

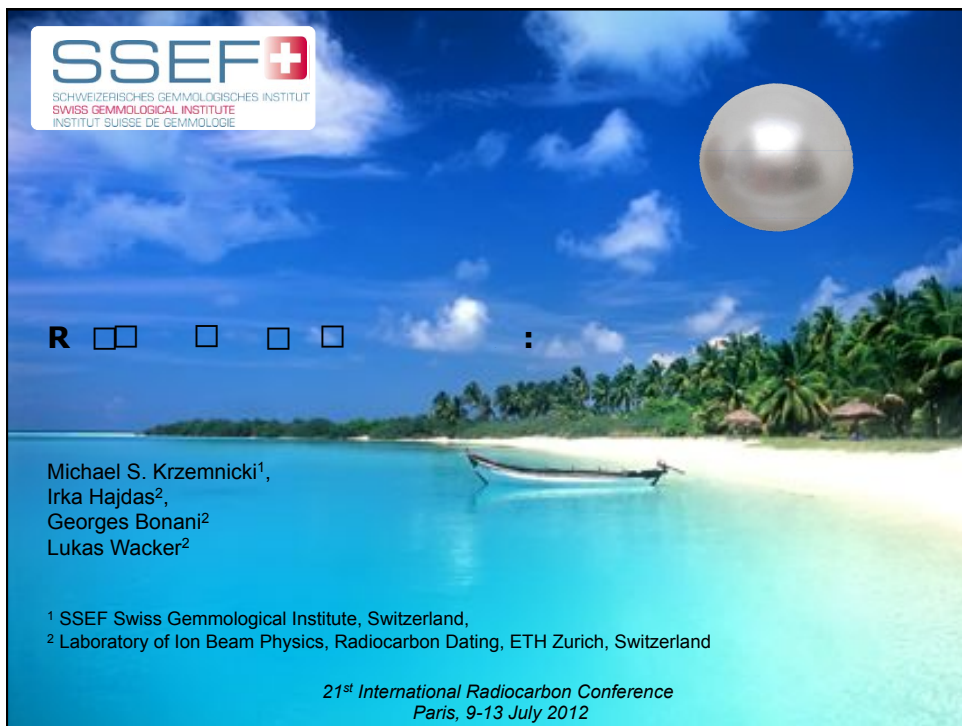
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R     :

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*21st International Radiocarbon Conference
 Paris, 9-13 July 2012*



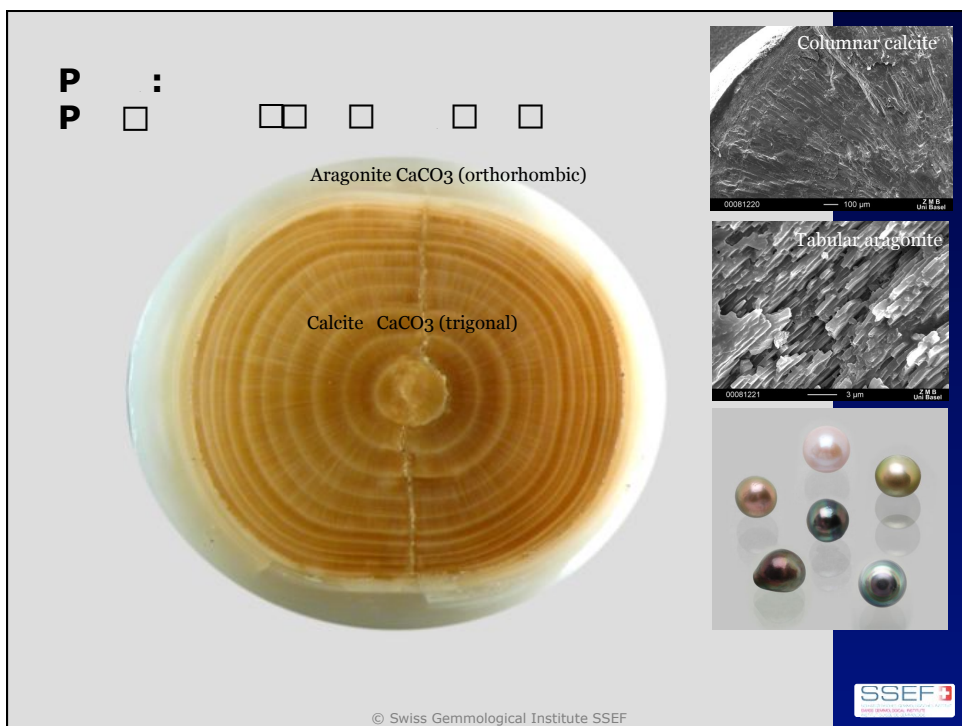
P :
P     

Aragonite CaCO_3 (orthorhombic)

Calcite CaCO_3 (trigonal)

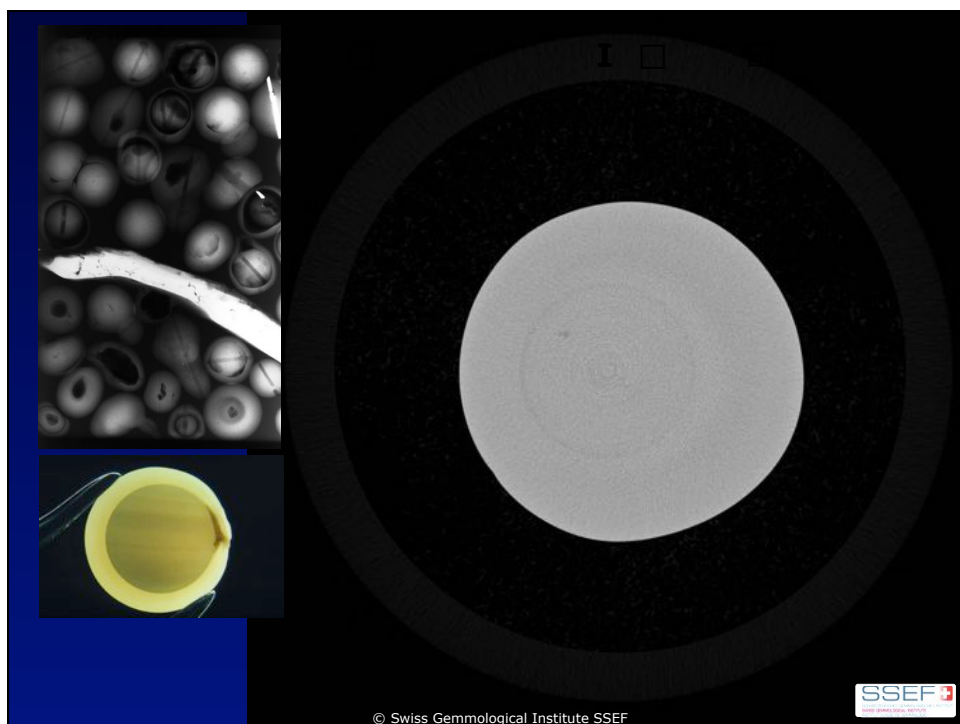
Columnar calcite

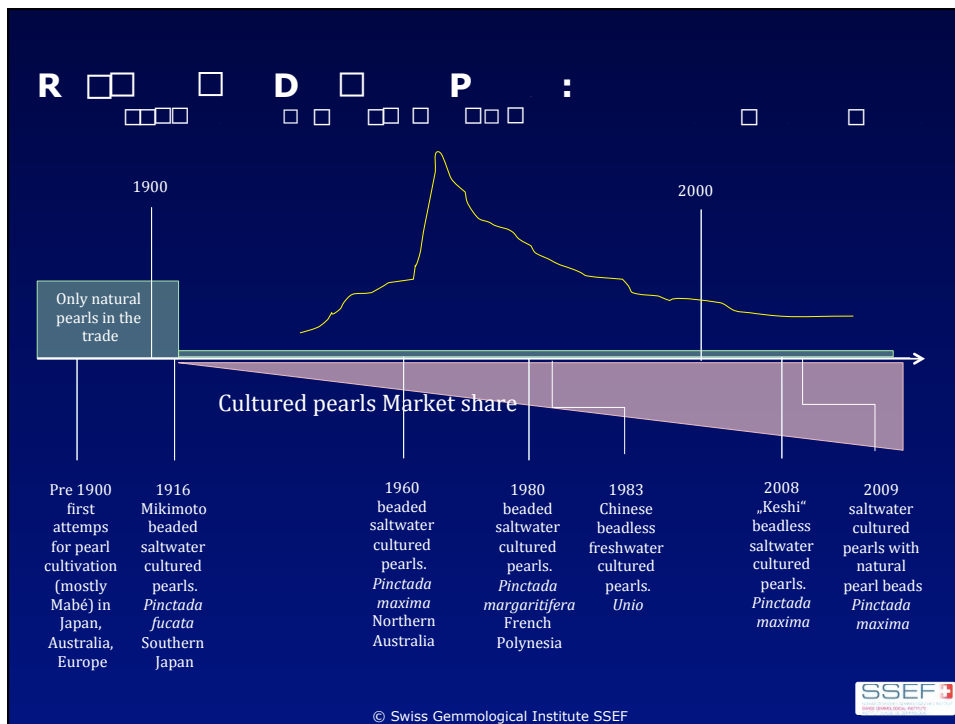
Tabular aragonite



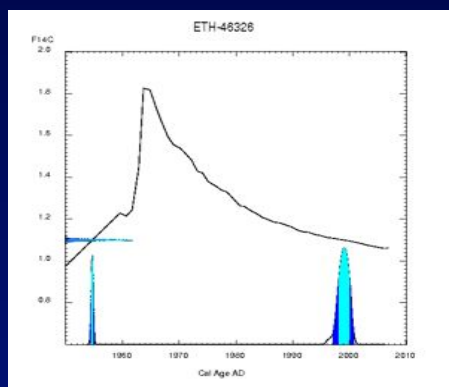
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R □ :



Calibration of 1.099000 ± 0.003000 with Levin ^{14}C dataset
Smoothing: 1.000000

I. Levin and B. Kromer (2004) The tropospheric $^{14}\text{CO}_2$ level in mid latitudes of the Northern Hemisphere. Radiocarbon 46(3):1261-1272.

I. Levin, S. Hammer, et al. (2008) Radiocarbon observations in atmospheric CO_2 : Determining fossil fuel CO_2 over Europe using Jungfraujoch observations as background. Science of the Total Environment 391:211-216.

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Shell from *Pinctada radiata* (Orient pearl oyster) from the Arabian Gulf, personally collected in 2009.

OneSigma

[1954.50(Jul) - 1954.81(Oct)] 0.127141

[1998.10(Feb) - 2000.06(Jan)] 0.872859

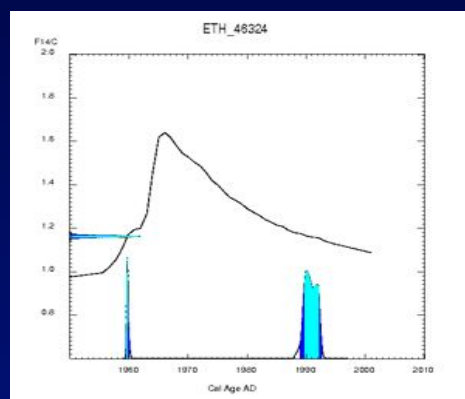
TwoSigma

[1954.28(Apr) - 1955.05(Jan)] 0.150058

[1997.12(Feb) - 2000.80(Oct)] 0.849942

Note: 300 years of INTCAL04 data have been prepended to this data set

R □ :



Calibration of 1.162000 ± 0.004000 with SH1.14c dataset
Smoothing: 1.000000

Q Hua and M Barbetti (2004) Review of Tropospheric Bomb ^{14}C Data for Carbon Cycle Modeling and Age Calibration Purposes, Radiocarbon 46: 1273-1298

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Shell from *Pinctada maxima* (Silverlip pearl oyster) from the Philippines, collected 1990 (pers. comm. H.A. Hänni)

OneSigma

[1959.61(Aug) - 1959.81(Oct)] 0.092576

[1989.67(Sep) - 1992.10(Feb)] 0.907424

TwoSigma

[1959.47(Jun) - 1960.07(Jan)] 0.118790

[1988.98(Dec) - 1992.65(Aug)] 0.881210

Note: 300 years of INTCAL04 data have been prepended to this data set

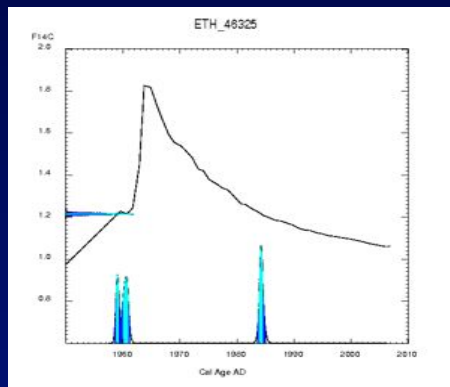
R □ :



Shell from *Pinctada radiata* (Orient pearl oyster) from the Arabian Gulf, collected in 1990 (pers. comm H.A.Hänni).

OneSigma
 [1958.76(Oct) - 1959.31(Apr)] 0.228138
 [1960.03(Jan) - 1960.91(Nov)] 0.365475
 [1983.87(Nov) - 1984.62(Aug)] 0.406388

TwoSigma
 [1958.50(Jul) - 1961.26(Apr)] 0.617661
 [1983.61(Aug) - 1985.05(Jan)] 0.382339
 Note: 300 years of INTCAL04 data have been prepended to this data set



Calibration of 1.215000 ± 0.004000 with Levin ^{14}C dataset
 Smoothing: 1.000000

I. Levin and B. Kromer (2004) The tropospheric $^{14}\text{CO}_2$ level in mid latitudes of the Northern Hemisphere. Radiocarbon 46(3):1261-1272.

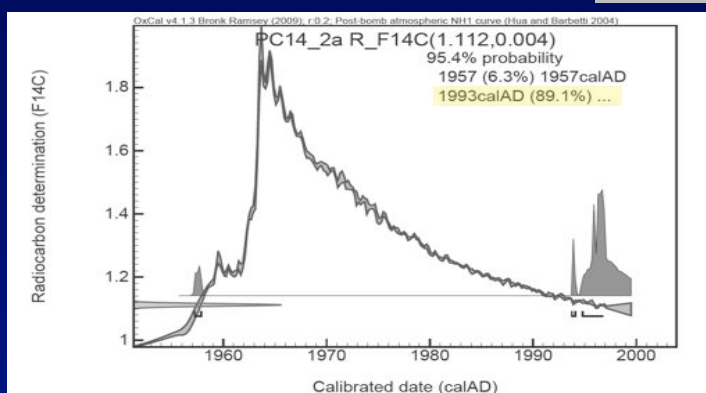
I. Levin, S. Hammer, et al. (2008) Radiocarbon observations in atmospheric CO_2 : Determining fossil fuel CO_2 over Europe using Jungfraujoch observations as background. Science of the Total Environment 391:211-216.

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Beadless saltwater cultured pearl, Keshi-type
Pinctada maxima, Indonesia
 ~ 2000 AD

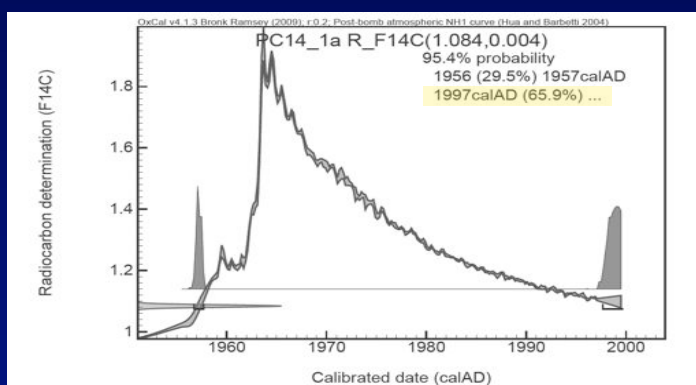


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R

Beadless freshwater cultured pearl
Unio, China
 ~ 2000 AD



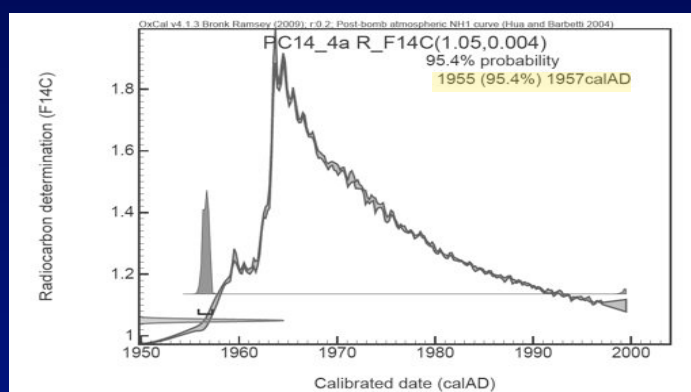
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P



Saltwater natural pearl
 Nova Scotia, Canada
 ~ 1950 ??



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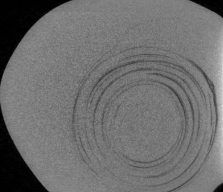




C
N

□ □ □ :
□ ?

Since about 2009: cultured pearls
with natural pearl as bead

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Natural pearl, as cultivation
methods for *Pinctada maxima*
pearls with natural pearls were
not developed before 2009.

ETH-46319 :
365±30 BP
68.2% probability
1450 AD (45.9%) 1530 AD
1570 AD (22.3%) 1620 AD

95.4% probability
1440 AD (51.5%) 1530 AD
1540 AD (43.9%) 1640 AD

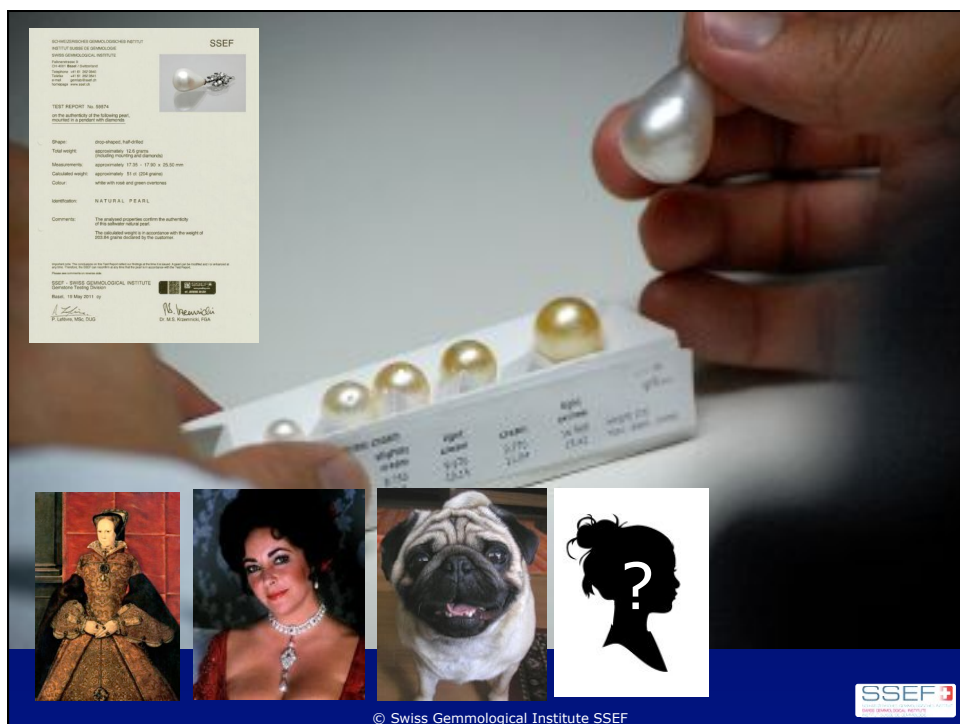
Calibrated C14 ages (Calendar time intervals) using OxCalv3.10
INFORM : References - Atmospheric data from Reimer et al (2009);
OxCal v3.10 Bronk Ramsey (2005)




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H □ □ :



Pearls from *Pinctada radiata* from the Arabian Gulf, probably from 1860 (pers. Comm. T. Faerber, Geneva)

ETH-46322 :

130±30BP 68.2% probability
 1680 AD (20.9%) 1740 AD
 1750 AD (1.1%) 1770 AD
 1800 AD (7.8%) 1820 AD
1830 AD (27.0%) 1890 AD
 1910 AD (11.4%) 1940 AD

95.4% probability
 1670 AD (37.9%) 1780 AD
 1790 AD (57.5%) 1950 AD

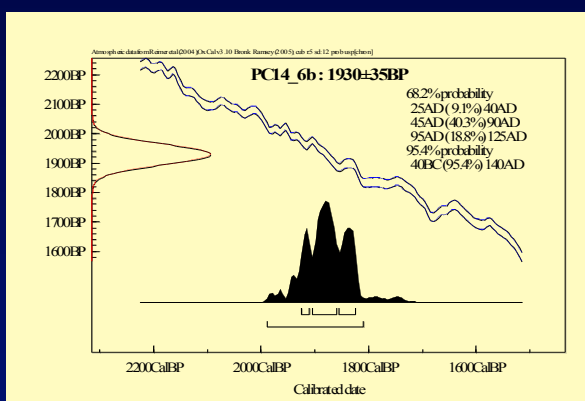
Calibrated C14 ages (Calendar time intervals) using OxCalv3.10

INFORM : References - Atmospheric data from Reimer et al (2009);
 OxCal v3.10 Bronk Ramsey (2005)

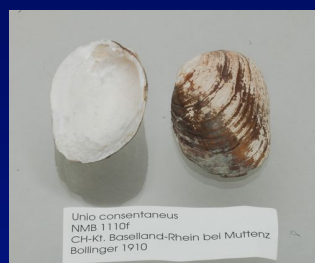
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H □ □ □ □



Freshwater shell
 Switzerland
 ~ 1910



Problem of „old“ ages due to unknown correction for carbon reservoir.

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C



- First results on a limited number of samples show that radiocarbon age dating of pearls is possible.
- Radiocarbon dating may result in additional data (using the bomb-peak) which enables a unambiguous distinction between cultured and natural pearls.
- Radiocarbon dating of historic pearls must be further investigated with well-documented samples.
- Extraction methods to avoid destruction of pearls have to be further developed by minimising the sample weight.
- For most pearls, the geographic locality where they formed is not known or only vaguely. This results in problems when corrections for the carbon reservoir ages are required.
- In general, freshwater shells and pearls give “fancy” ages (carbon reservoir).

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