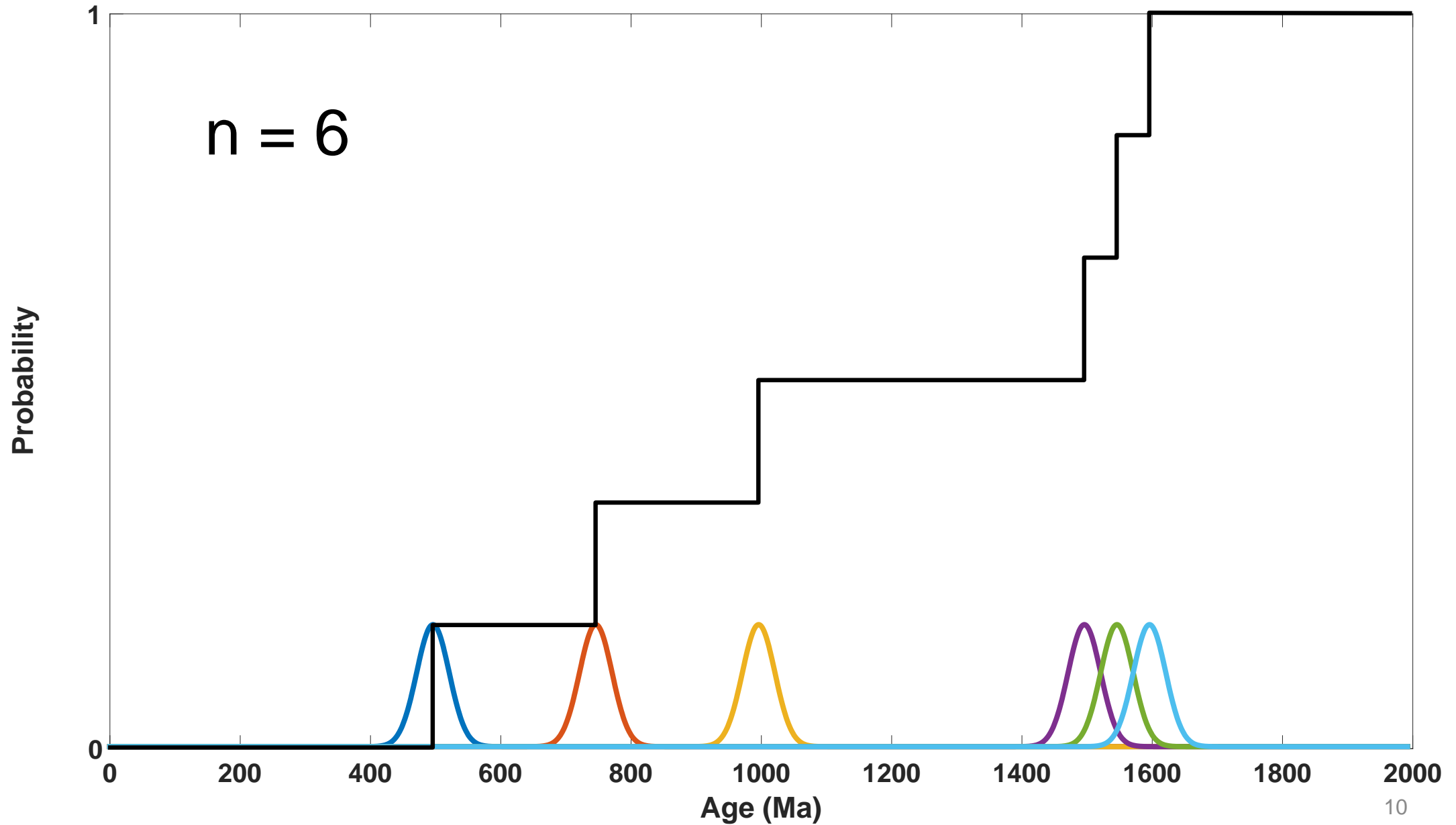
Kernel Density Estimate (KDE)



Cumulative Distribution Function (CDF)

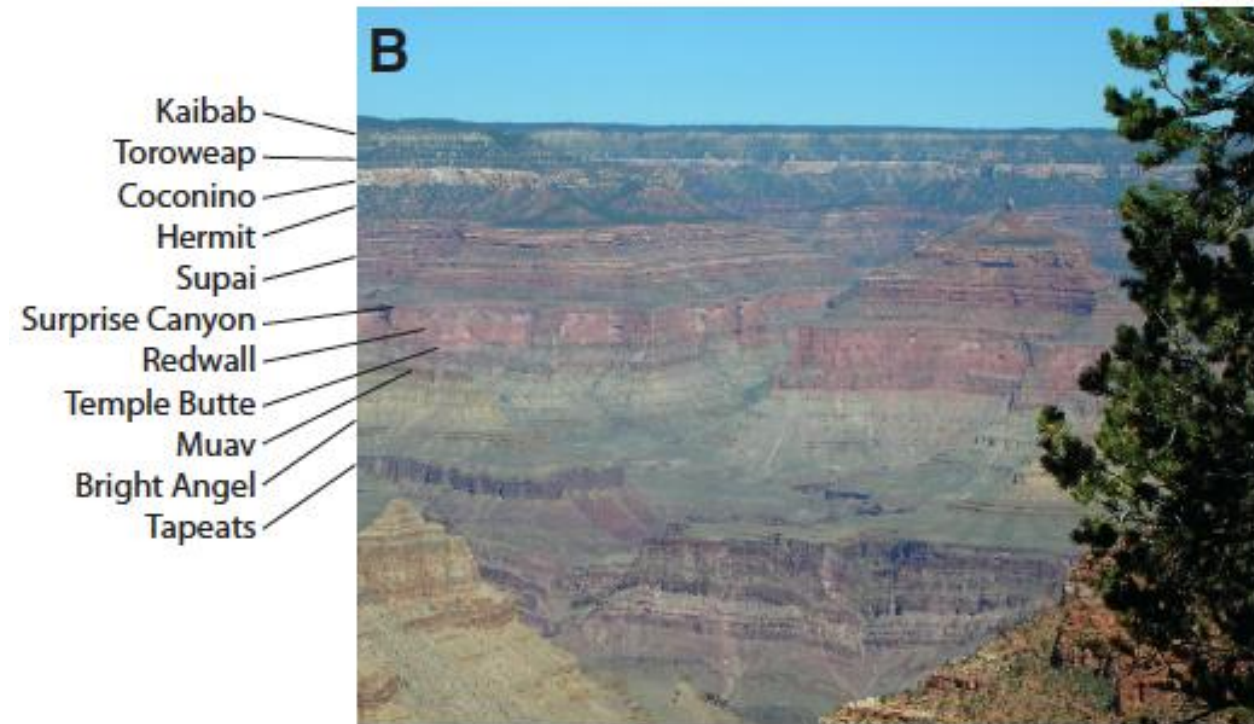
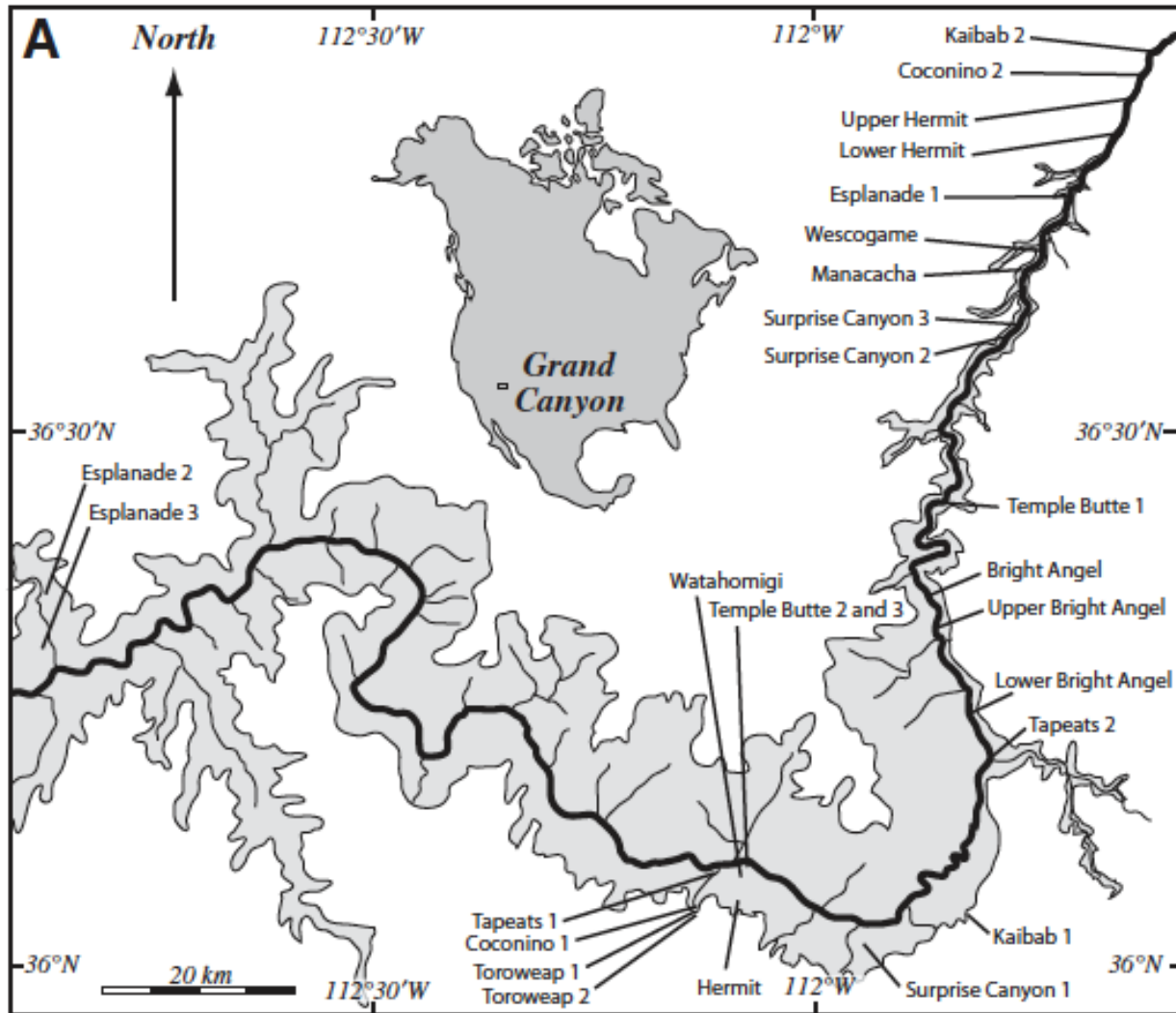


Cumulative Distribution Function (CDF)

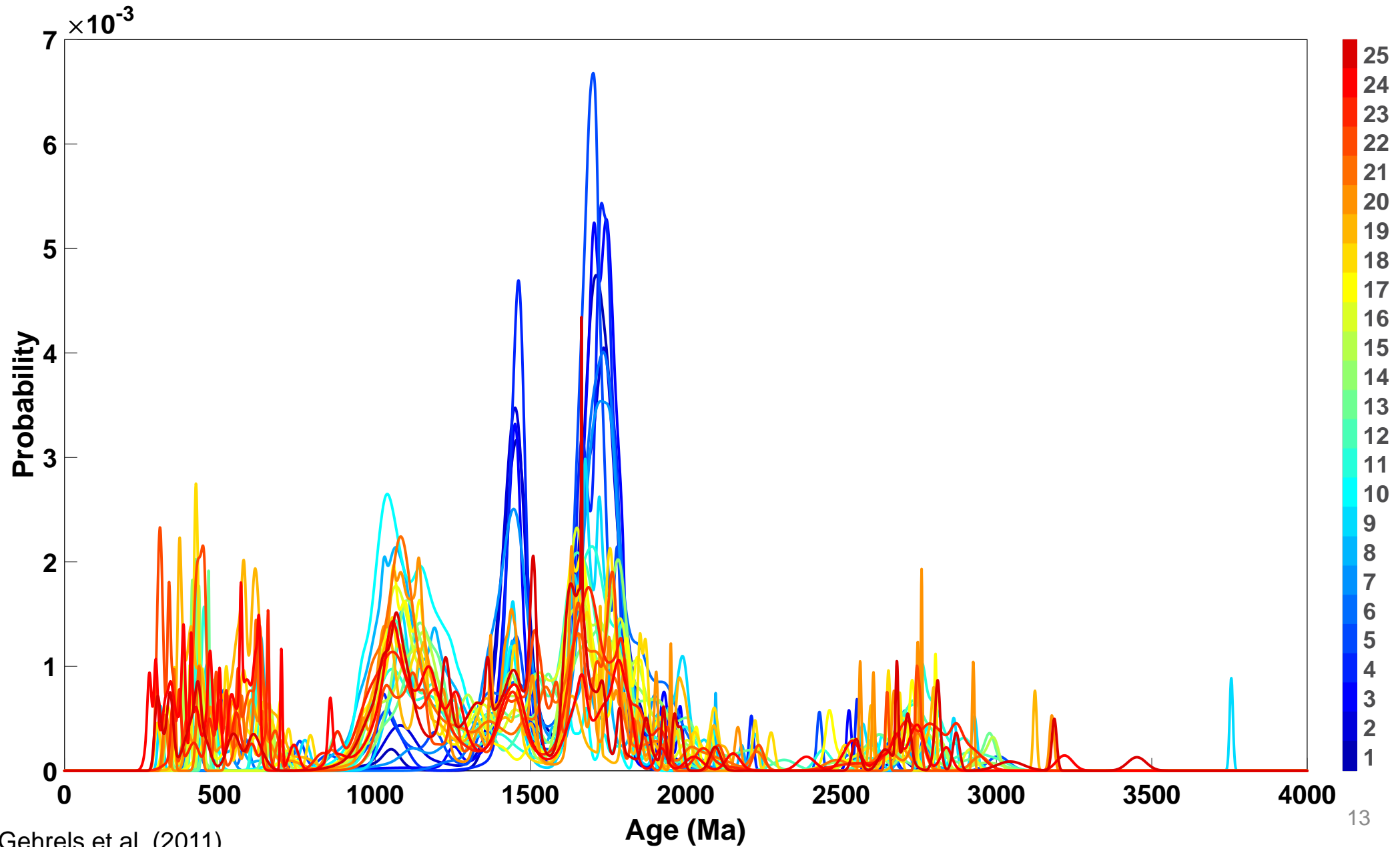


How to Handle Multiple Samples?

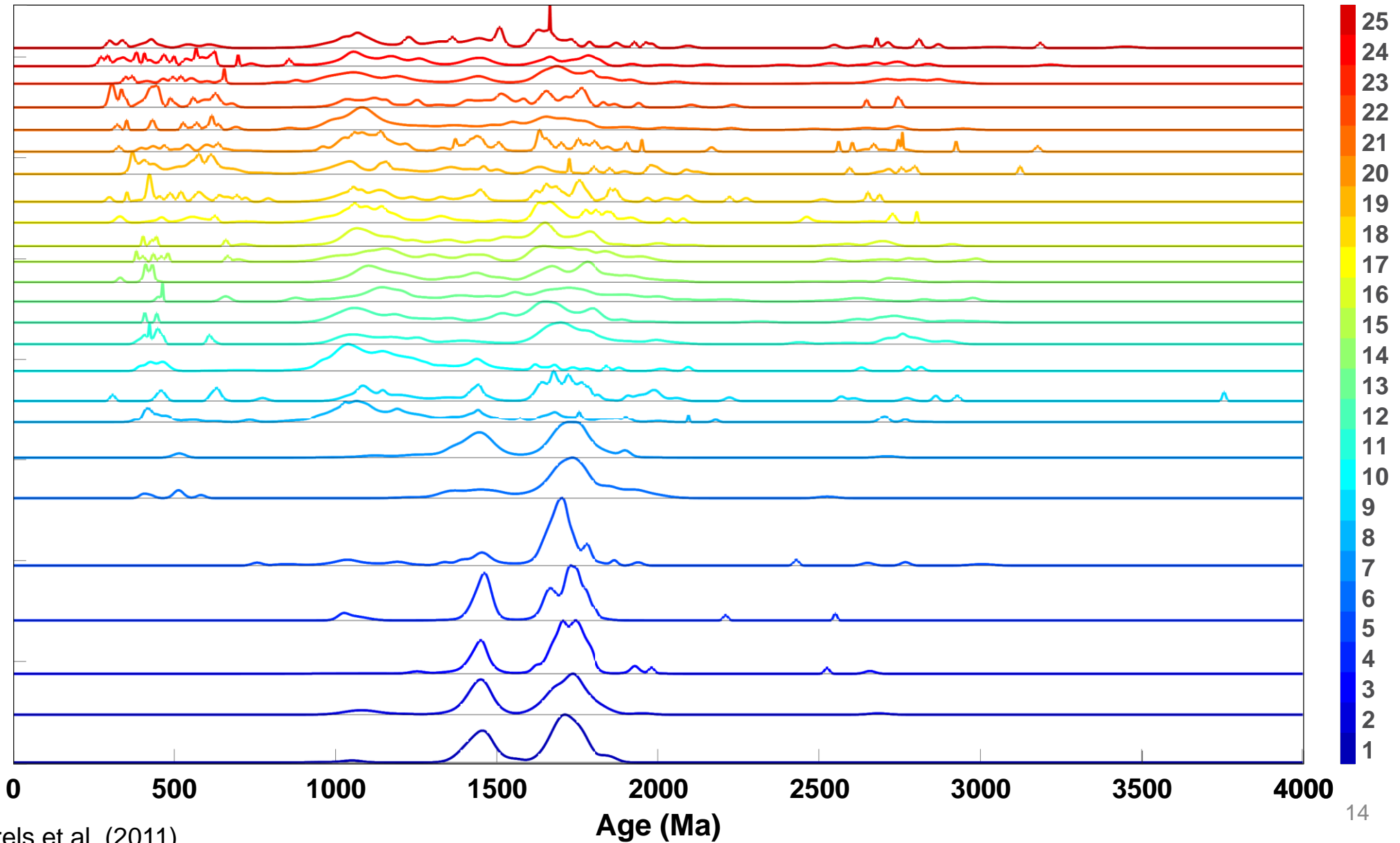
Grand Canyon



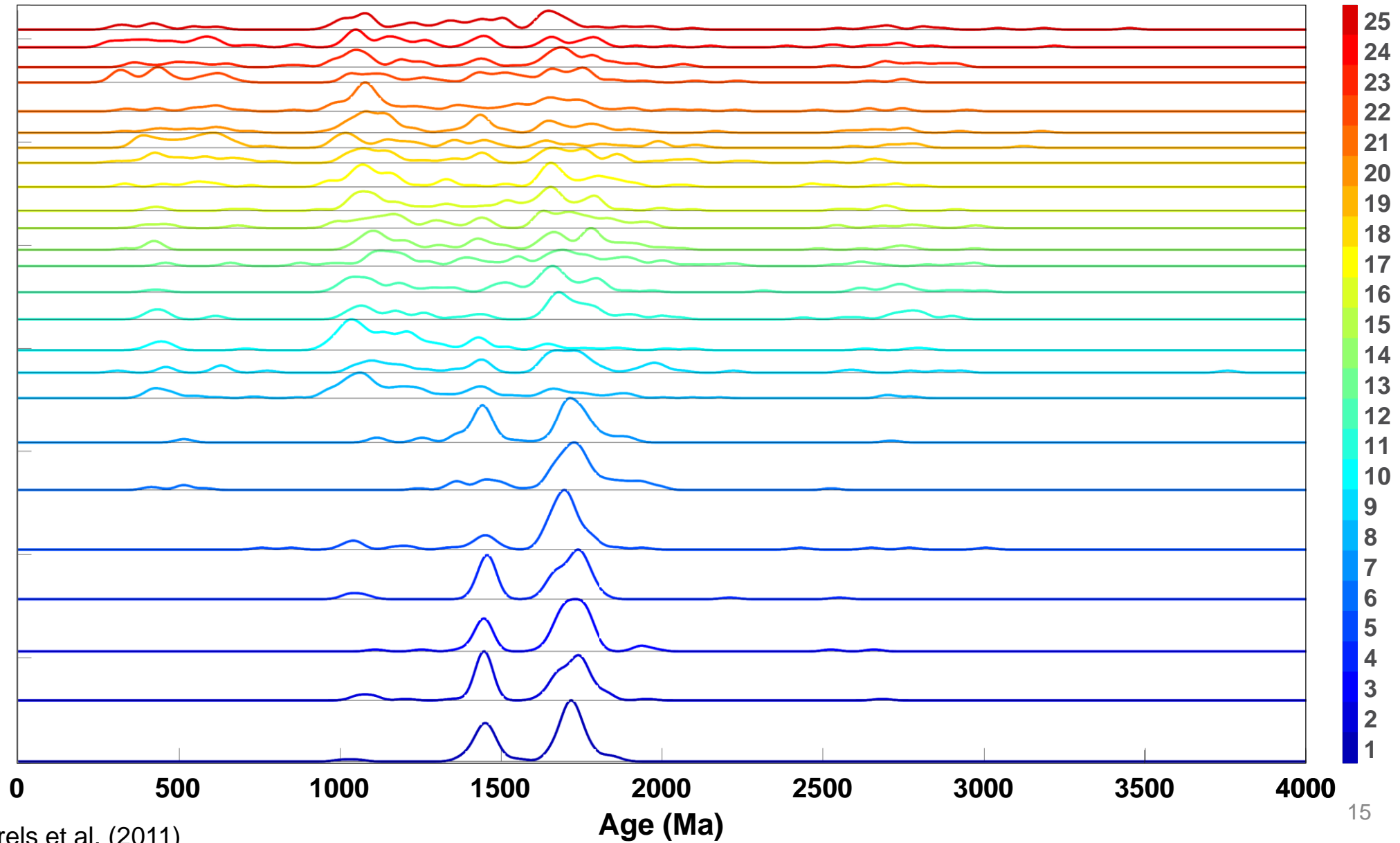
Multiple PDPs



Stacked PDPs

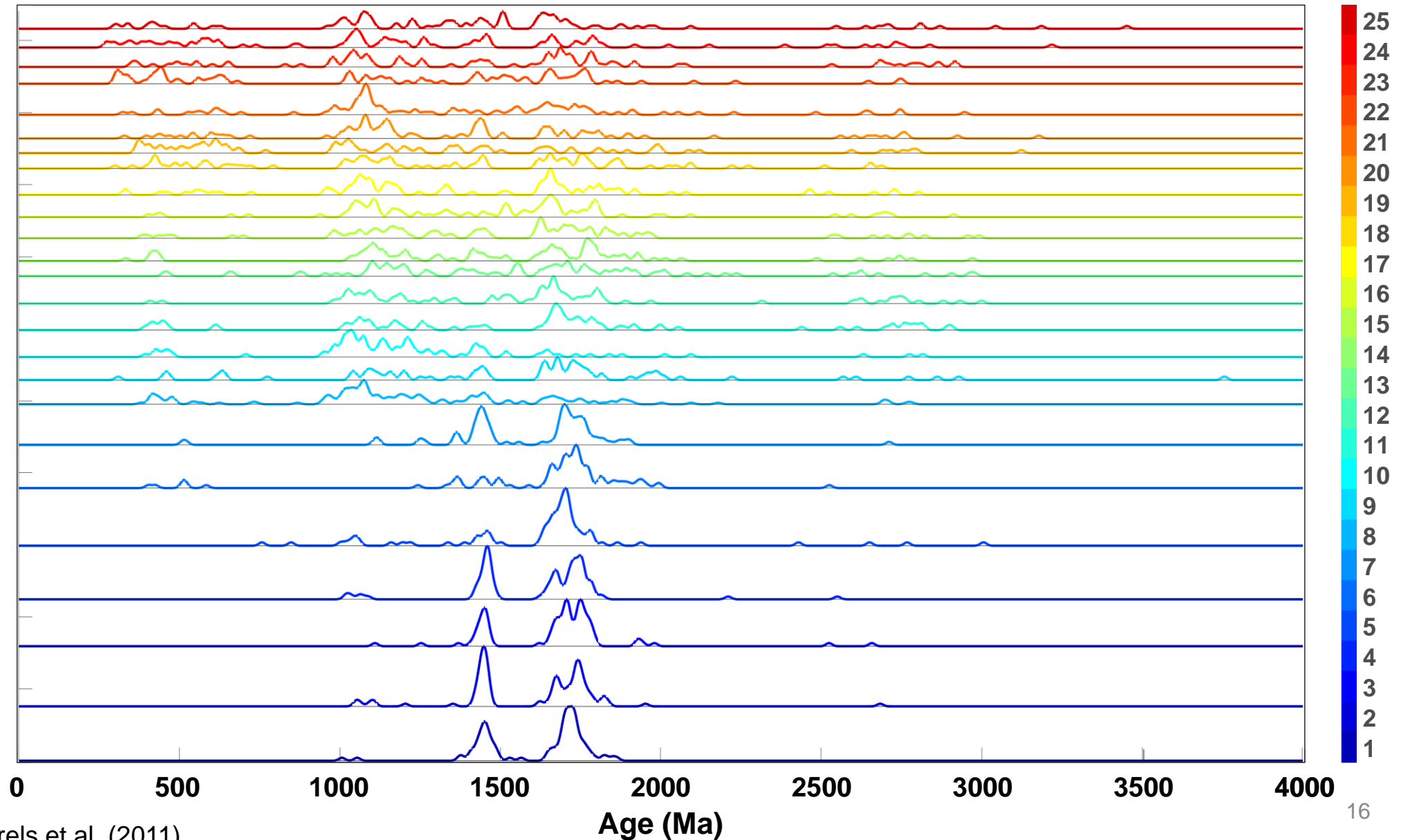


Stacked KDEs (25 Myr kernel bandwidth)

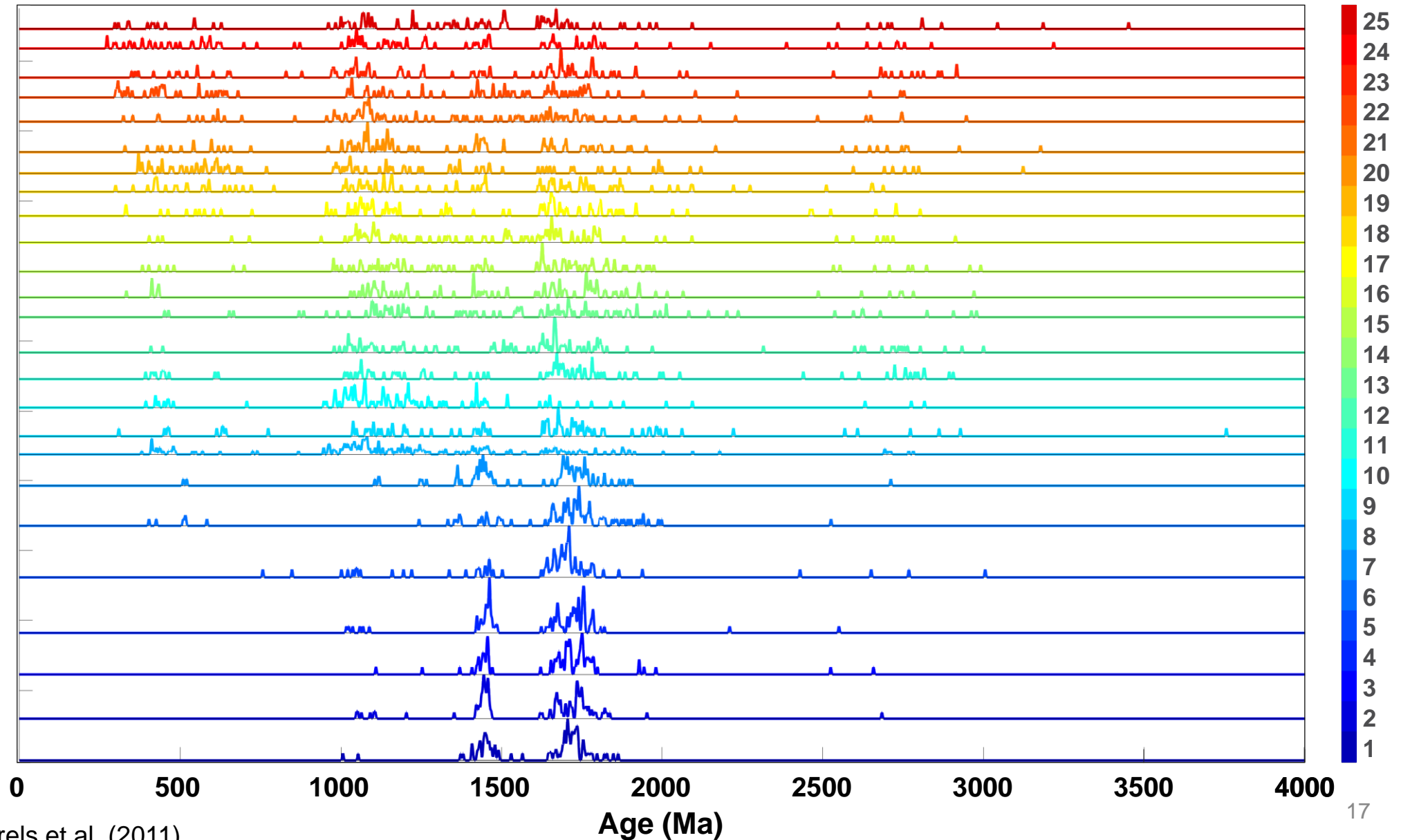


Data from Gehrels et al. (2011)

Stacked KDEs (10 Myr kernel bandwidth)

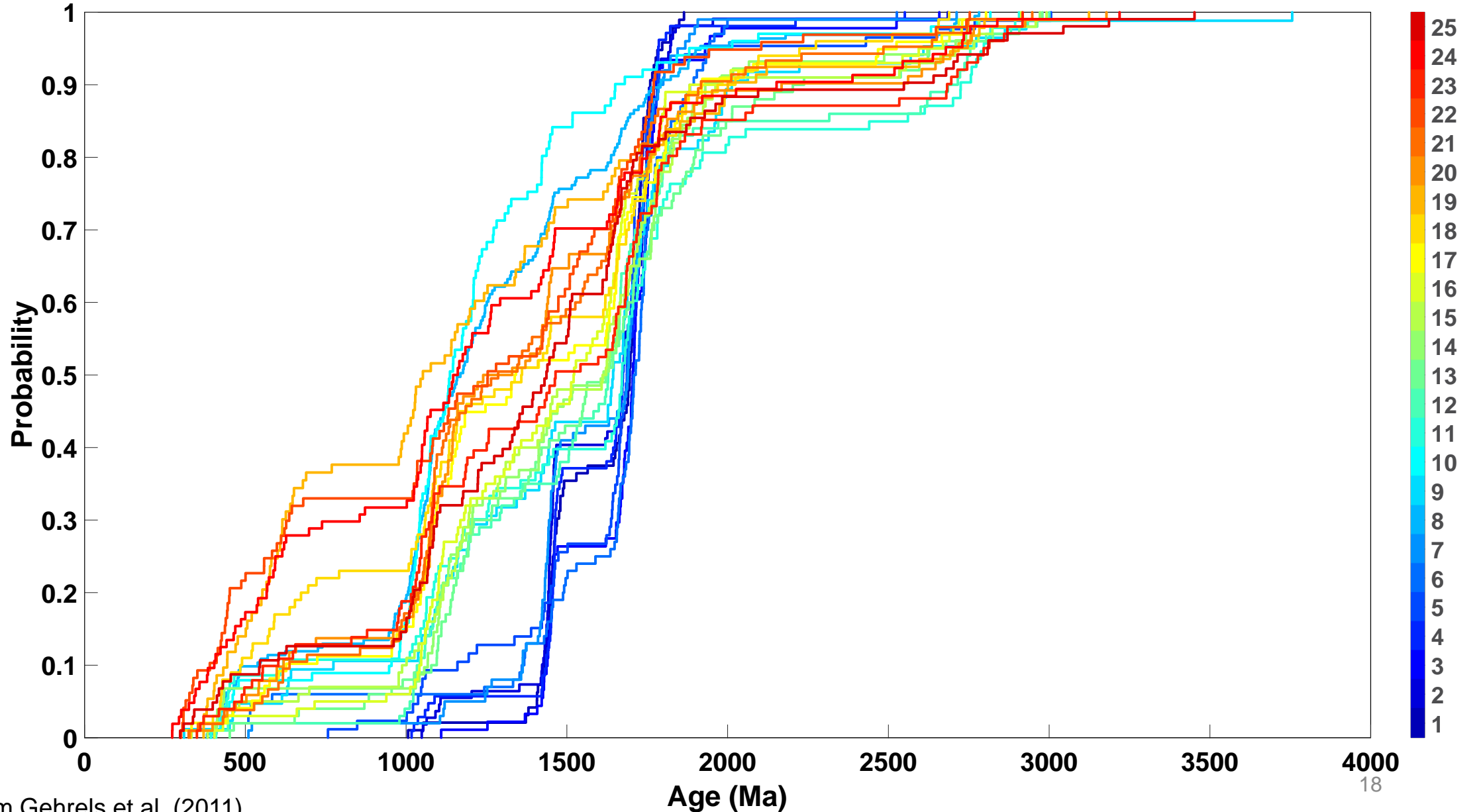


Stacked KDEs (2 Myr kernel bandwidth)

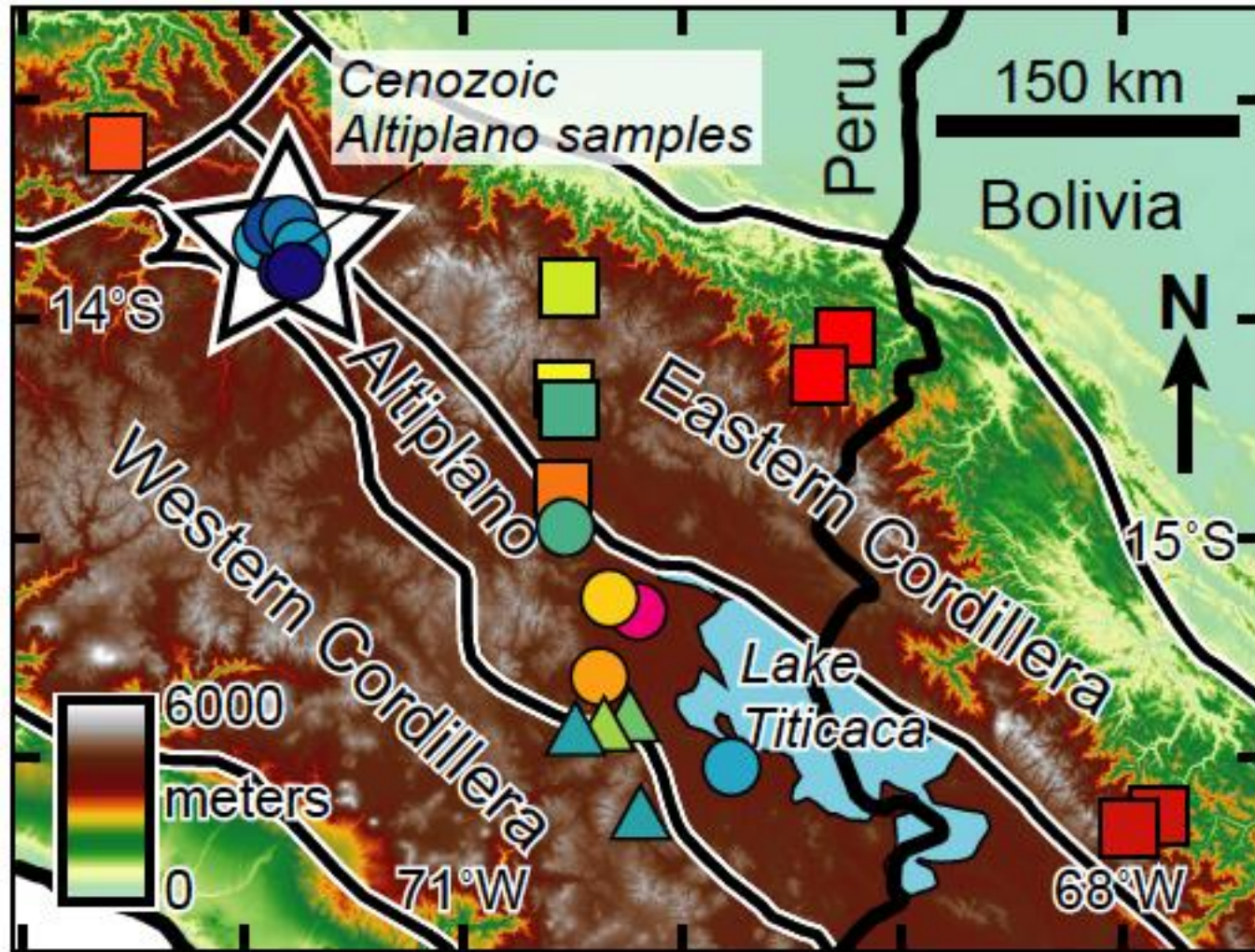


Data from Gehrels et al. (2011)

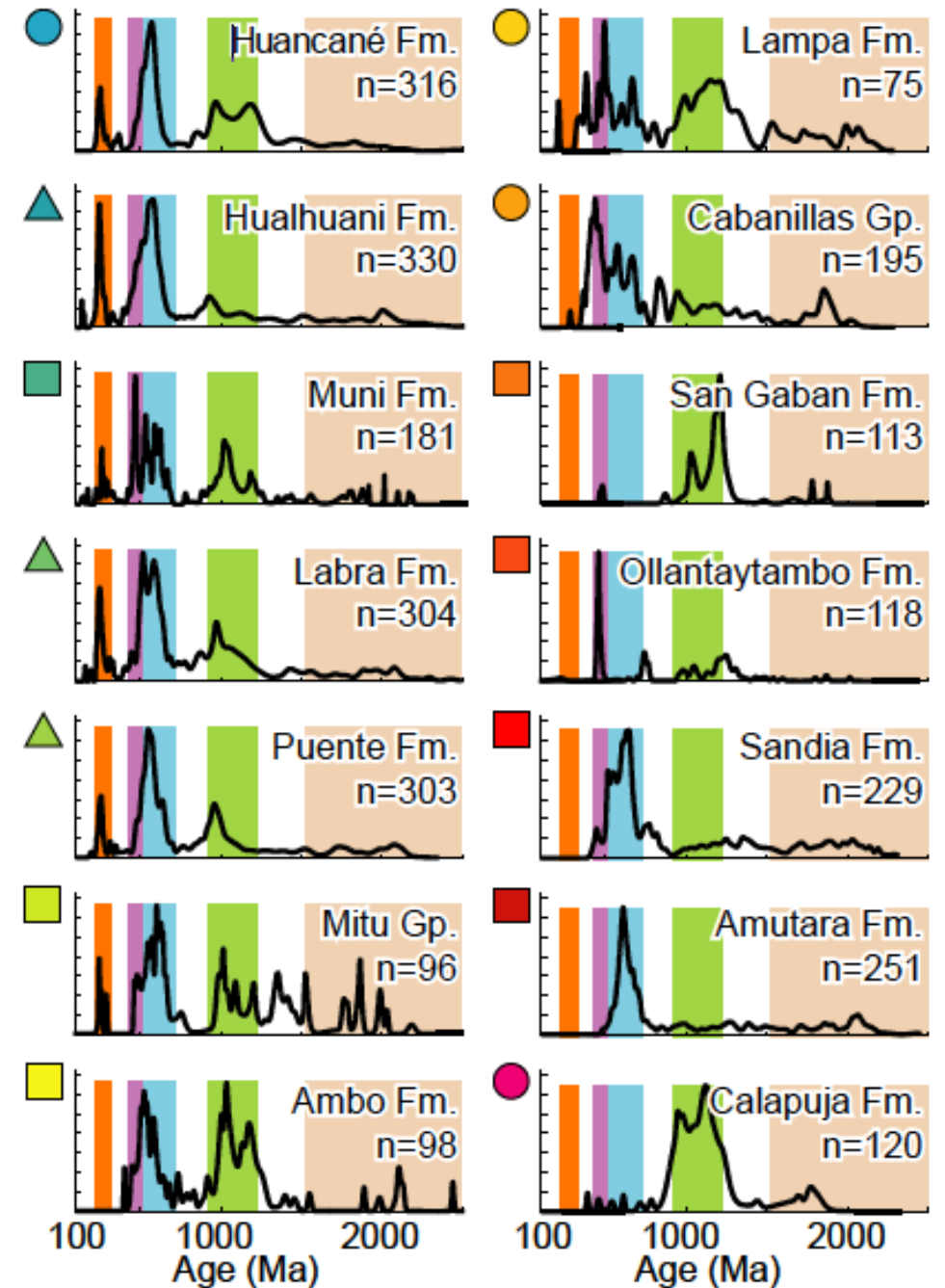
Multiple CDFs



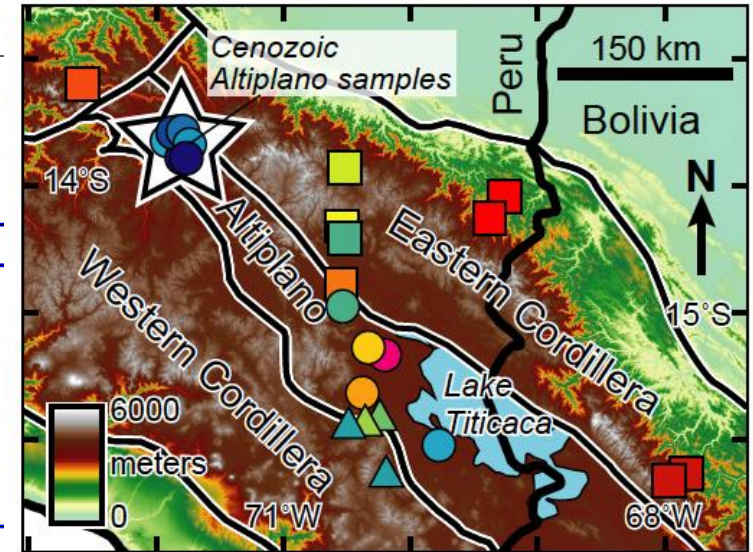
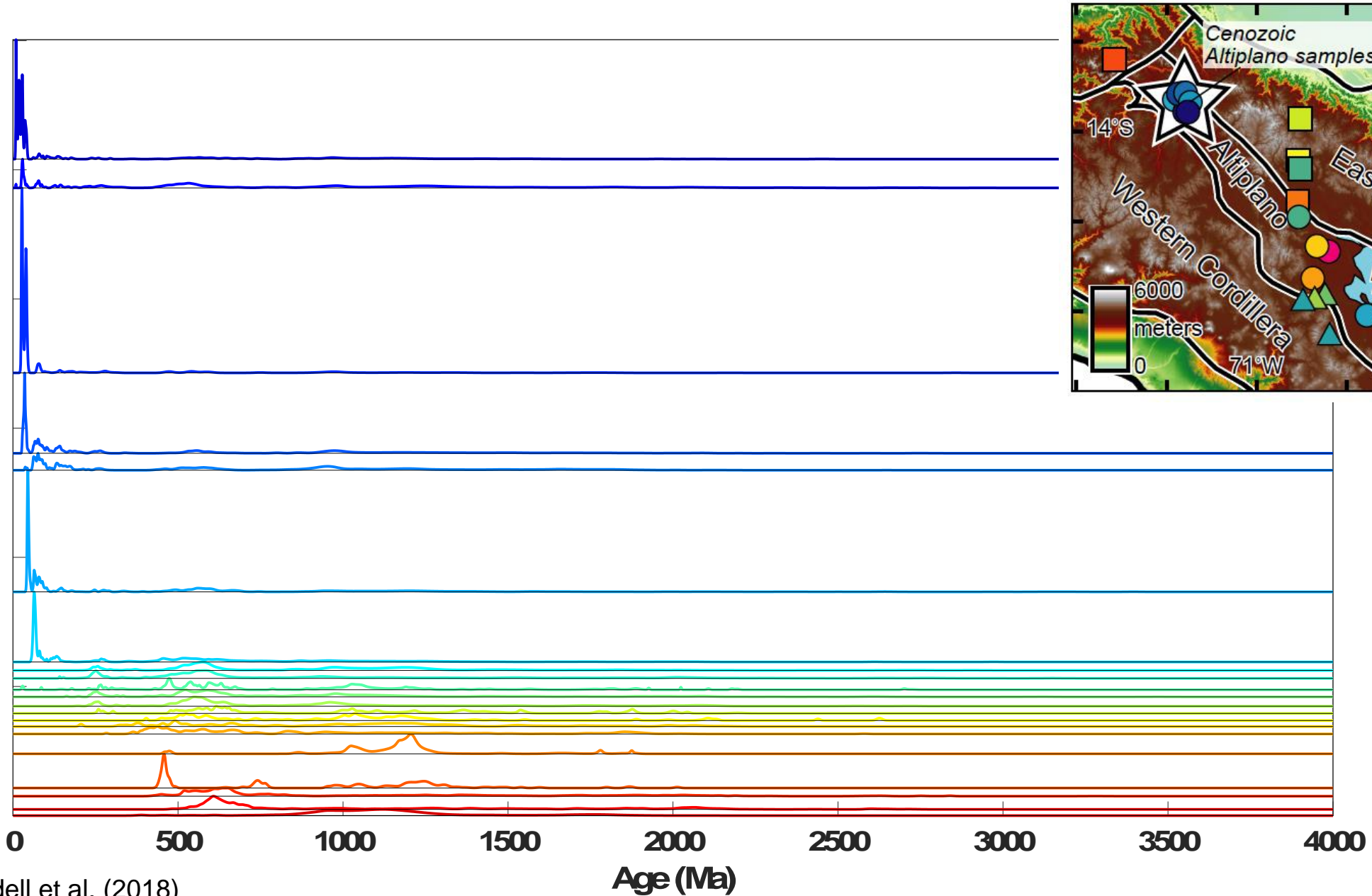
Central Andes



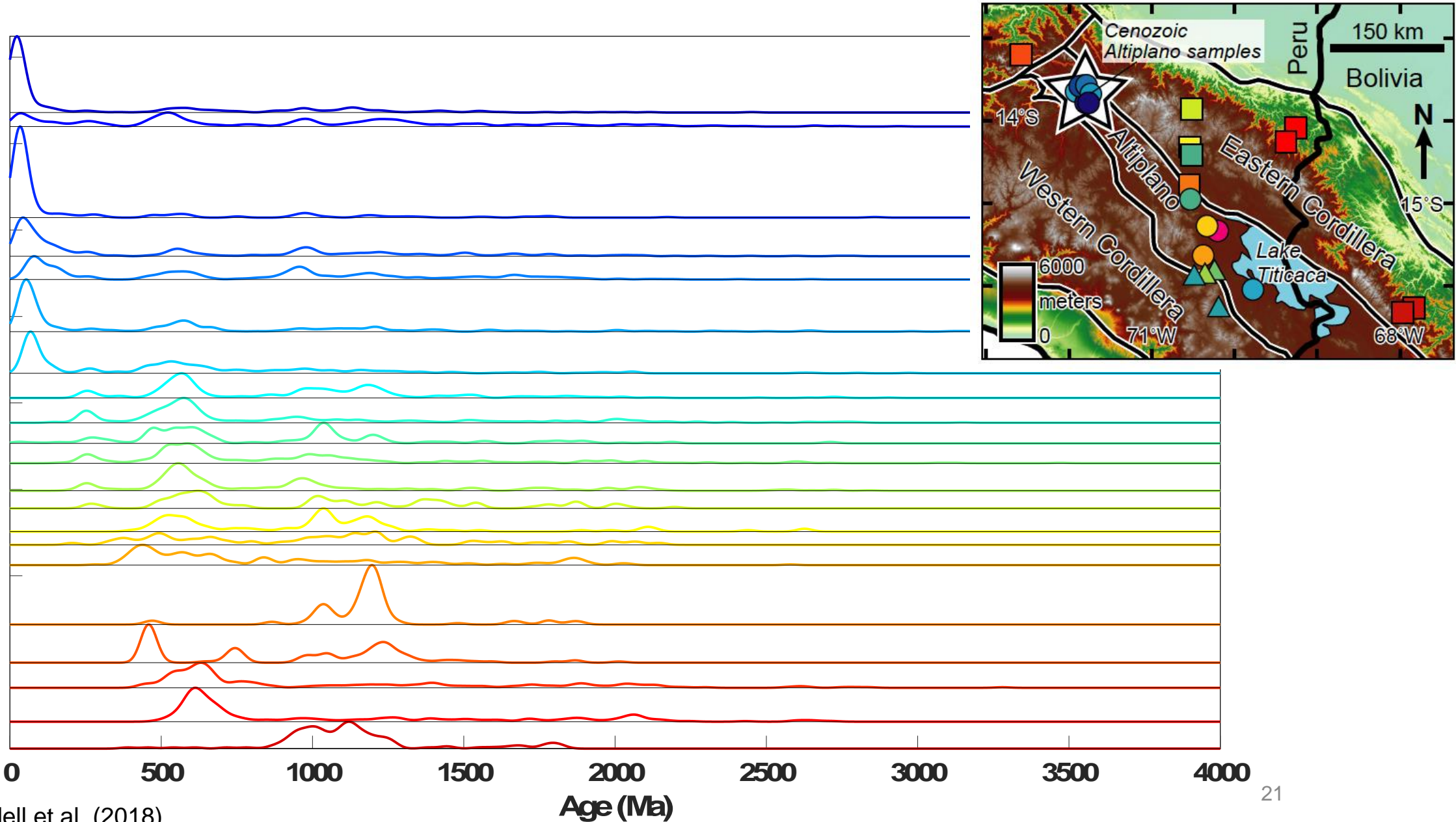
△ Western Cordillera ○ Altiplano □ Eastern Cordillera



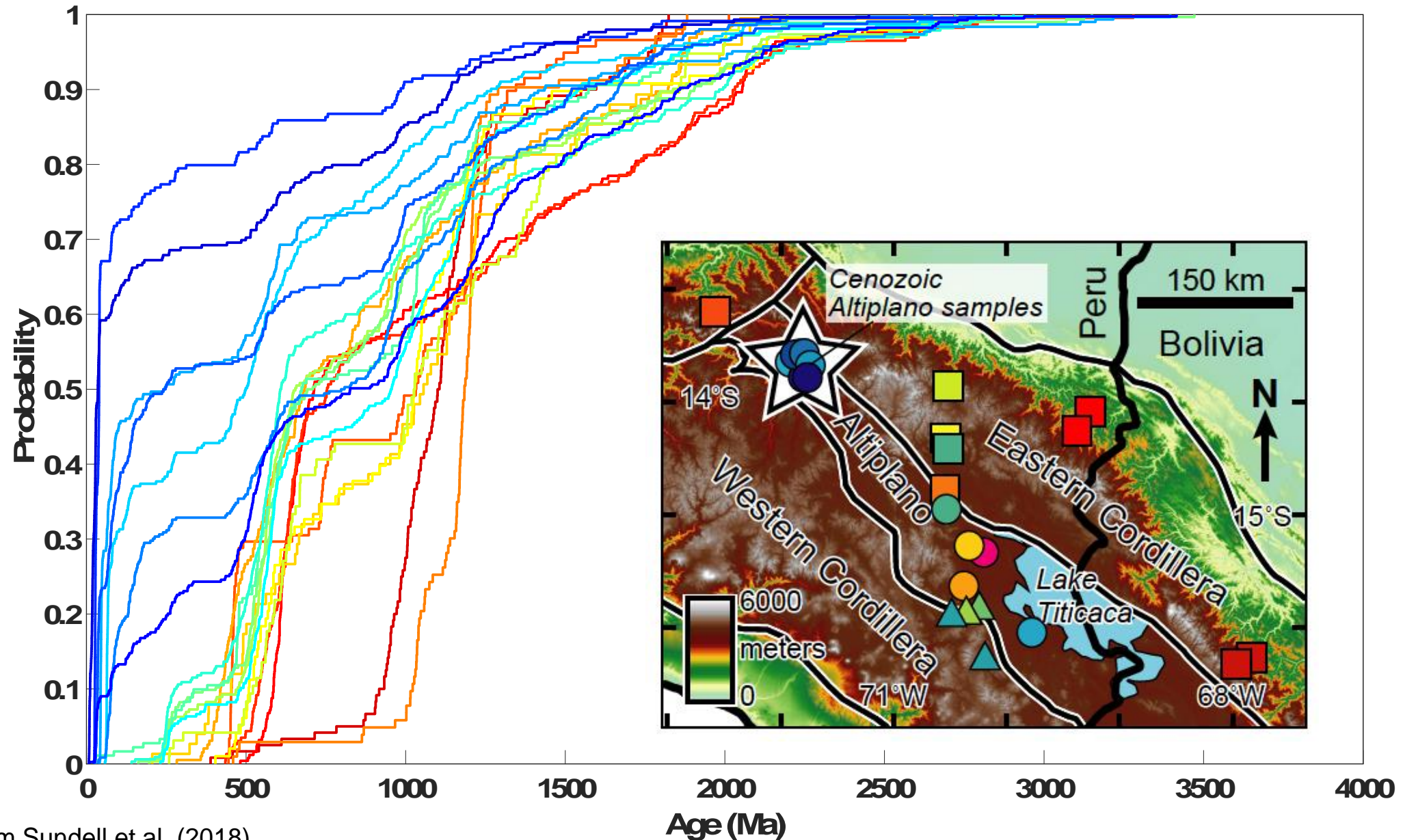
Stacked PDPs



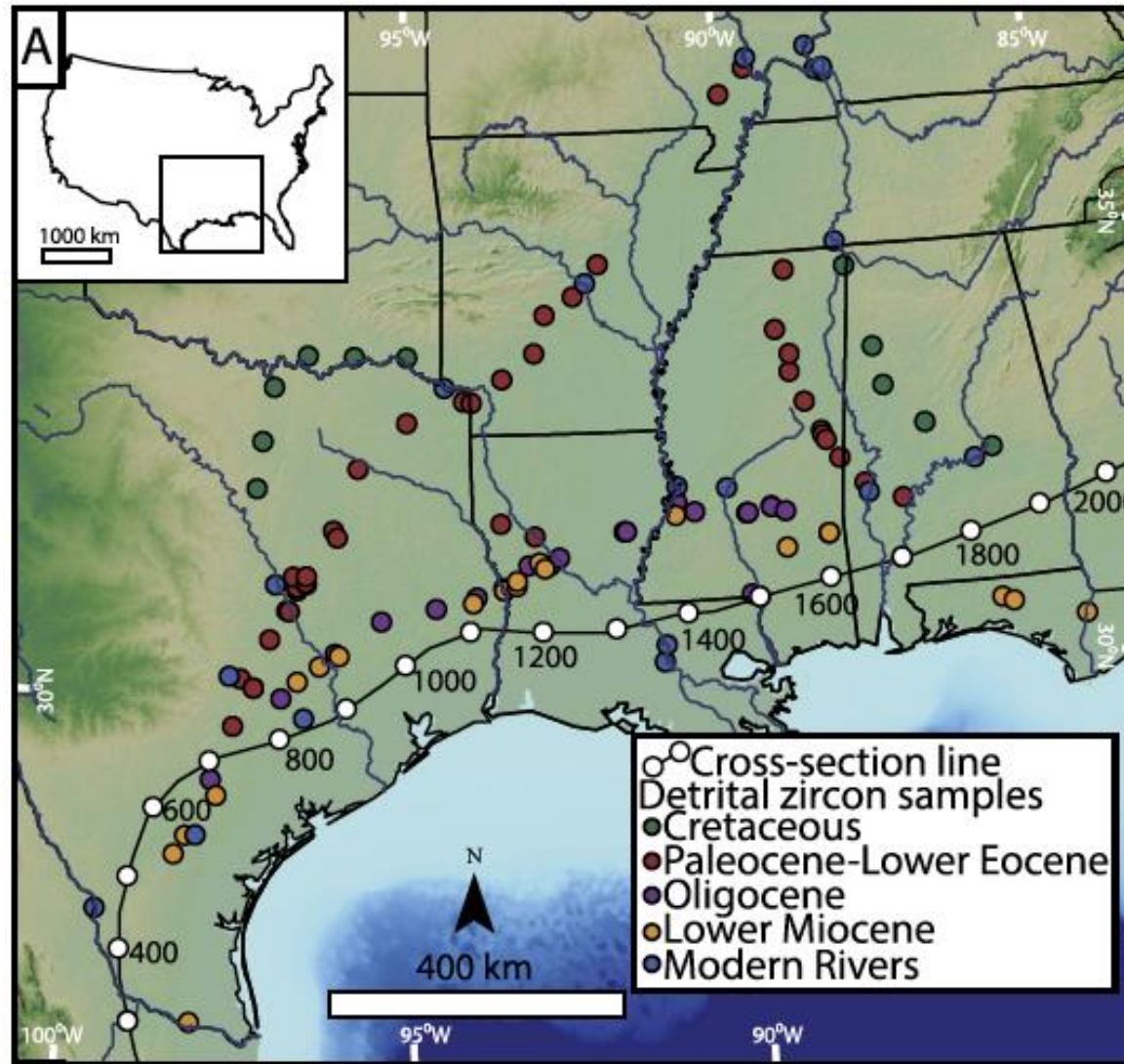
Stacked KDEs (with 25 Myr kernel bandwidth)



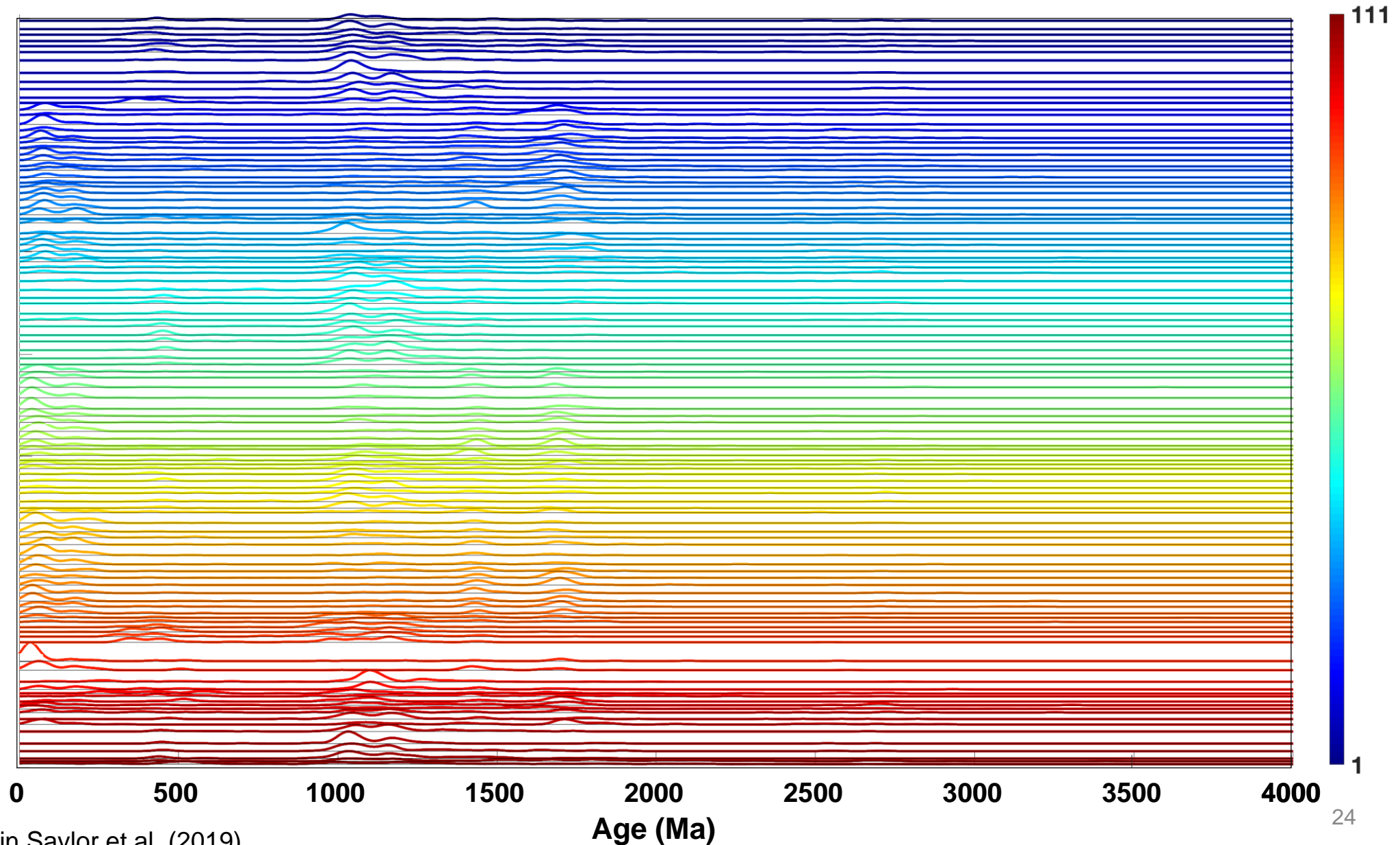
Multiple CDFs



Gulf of Mexico

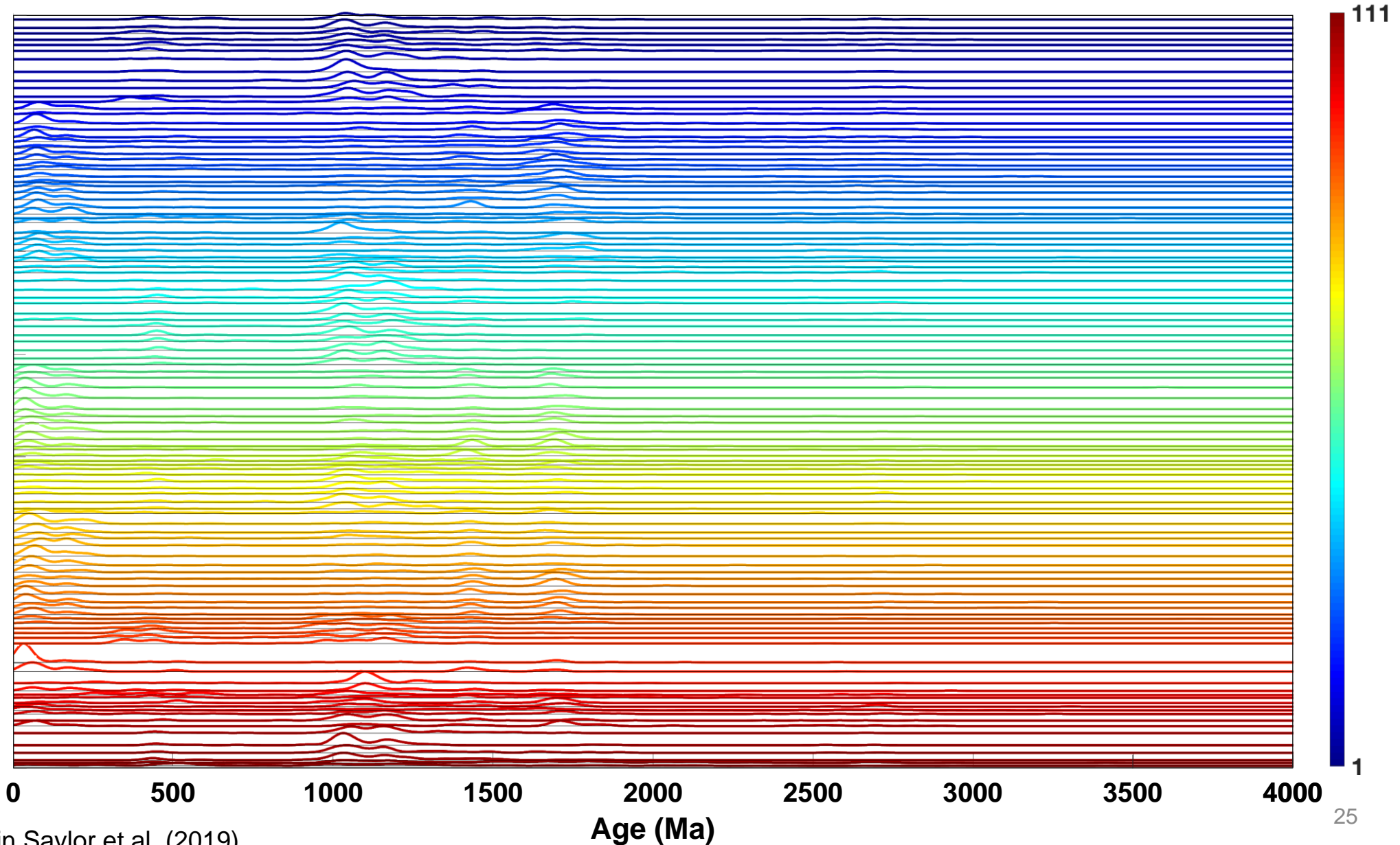


Gulf of Mexico: PDPs



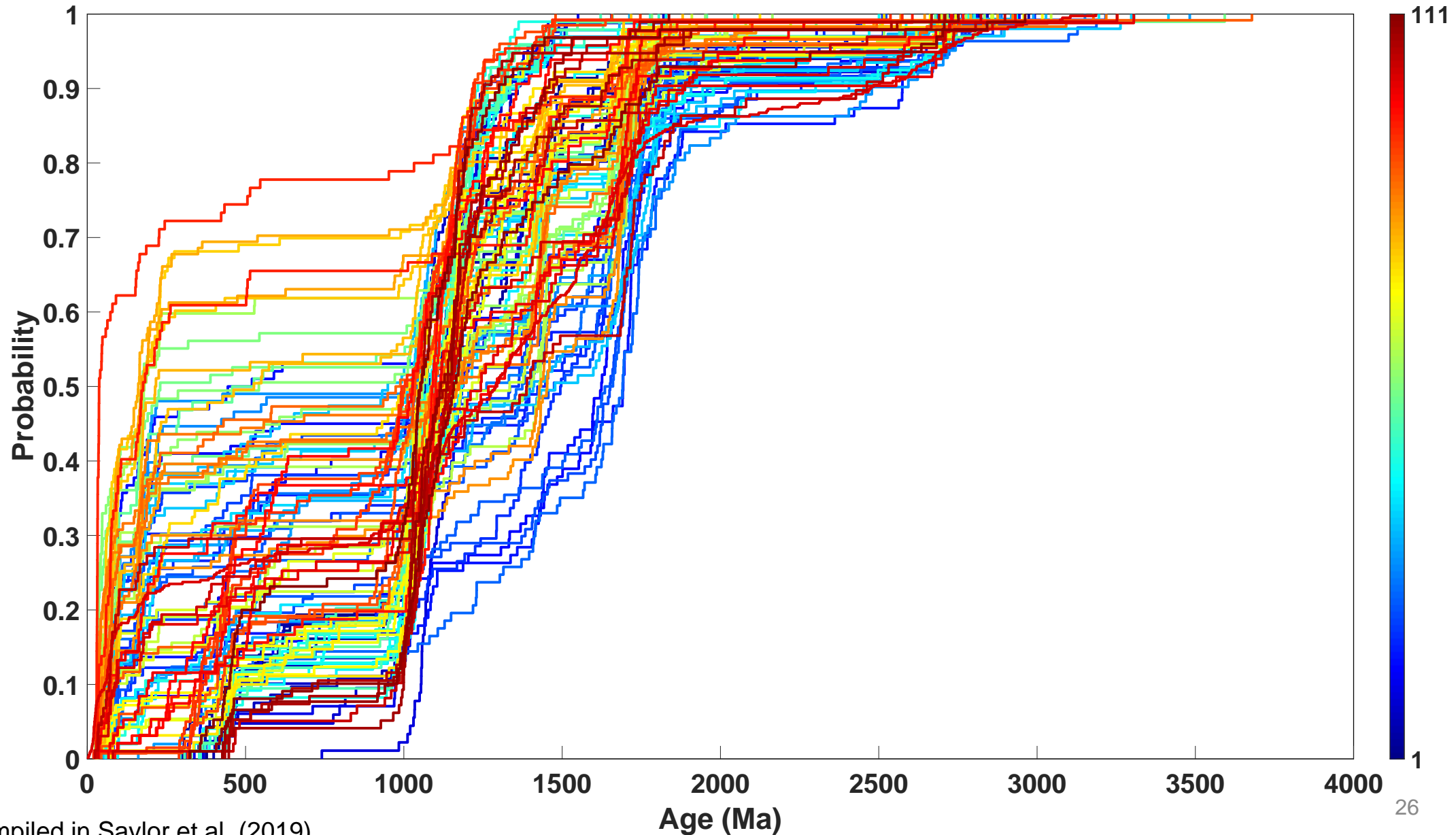
Data compiled in Saylor et al. (2019)

Gulf of Mexico: KDEs



Data compiled in Saylor et al. (2019)

Gulf of Mexico: CDFs



Data compiled in Saylor et al. (2019)

Which Should I Use?!

- Each has its strengths and weaknesses
- Over- and under-smoothing
 - PDPs tend to over-smooth older ages
 - KDEs tend to over-smooth younger ages
- Uncertainties
 - PDPs incorporate uncertainty
 - KDEs and CDFs do not incorporate uncertainty
- Large data sets
 - CDFs are an effective way to visualize large sample compilations
 - Is there a better way to compare?! → Quantitative comparison methods!