

OPEN ACCESS

## Shell-middens and peat-bog of Southeastern Brazil as evidence of holocene climate change

To cite this article: Alethéa Ernandes Martins Sallun *et al* 2009 *IOP Conf. Ser.: Earth Environ. Sci.* **6** 072024

View the [article online](#) for updates and enhancements.

### You may also like

- [Ambient dose equivalent and effective dose from scattered x-ray spectra in mammography for Mo/Mo, Mo/Rh and W/Rh anode/filter combinations](#)  
R Künzel, S B Herdade, P R Costa et al.
- [Fluorescence spectroscopy for the detection of potentially malignant disorders of the oral cavity: analysis of 30 cases](#)  
A L N Francisco, W R Correr, L H Azevedo et al.
- [Status Report of the Schenberg Gravitational Wave Antenna](#)  
O D Aguiar, J J Barroso, N C Carvalho et al.



The Electrochemical Society  
Advancing solid state & electrochemical science & technology

# UNITED THROUGH SCIENCE & TECHNOLOGY

**248th  
ECS Meeting**  
Chicago, IL  
October 12-16, 2025  
*Hilton Chicago*



**Science +  
Technology +  
YOU!**

**SUBMIT  
ABSTRACTS by  
March 28, 2025**

**SUBMIT NOW**

# P07.12

## Shell-middens and peat-bog of southeastern Brazil as evidence of holocene climate change

*Aleth a Ernandes Martins Sallun(1), W Sallun Filho(1), K Suguio(2,3), PE de Oliveira(2), MJ Garcia(2), RS Fernandes(2), C da Silva Santos(2), VB de Medeiros(2), MC Santiago-Husse(2), w Duleba(4), M Babinsky(3), SMCL Gliioia(3)*

*(1) Geological Institute (IG/SMA), S o Paulo, Brazil*

*(2) Guarulhos University (UnG-CEPPE), S o Paulo, Brazil*

*(3) Geoscience Institute (IGc-USP), S o Paulo, Brazil*

*(4) Arts, Science and Humanities School (EACH-USP), S o Paulo, Brazil*

The Shell-middens are used in ancient sea-levels and strandlines reconstructions in several parts of the world, associated with geological (or geomorphological) and biological proxy records. Data obtained from shell-middens and peat-bogs in southeastern Brazil inland are here used as paleoenvironmental indicators. Two drillings made in the peatland (Campina do Encantado S o Paulo State Park), with a vibrocorer supplied with maximum ages changeable from 3,560 to 3,380 cal. yr B.P. These peat-bogs extend through an area of more than 28 km<sup>2</sup> and presents a thickness of more than 6 m and contains methane gas stored in the underground, susceptible to land pipes burning naturally at the surface. After the  $\delta^{13}\text{C}_{\text{PDB}}$  obtained from organic sediments is concluded that they are composed dominantly by remains of C3 photosynthetic cycle (arboreal) plants, because the recorded values changed from -24.5‰ (3.65 m deep) until -29.3‰ (surface). Around the peatland there are several shell-middens, according to their geographical positions and ages, related to the Holocene paleolagoonal geological evolution (Suguio et al. 1992). A shell-midden situated adjacent to the peatland supplied with an age between 5,870 to 5,600 cal. yr B.P. Ages of two other shell-middens obtained by Suguio & Martin (1978) were re-calculated with INTCAL04 Radiocarbon Age Calibration (2004), assuming two-sigma error of radiocarbon measurements with error multiplier of 1.0, being obtained ages from 5,923 to 5,272 cal. yr B.P. and 5,670 to 4,974 cal. yr B.P. The  $\delta^{13}\text{C}_{\text{PDB}}$  values for Crassostrea from the Shell-middens oscillated from -3.00‰ to -3.66‰. In southeastern Brazil, radiocarbon ages of shell-middens and peat-bogs, situated between 19 to 25 km far from the present strandline and with an elevation of the 7 to 8 m above present sealevel, suggest millennial scale paleoenvironmental change patterns correlative with the worldwide recognized marine oxygen isotope stages and relative sealevel changes. The obtained data ratified the Suguio & Martin (1978) model, when the uplifting relative sealevel attained the present one, between 7,000 to 6,500 yr B.P., during the Santos Transgression of Brazil, when a very extensive laggonal propitiating the construction of shell-middens, that are presently situated until more than 20 km from the current shoreline. Later, the relative sealevel dropped more-or-less regularly, intercalated by two important negative fluctuations, between 4,100 to 3,600 yr B.P. and 3,000 to 2,500 yr B.P., which favoured deposition of Campina do Encantado peatland, which is essentially continental in origin.

Sample Data	Lab. number	<sup>14</sup> C Age	$\delta^{13}\text{C}_{\text{PDB}}$	Calendar age (cal. yr B.P.)**	Distance (km)	Elevation a.s.l.(m)
S01A (0 m)	Beta - 238842	1110±40 yr BP	-29.3	1080 to 940	25 km	8.00
S01A (3.65 m)	Beta - 238843	2210±40 yr BP	-24.5	2340 to 2120		4.35
S02B (0 m)	Beta - 238844	112.2±0.5 pMC	-29.1	- *	23.6 km	7.00
S02B (4.39 m)	Beta - 238845	3240±40 yr BP	-28.6	3560 to 3380		2.61
PECE (shell)	Beta - 244545	5360±50 yr BP	-3.0	5870 to 5600	23 km	8
Jatituba*** (shell)	Bah. 346	5235±150 yr BP	-3.26	5923 to 5272	19 km	8
Pariquera-A�u*** (shell)	Bah. 295	5035±140 yr BP	-3.66	5670 to 4974	19.7 km	8

\*reported data indicates an age of post B.P., and has been assumed as % of the modern reference standard, suggesting that the material came from a living being within the last 50 years.

\*\* calibrated ages are calculated from Stuiver et al. (1998) and Talma & Vogel (1993), assuming two-sigma error on radiocarbon measurements with error multiplier of 1.0; cal. = calibrated.

\*\*\*Martin et al. (1979) - Bah. = Labor rio de F sica Nuclear Aplicada (UFBA)

Table 1: Radiocarbon ages from shell-middens and peat-bogs from Campina do Encantado S o Paulo State Park. The intervals given in calendar years B.P., correspond to maximum and minimum values, assuming a two-sigma error of the radiocarbon measurements.

### Acknowledgements

We are sincerely grateful to FAPESP (Fundação de Amparo à Pesquisa do Estado de São Paulo - Process 06/04467-7) and CNPq (Conselho Nacional de Desenvolvimento Científico e Tecnológico - Process (309281/2006-7)).

### References

- Martin, L., Suguio, K., Flexor, J.M. 1979. Le quaternaire marin du littoral brésilien entre Cananéia (SP) et Barra de Guaratiba (RJ). In: USP, International Symposium on Coastal Evolution in the Quaternary, 1978, Proceedings, p. 296-331.
- Stuiver, M., Reimer, P.J., Bard, E., Beck, J.W., Burr, G.S., Hughen, K.A., Kromer, B., McCormac, F.G., Van Der Plicht, J. 1998. INTCAL 98. Radiocarbon age calibration 24,000–0 cal BP. *Radiocarbon*, 40:1127– 1151.
- Suguio K. & Martin L. 1978. Quaternary marine formations of the States of São Paulo and southern Rio de Janeiro. In: USP, International Symposium on Coastal Evolution in the Quaternary, 1978, Special Publication 1, pp. 55.
- Suguio, K., Martin, L., Flexor J.M. 1992. Paleoshorelines and the sambaquis of Brazil. In: L.L. Johnson & M. Stright (eds.) *Paleoshorelines and prehistory: An investigation of method*. CRC, Boca Raton, pp: 83-99.
- Talma, A. S. & Vogel, J. C. 1993. A simplified approach to calibrating 14C dates. *Radiocarbon*, 35(2):317-322A.