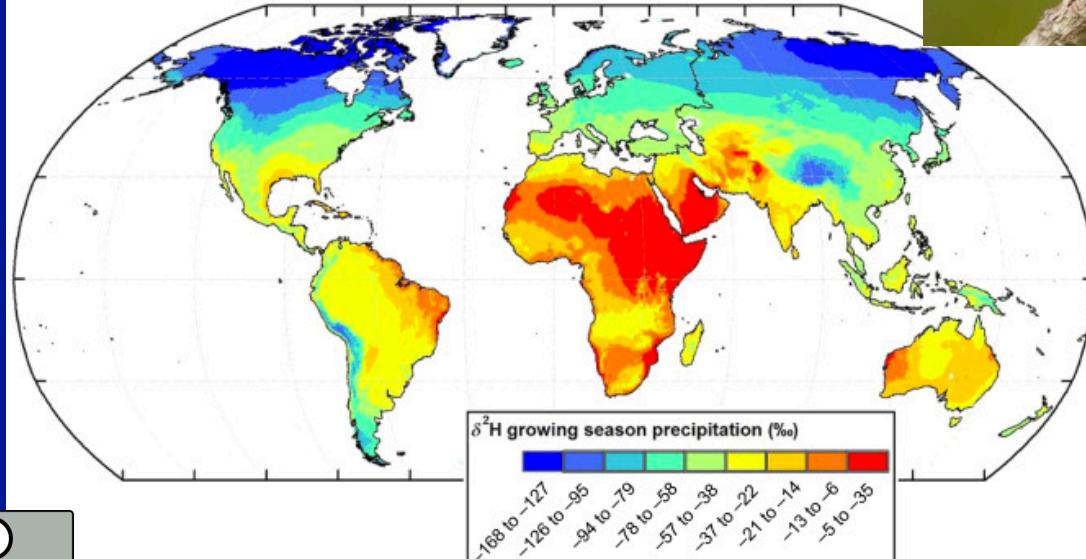
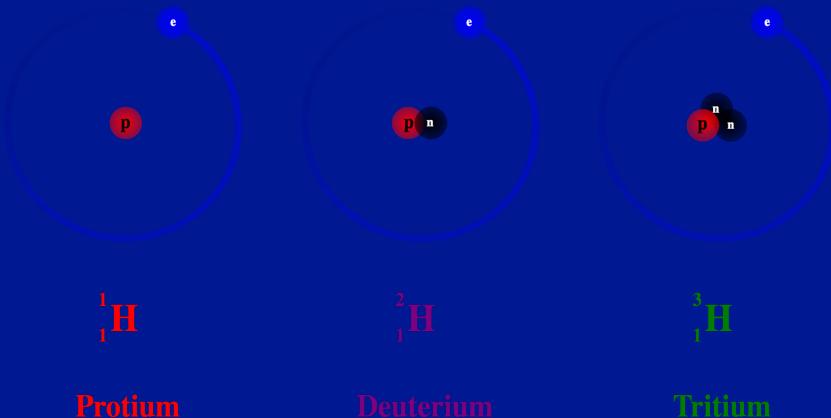
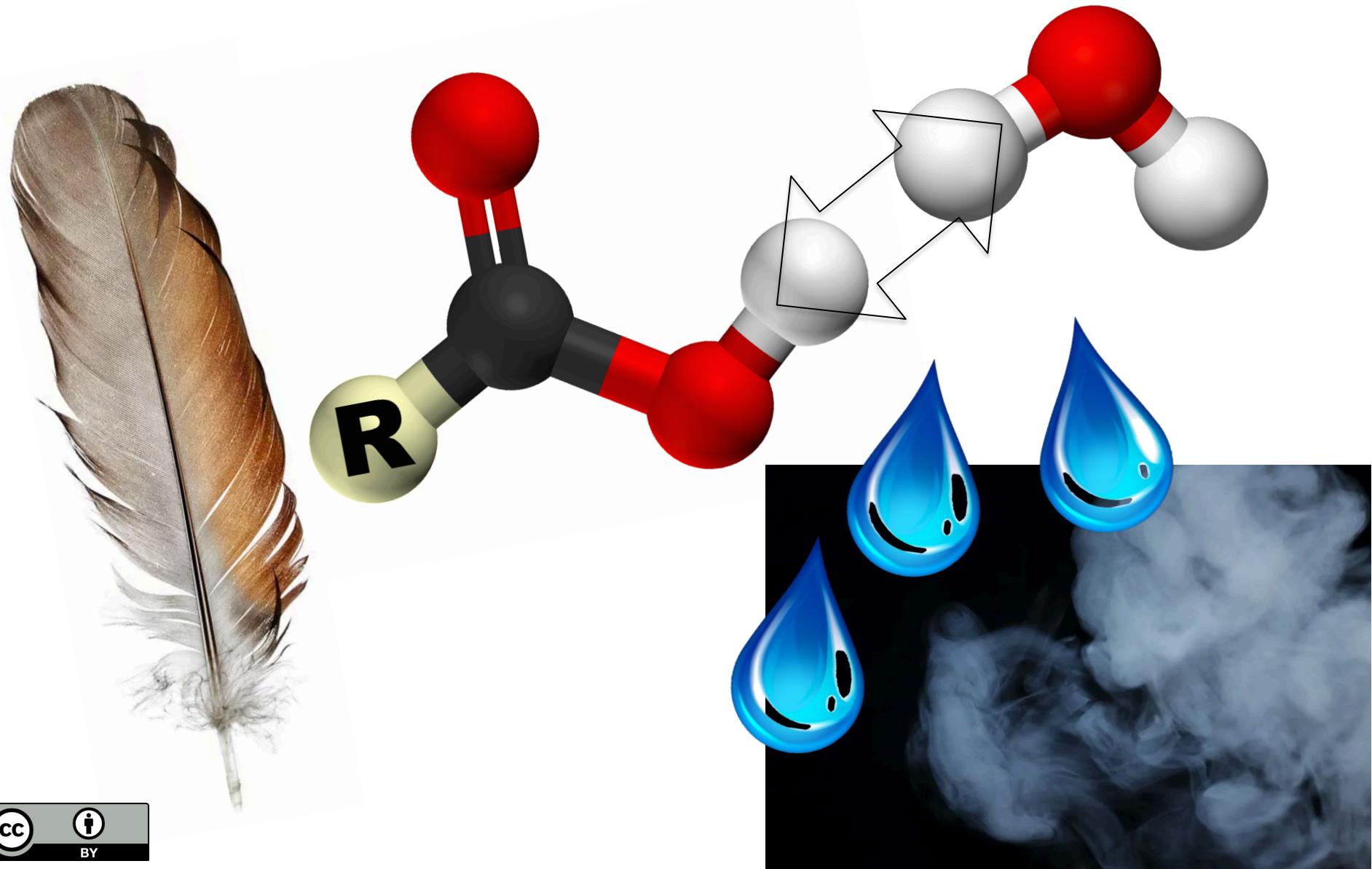


A compilation of known-origin keratin H and O isotope data for wildlife and forensic research

Sarah Magozzi, Andrea Contina, Mike Wunder, Hannah Vander Zanden, Gabe Bowen
In collaboration with: Clement Bataille, John Howa, David Soto, Craig Stricker,

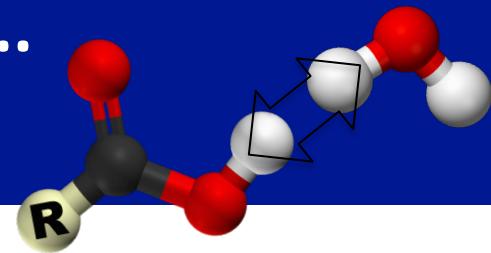


H isotopic exchange



Different protocols to correct for exchange ...

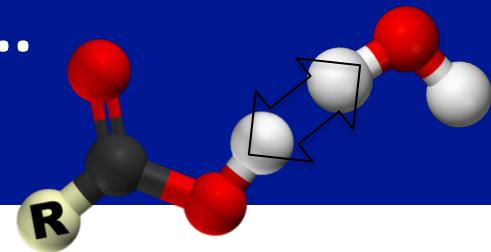
And not only!



What type of sample is analysed ?	Feather
What method is used for sampling ?	Vane
Is the sample powdered ?	Y
Are lipids extracted ?	Y
How ?	2:1 chloroform:methanol
Is H isotopic exchange corrected for ?	Y
How ?	Comparative equilibration
What is the exchange T ?	Ambient
What standards are used ?	CHS/CFS/BWB
Are standards powdered ?	Y
How is the quality of drying / handling procedures ?	High
What method is used for analysis ?	TCEA
What type of analysis is performed ?	H

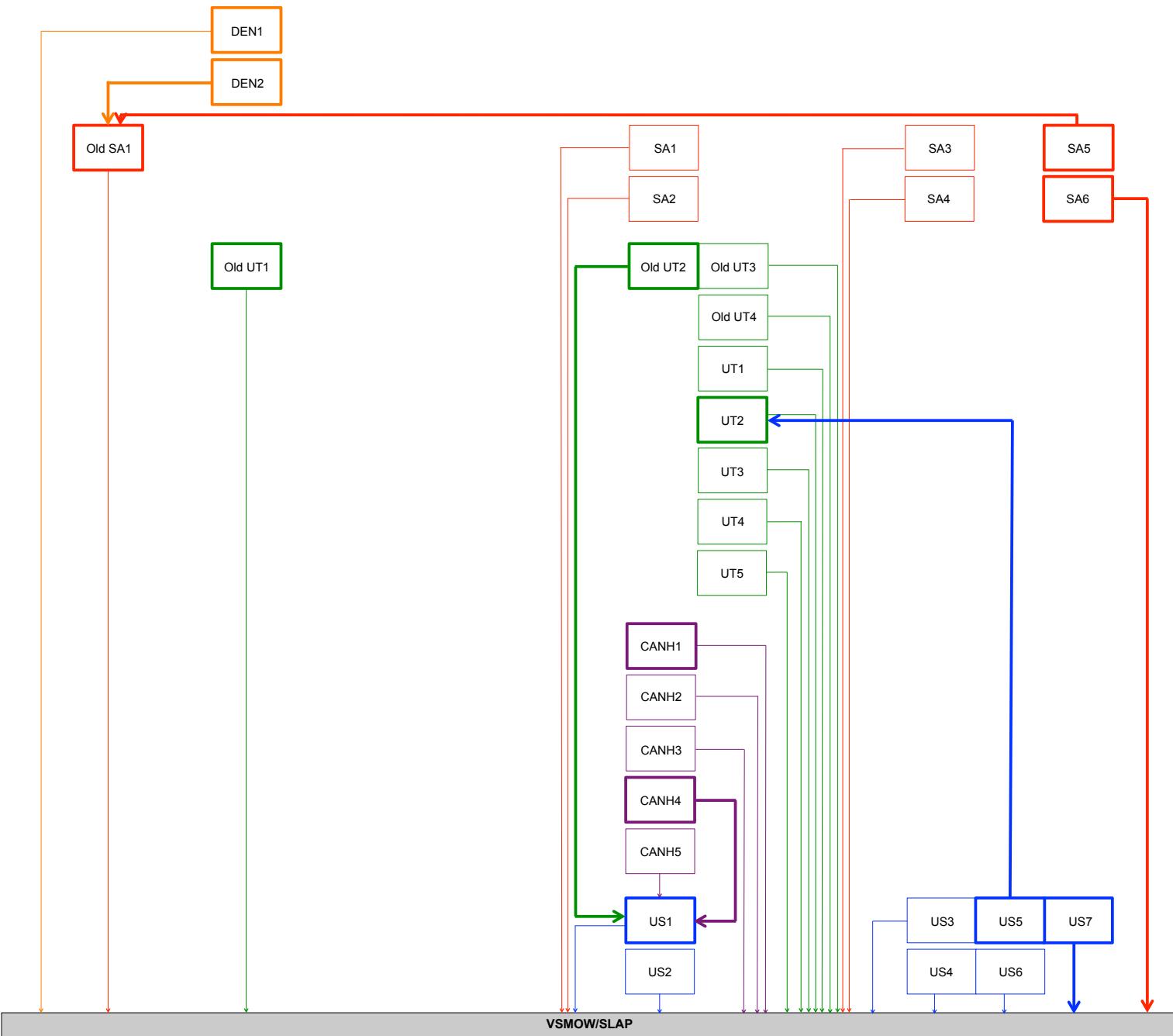
Different protocols to correct for exchange ...

And not only!

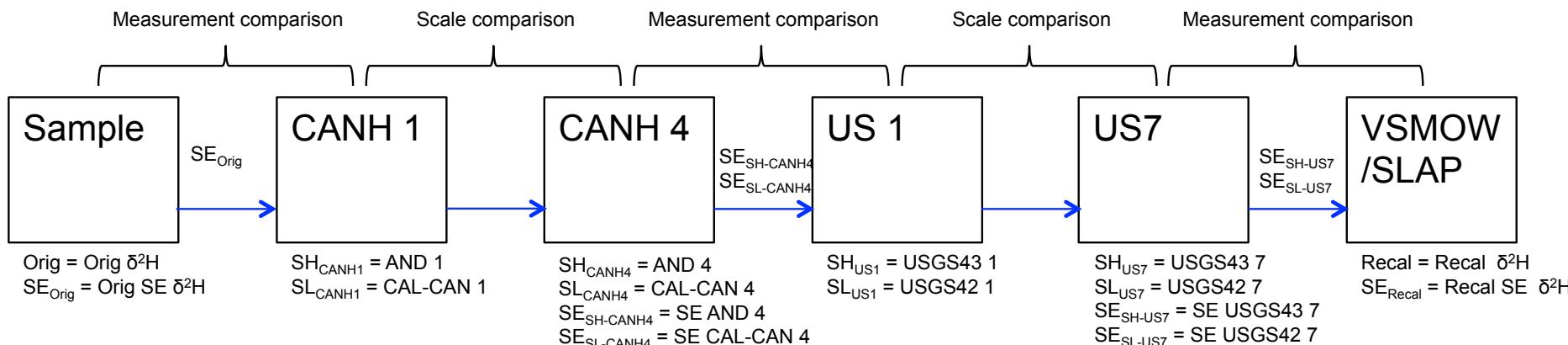
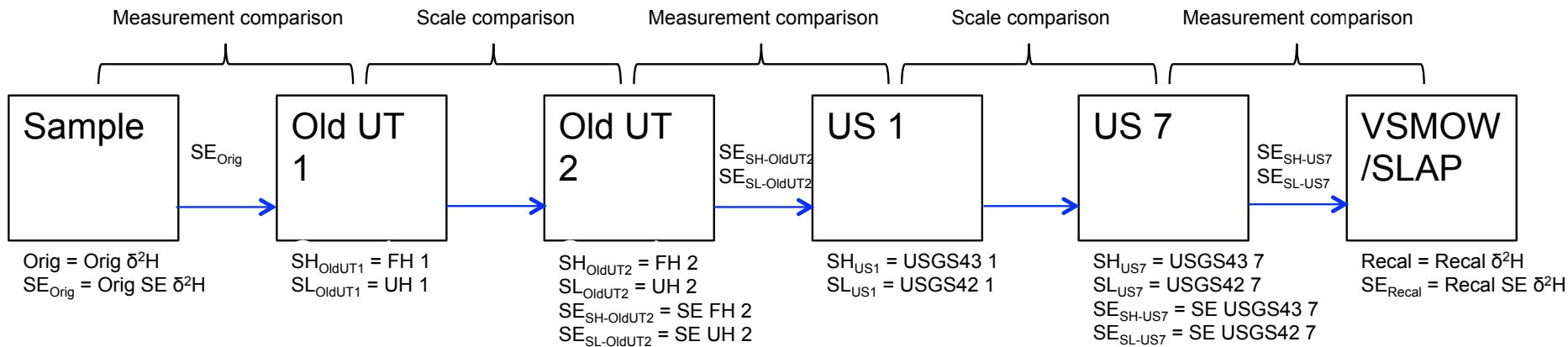
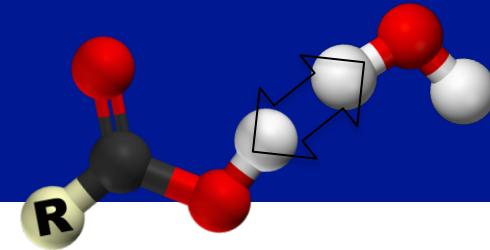


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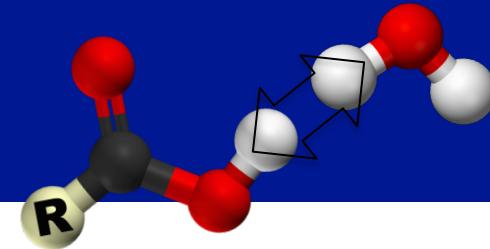
2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
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Recalibration to VSMOW/SLAP



Recalibration to VSMOW/SLAP

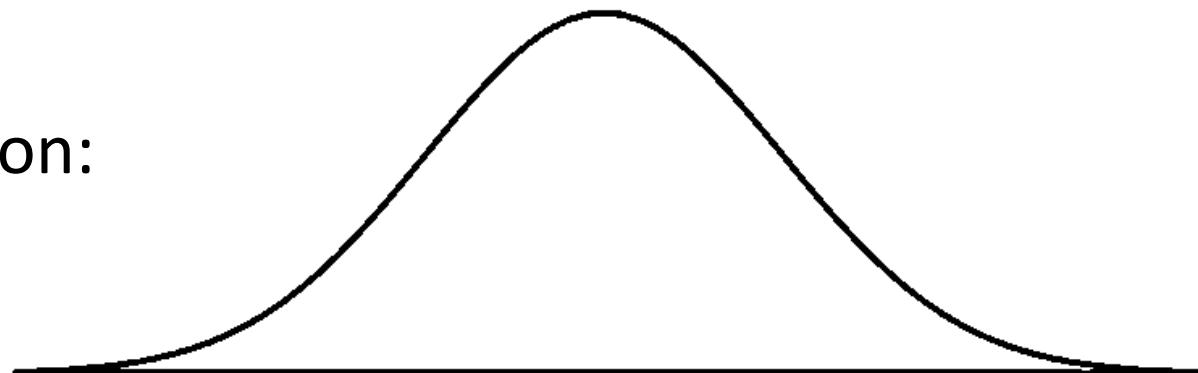


$$\delta^2\text{H}_{\text{new}} = \delta^2\text{H}_{\text{old}} * m_{\text{new_old}} + b_{\text{new_old}}$$

$$m_{\text{new_old}} = (\text{SH}_{\text{new}} - \text{SL}_{\text{new}}) / (\text{SH}_{\text{old}} - \text{SL}_{\text{old}})$$

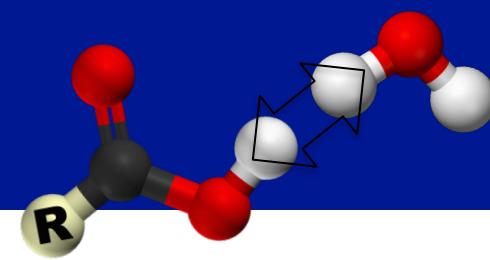
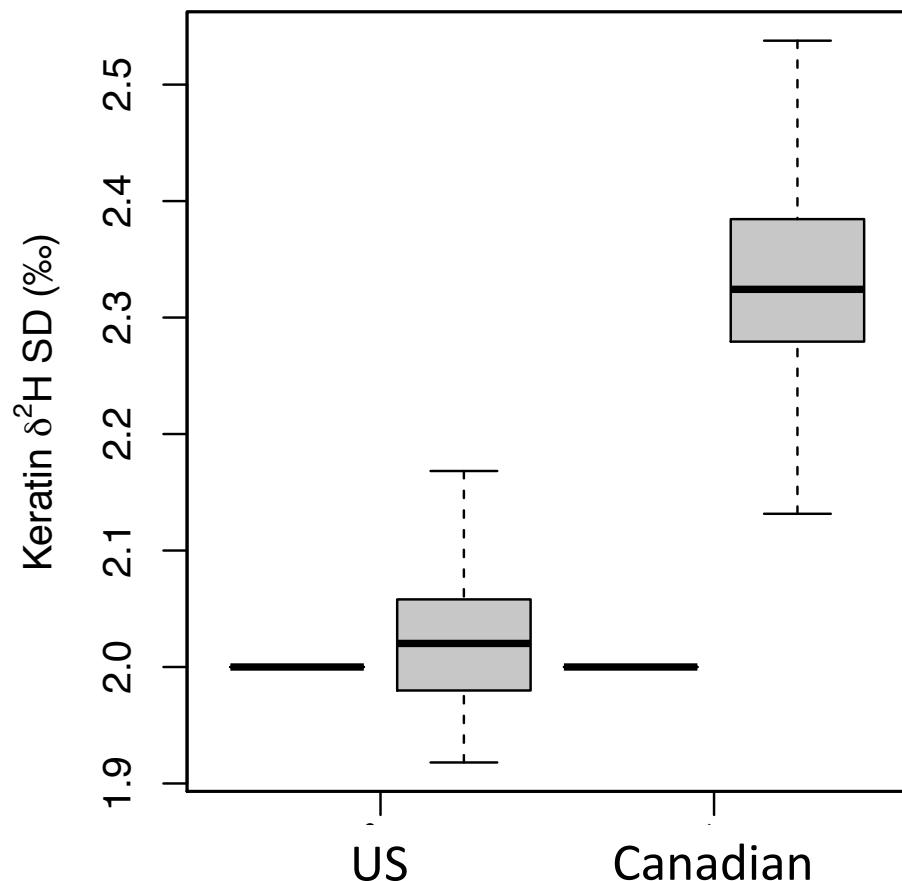
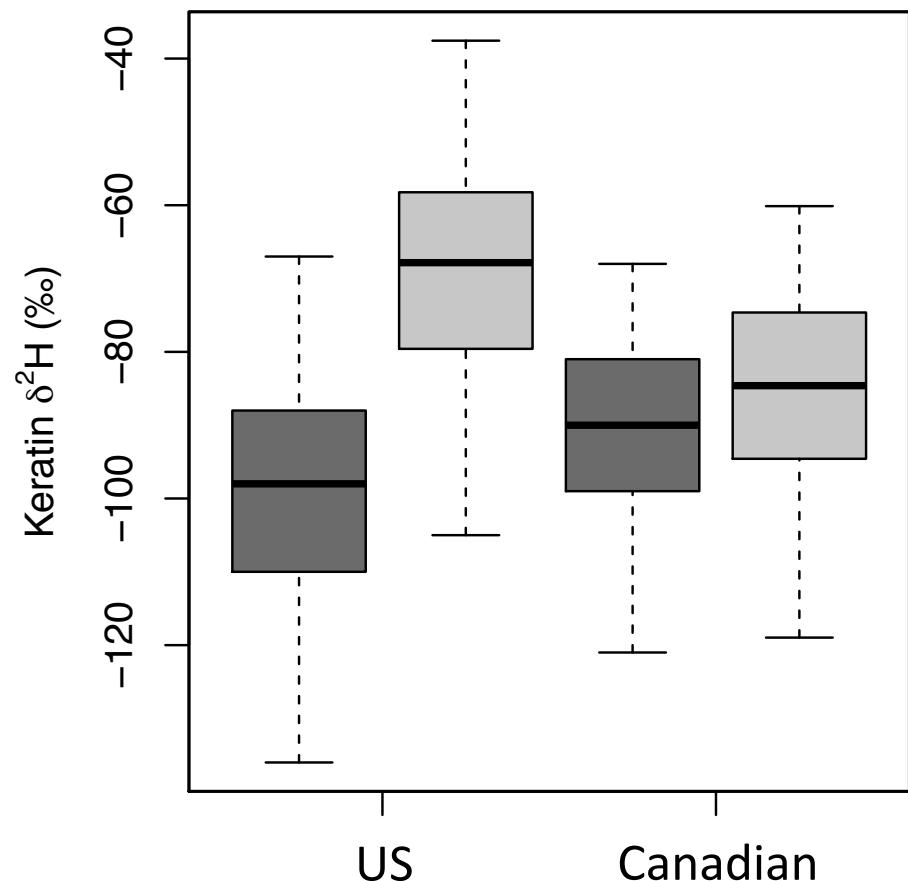
$$b_{\text{new_old}} = \text{SH}_{\text{new}} - \text{SH}_{\text{old}} * m_{\text{new_old}}$$

Uncertainty propagation:
Monte Carlo sampling



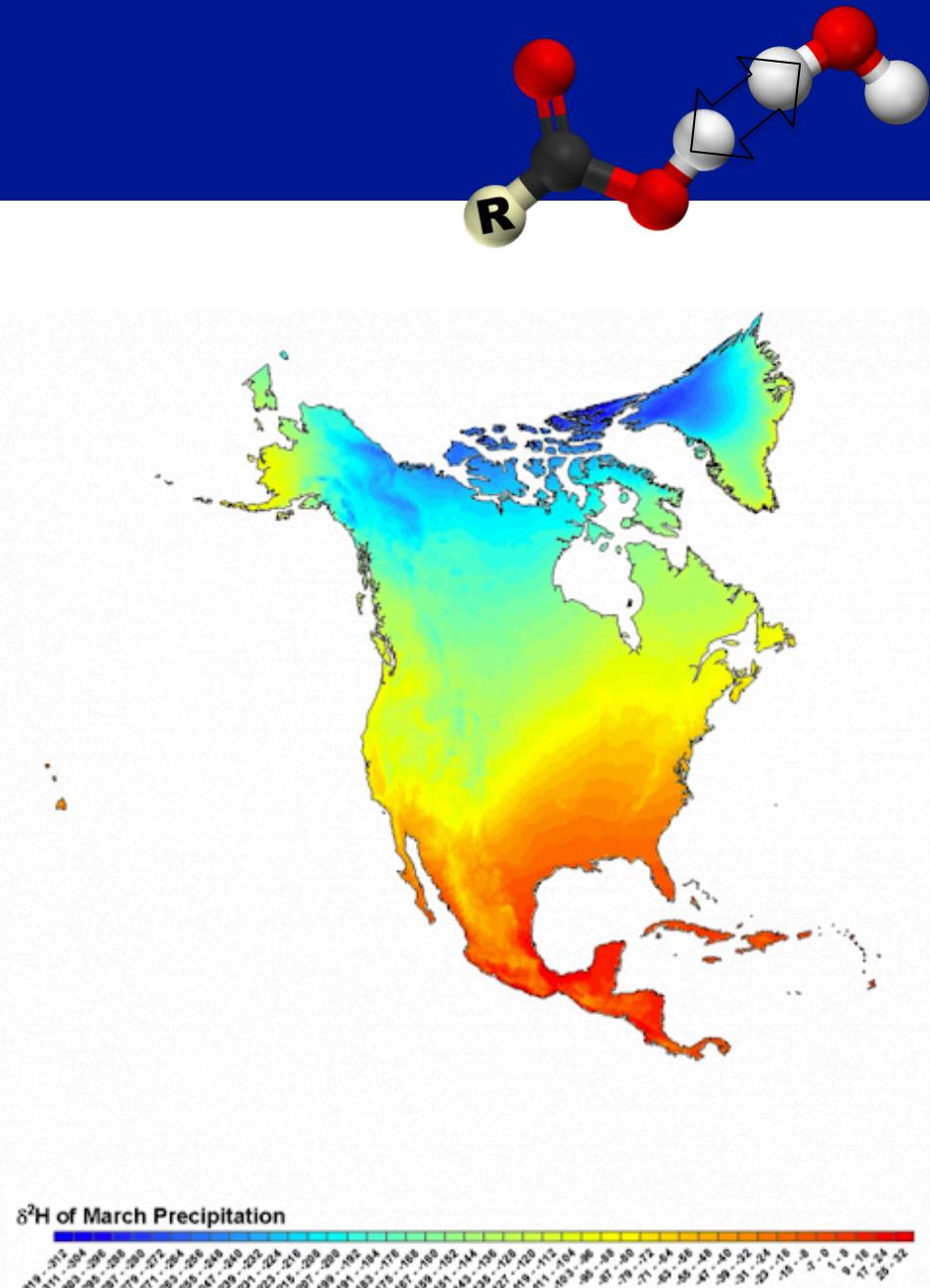
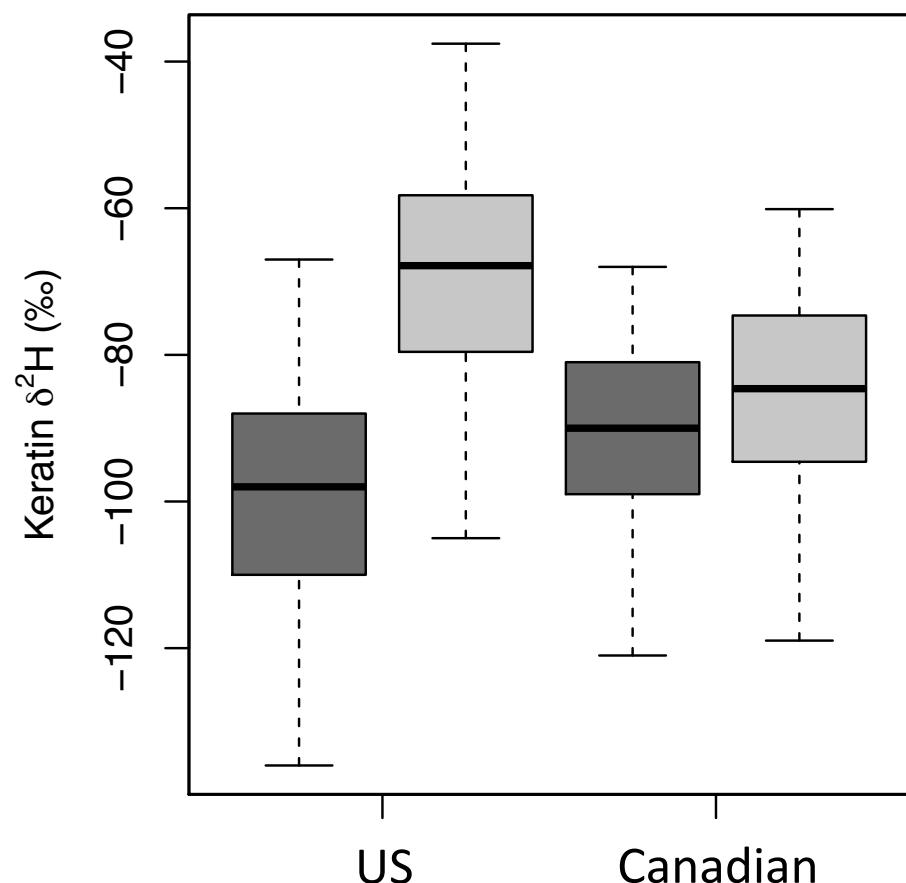
US vs. Canadian human hair

Original Recalibrated

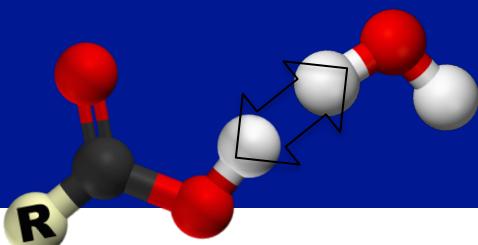


US vs. Canadian human hair

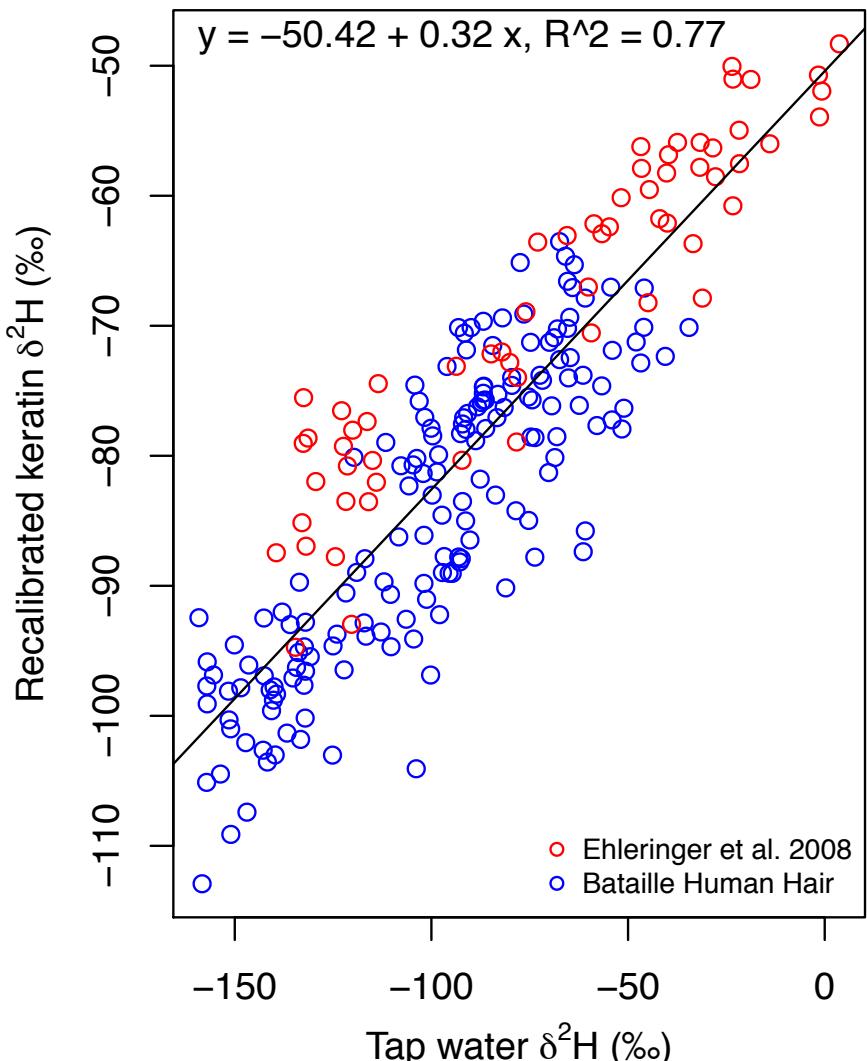
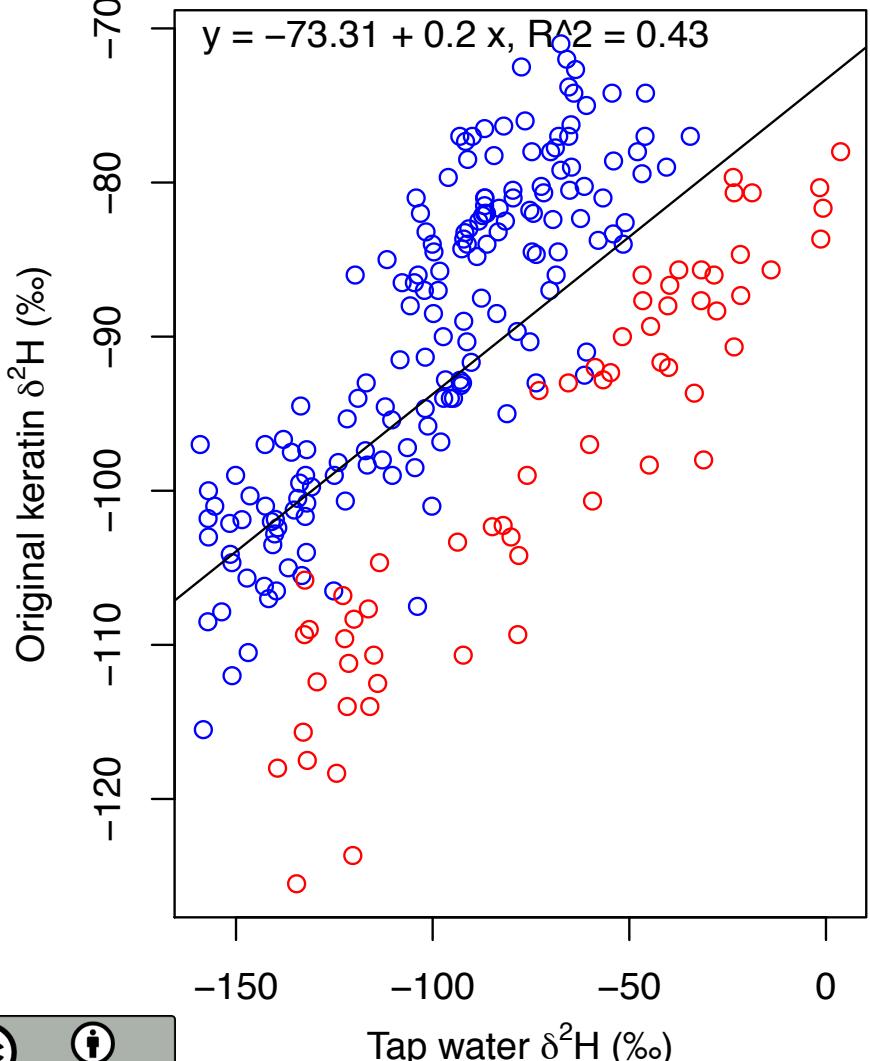
Original Recalibrated



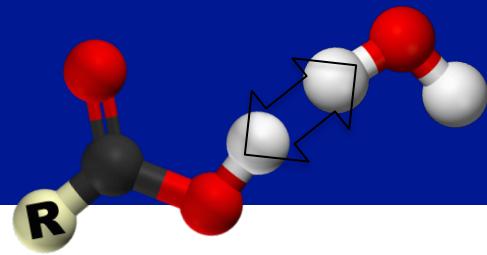
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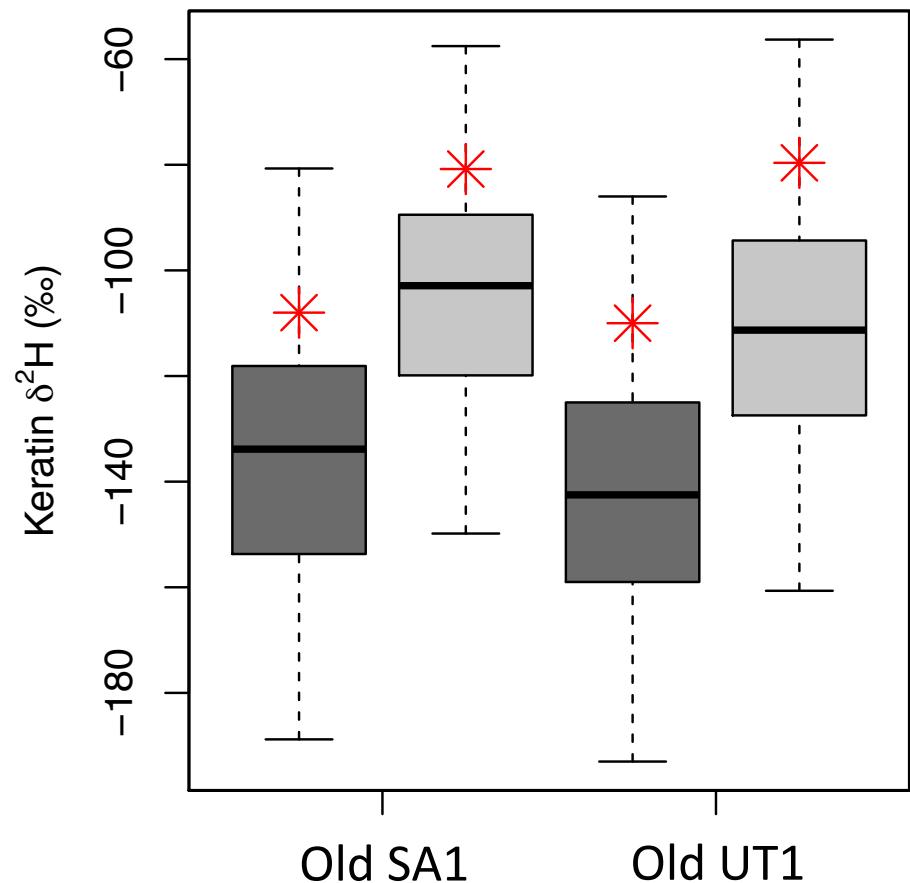
US Canada



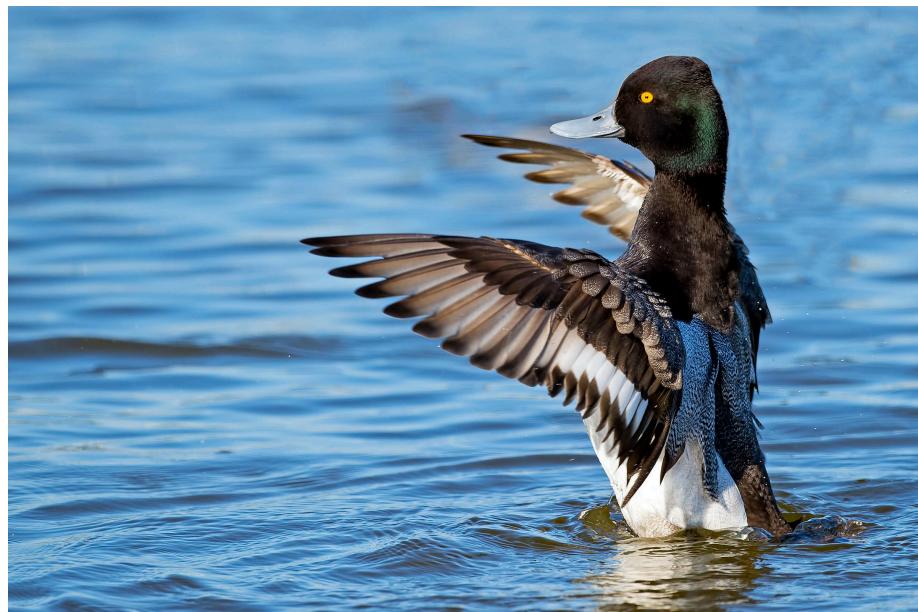
Scaup feathers



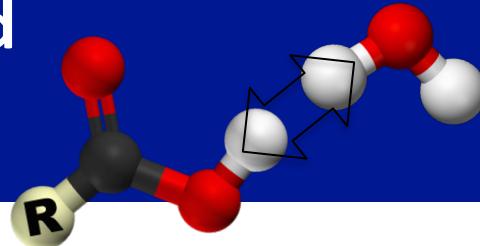
Original Recalibrated BWB check



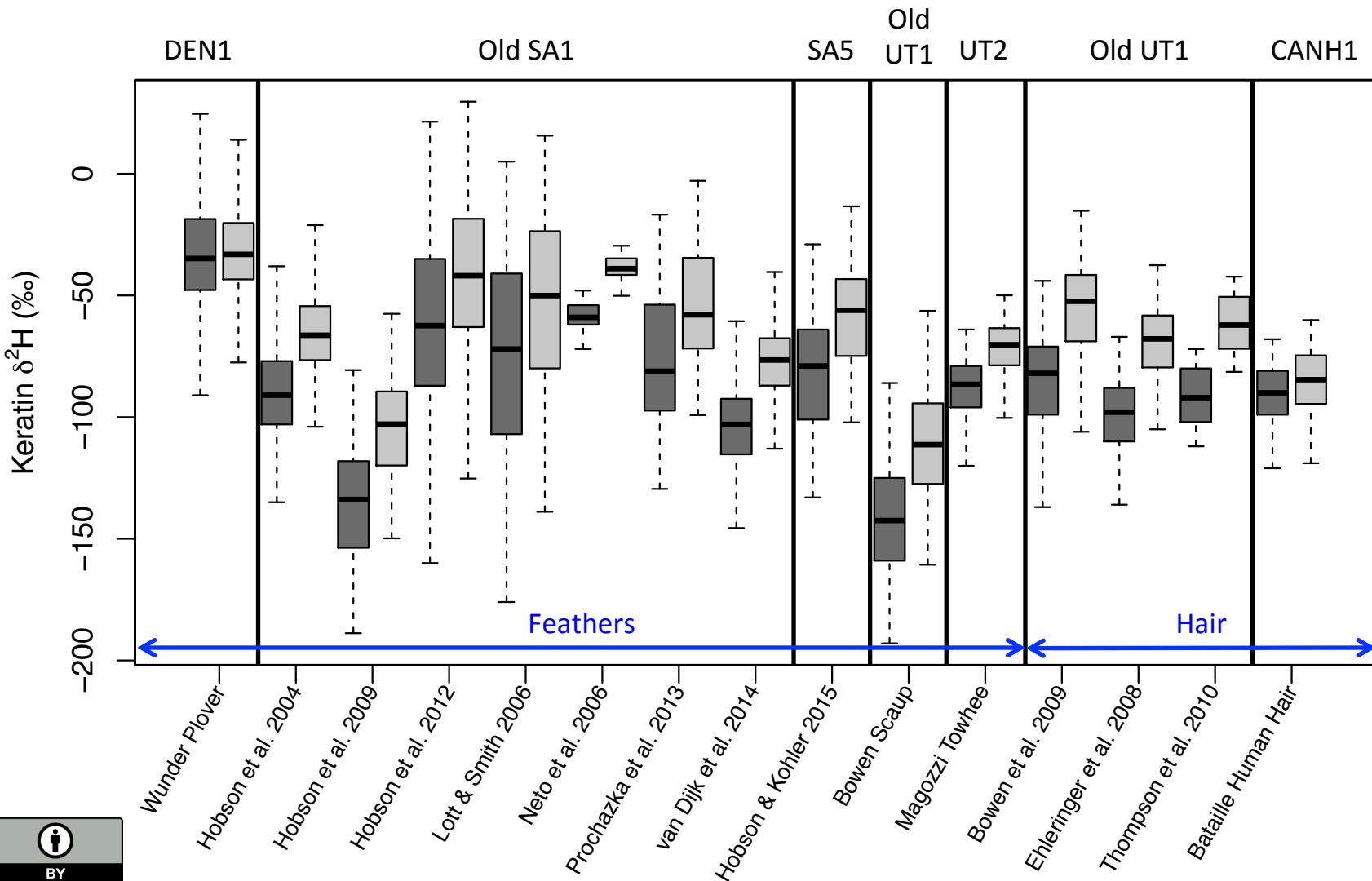
Drying / handling ?



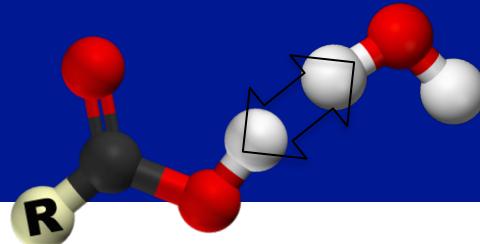
Difference between original and recalibrated Differences between scales



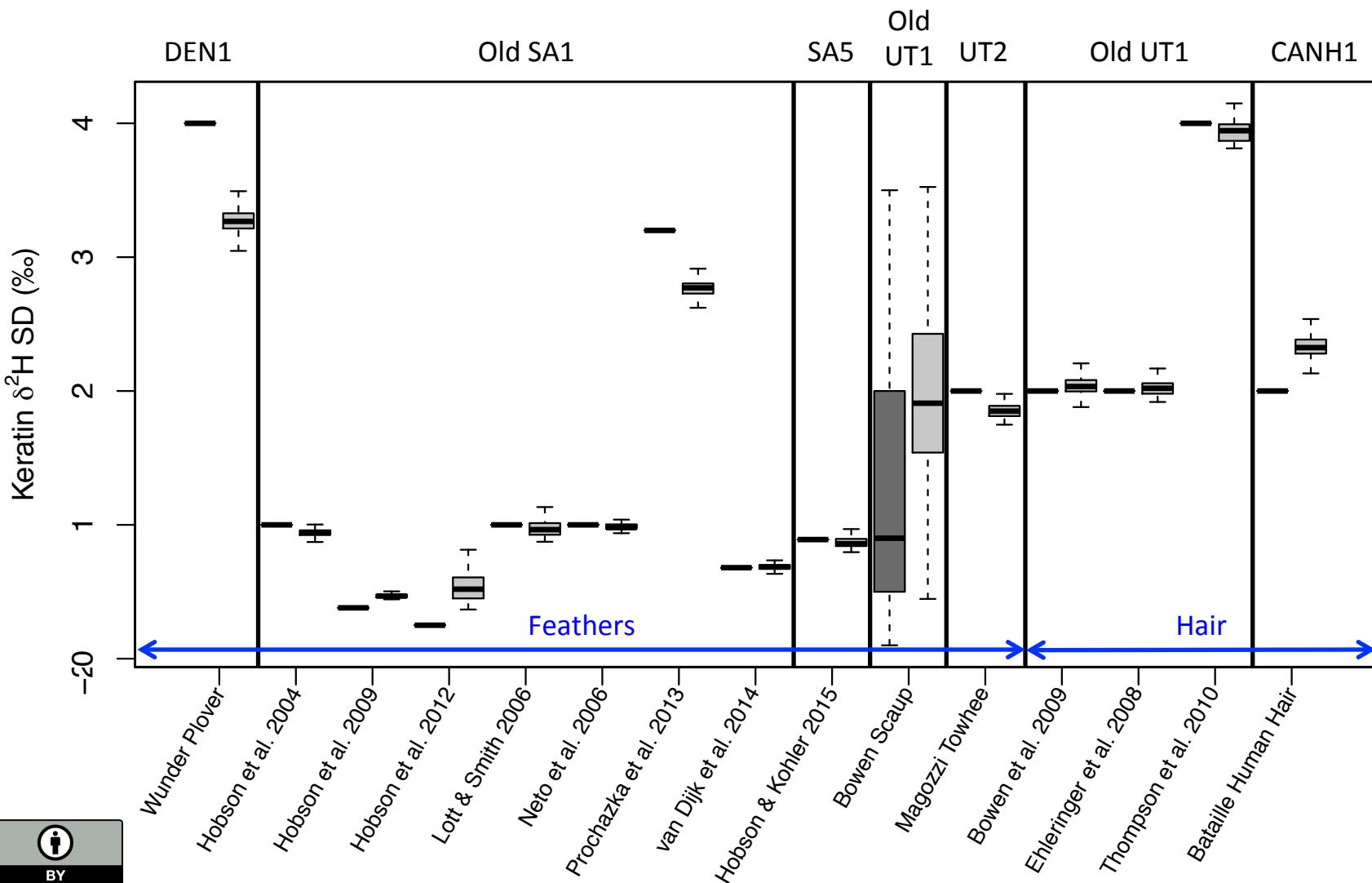
Original Recalibrated



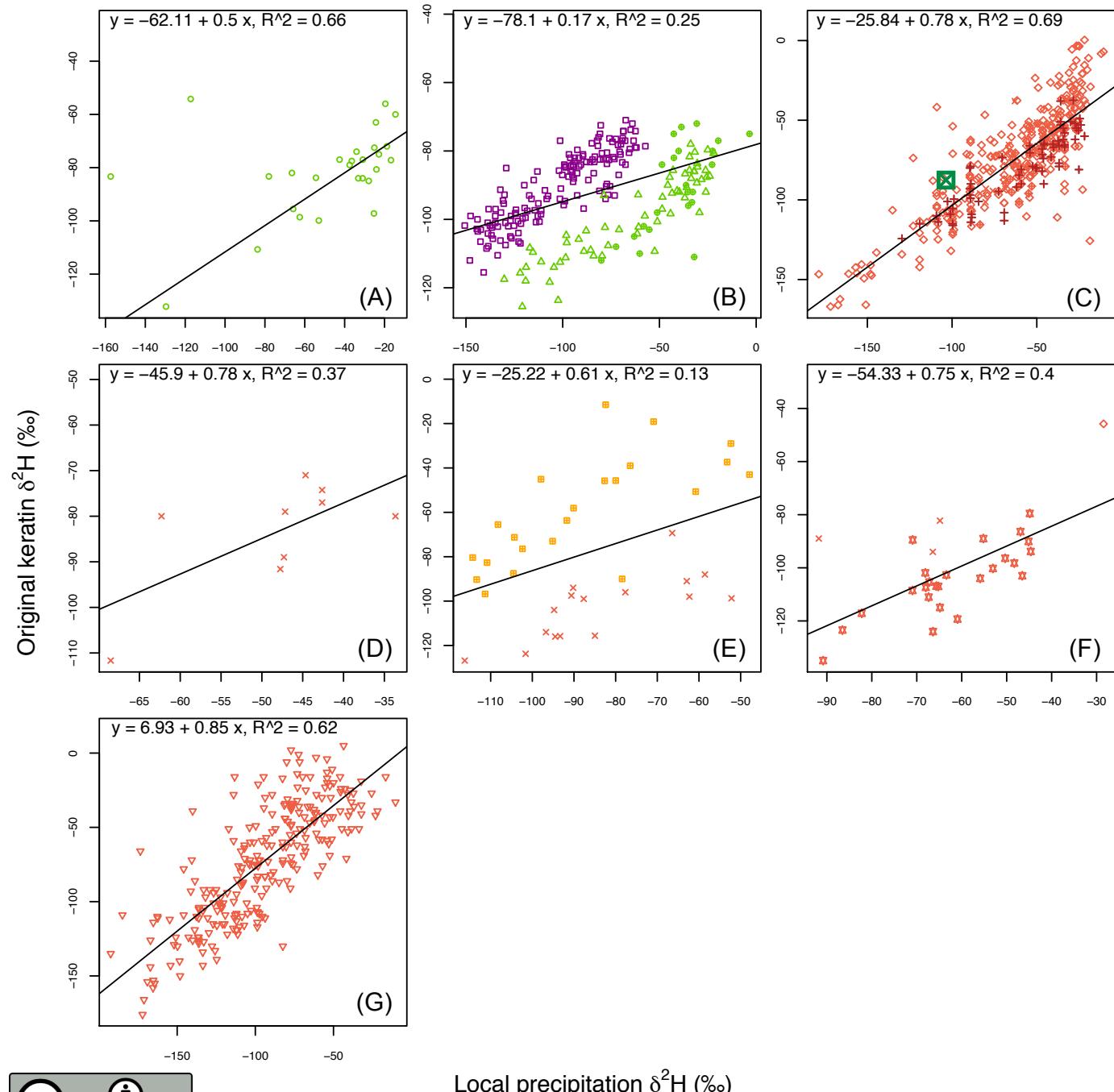
Uncertainty propagation



Original Recalibrated



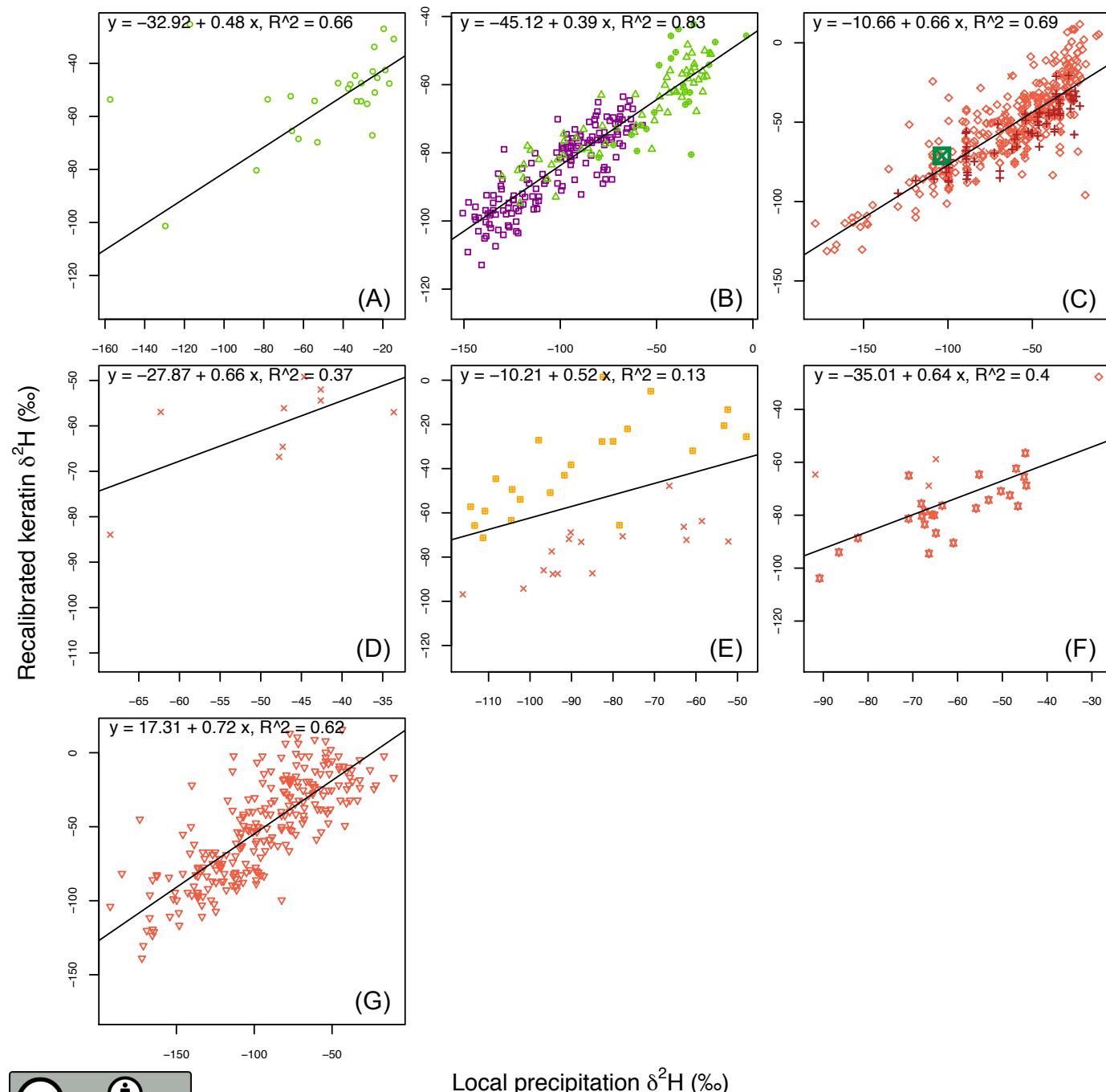
Original



- DEN 1
- Old SA 1
- SA 5
- Old UT 1
- UT 2
- CANH 1

- Bataille Human Hair
- Bowen et al. 2009
- △ Ehleringer et al. 2008
- + Hobson & Kohler 2015
- × Hobson et al. 2004
- ◊ Hobson et al. 2012
- ▽ Lott & Smith 2006
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- ◆ Prochazka et al. 2013
- ⊕ Thompson et al. 2010
- ⊗ van Dijk et al. 2014
- Wunder Plover

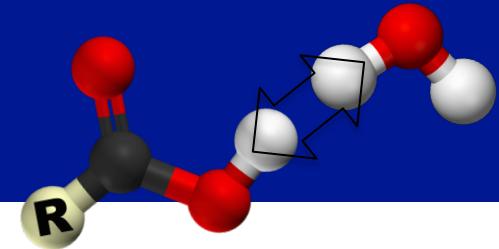
Recalibrated



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- Wunder Plover

Conclusions



Keratin comparisons:

- where keratins are analysed with comparative eqib, recalibration to VSMOW/SLAP through std chains & uncertainty propagation with Monte Carlo sampling improve comparability of keratin d2H data
- global compilation of known-origin keratin H (and O) isotope data will be deposited in IsoBank (<http://isobank.org/>) for use in wildlife and forensic research

Chitin & keratin/chitin comparisons:

- dual water eqib recommended, due to lack of std for comparative eqib and different AA composition