How Quaternary climate changes build and erode sedimentary deposits in an intraplate large fluvial system: the São Francisco River, Brazil

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Introduction

The São Francisco River is the easternmost large river of South America (Fig. 01), with its upper course in semi-humid settings, but with a watershed mostly under semi-arid conditions. As this is a river with its basin in tectonically quiescent areas and controlled by local base level, the São Francisco River's deposits are an excellent fluvial sedimentary record to understand how large tropical rivers systems responded to past climate changes.

Materials and Methods

We studied a stretch of the middle course of the São Francisco (Fig. 01) by using remote sensing methods and field surveys for geomorphological and sedimentological analyses combined with optically stimulated luminescence dating (OSL).

Results and Discussion

We recognized at least four phases of fluvial aggradation (>90 ka; 65 to 39 ka; 18 to 9.5 ka and 380 years to recent; Fig. 02-03) and three phases of incision (I1 - 85 to 65 ka; I2 - 39 to 18 ka and I3 - 9.5 to 1.0 ka). Two aggradation events and the incision event I2 are also observed in the upper course of the São Francisco River (Fig. 04 e). The river incision events agree with precession insolation controlled by multi-millennial climate changes.

Conclusion

- Aggradation/incision phases controlled by multi-millennial precipitation changes
- Incision events were triggered by increased river discharge in the watershed
- Sedimentation in plain of big plateau river can be decoupled from the coastal area

For more information:


References