

Dating of Pleistocene fluvial sequence in the upper Garonne valley and implications for glacial fluctuations

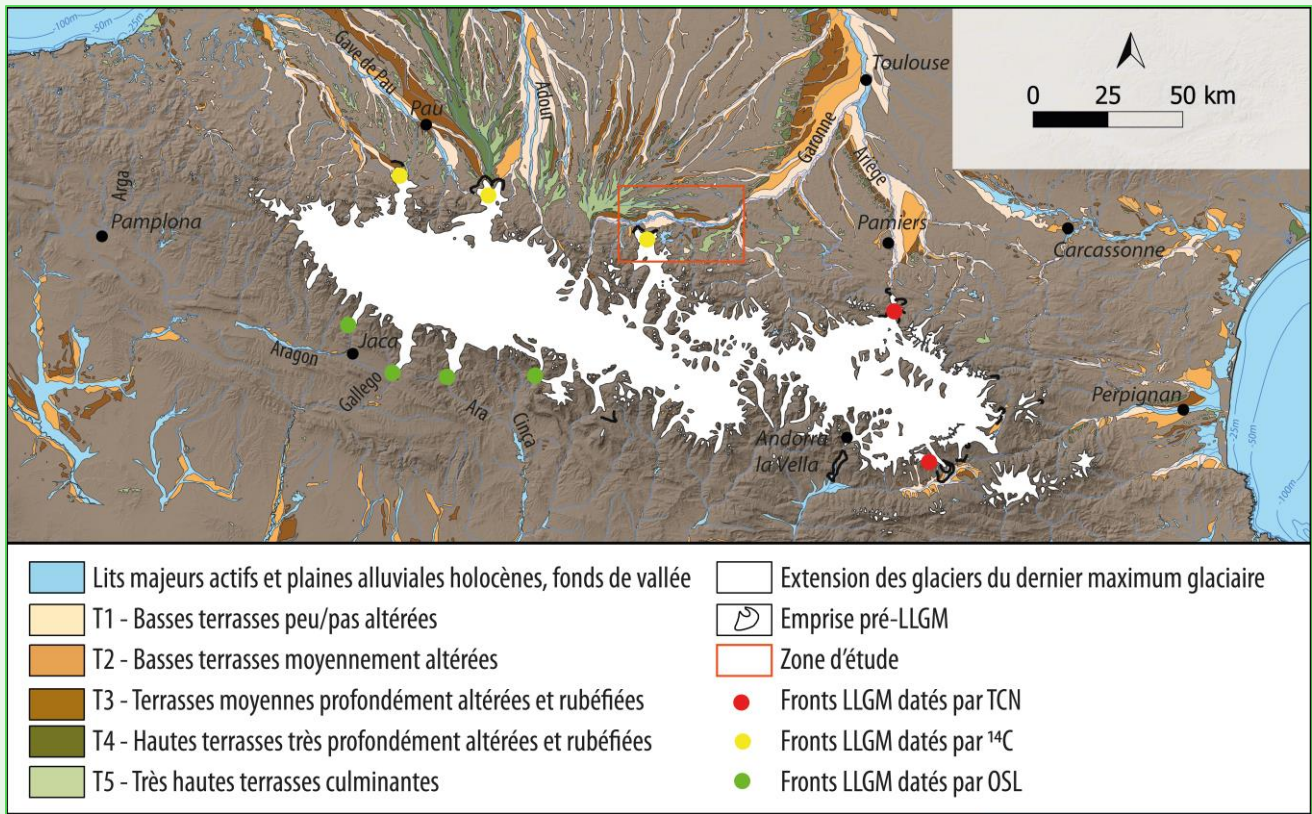
*Under the supervision of Magali Delmas,
Pierre Valla and Pierre Voinchet*



View of the Serre morainic complex, Hte Garonne

INTRODUCTION

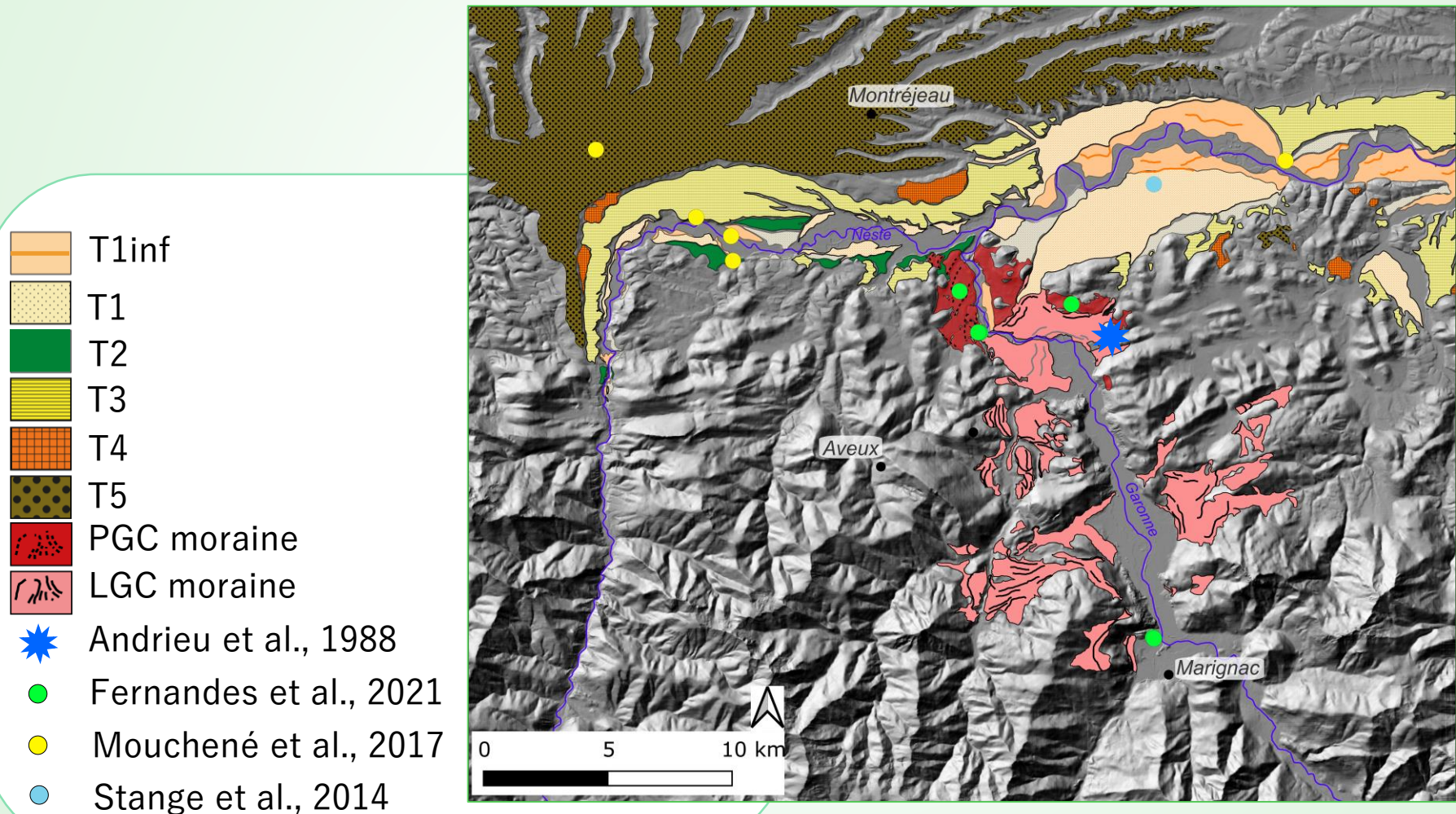
Dating of Pleistocene fluvial sequences to characterize environmental changes, particularly during MIS 3 (60-27 ka).



- Delmas et al., 2011; Pallas et al., 2010
- Mardones et al., 1983; Andrieu, 1987; Andrieu, 1991; Jalut et al., 1982
- Sancho et al., 2003, 2004; Garcia-Ruiz et al., 2013; Lewis et al., 2009

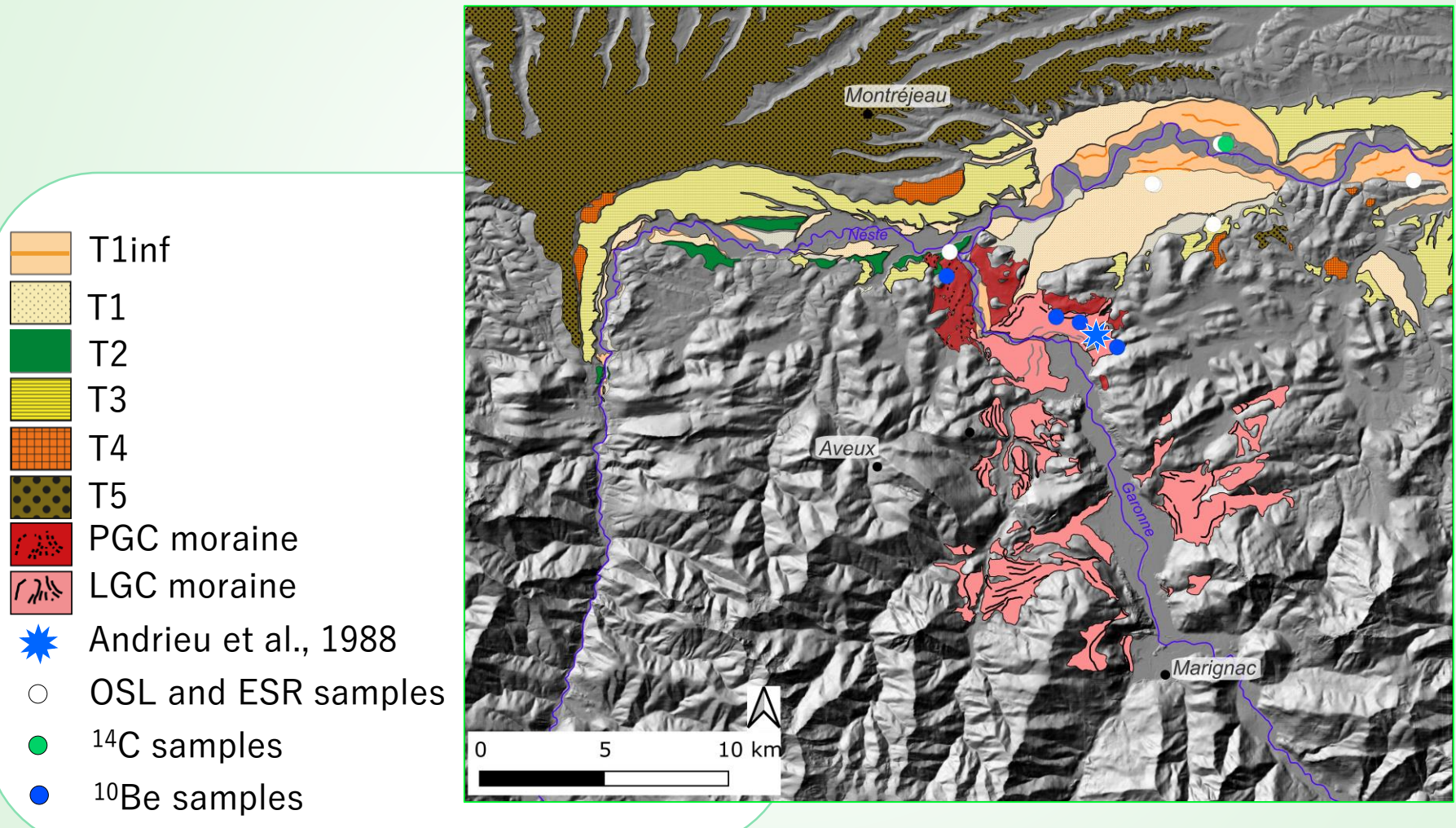
GEOMORPHOLOGICAL SETTING

- ^{14}C datings on Barbazan paleolake sequence, TCN surface exposure dating on morainic boulders, TCN vertical profiles on fluvial terraces



MATERIAL AND METHODS

- 6 OSL and ESR datings on fluvial lens, 4 ¹⁴C datings on charcoal, 3 TCN surface exposure datings on boulders



RESULTS

▪ River charcoals at Sède, ^{14}C :

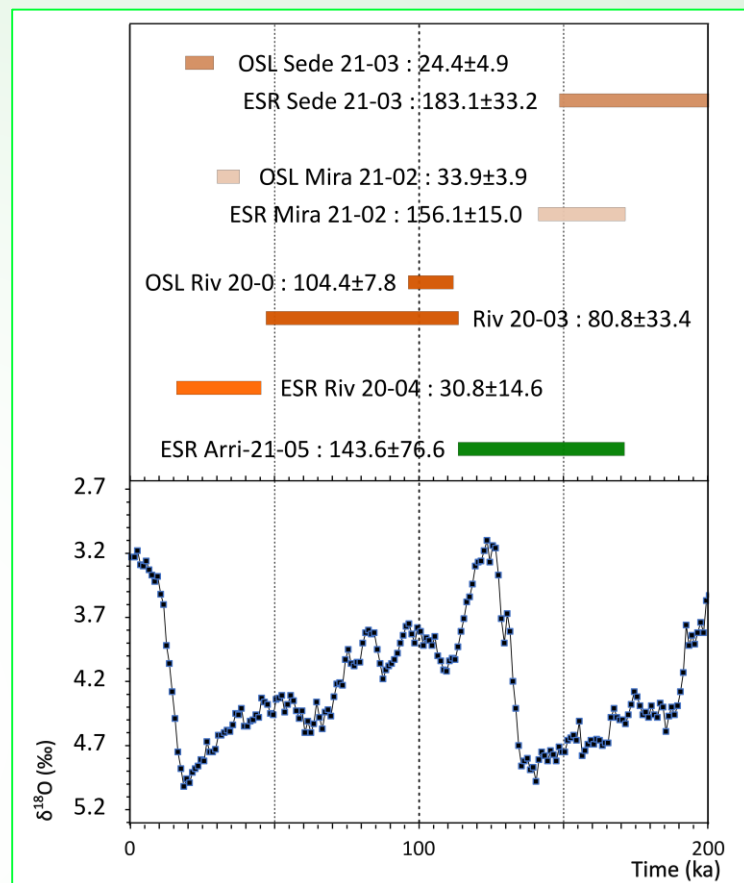
C1 5450-5040 yrs cal BP

C2 5320-4970 yrs cal BP

C3 4840-4520 yrs cal BP











C4 5460-5040 yrs cal BP

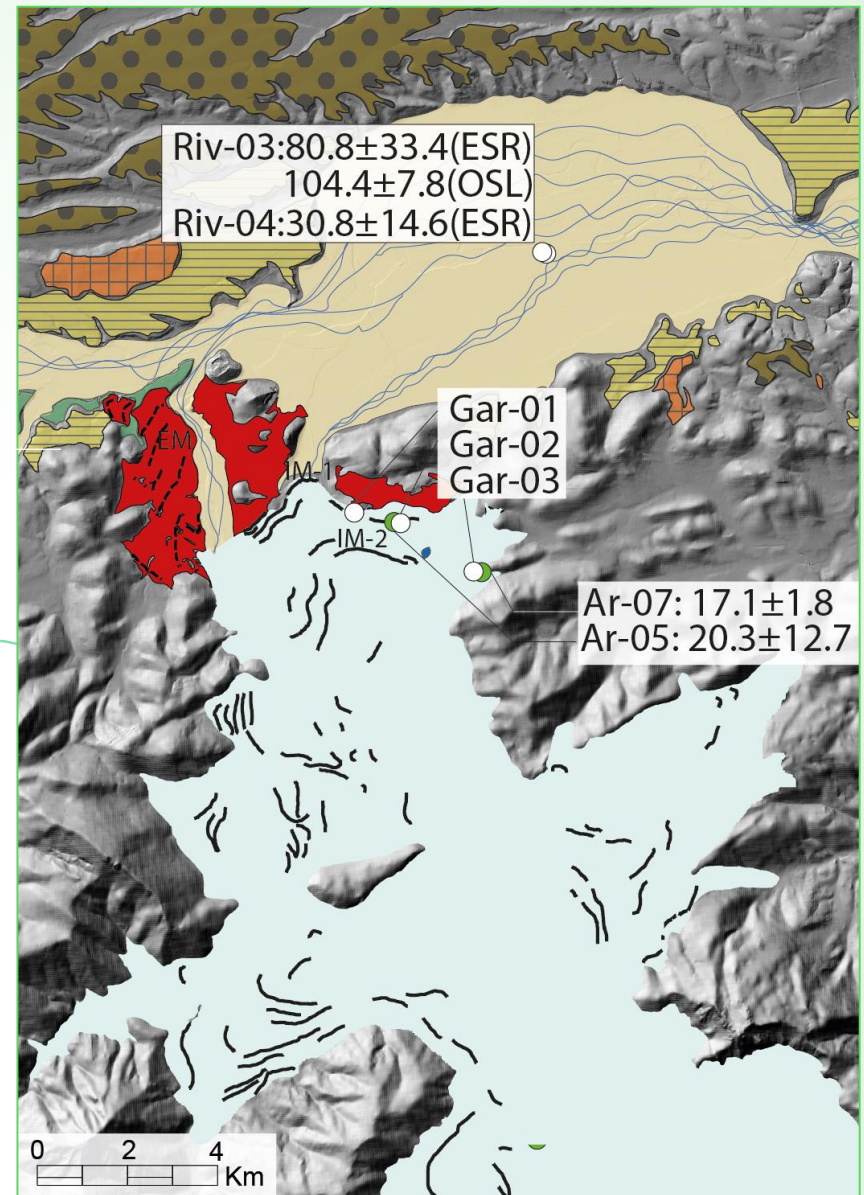
▪ OSL and ESR ages:



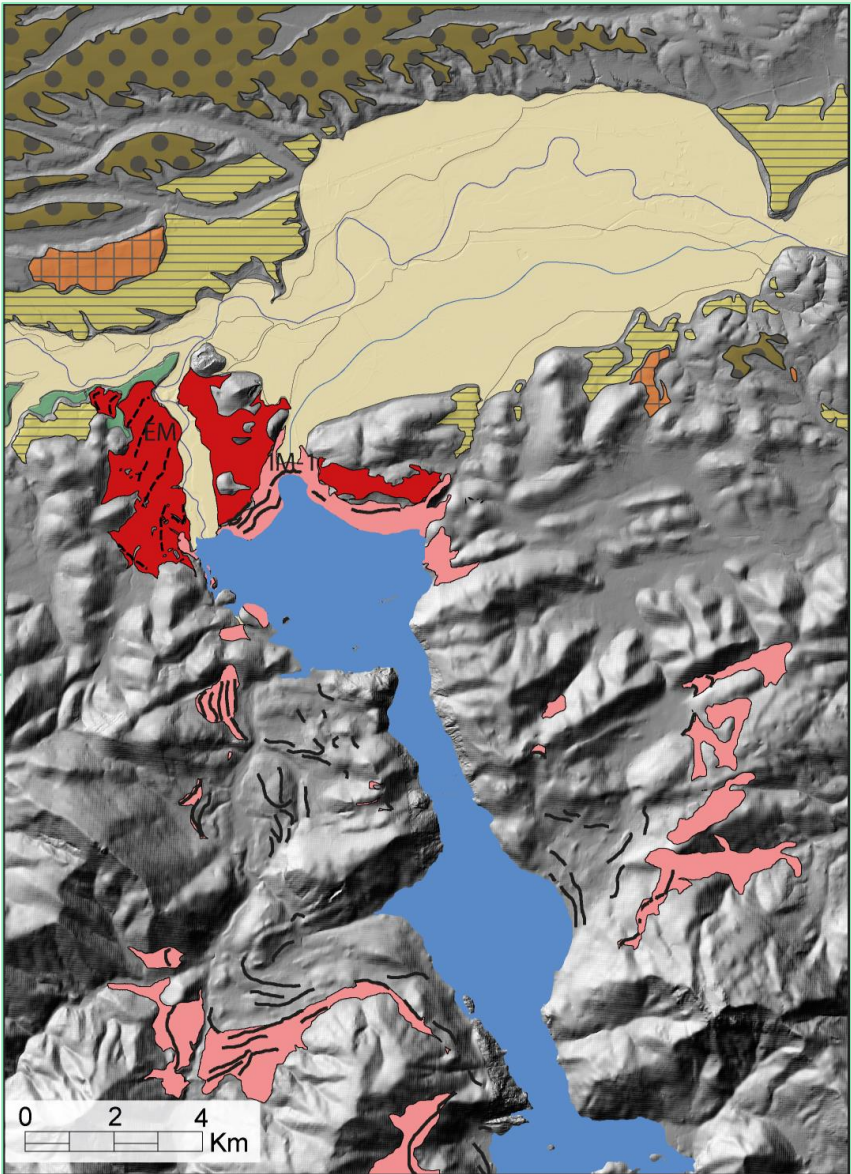
Name	Stratigraphy	ESR	OSL	Depth under terrace (m)
SEDE 21-03	T1 inf.	183.1 ± 33.2	24.4 ± 4.9	4 - 5
MIRA 21-02	T1 inf.	156.1 ± 15.0	33.9 ± 3.9	4 - 5
RIVIERE 20-03	T1	80.8 ± 33.4	104.4 ± 7.8	7 - 8
RIVIERE 20-04	T1	30.8 ± 14.6	—	6 - 7
ARRI 21-05	T2	143.6 ± 28.7	—	15
LABA 21-04	T3	598.0 ± 76.6	—	1.5









100-80 ka glacier reconstruction and T1 aggradation

-  PGC moraine and moraine ridges
-  LGC moraine and moraine ridges
-  LLGM glacier
-  T1 terrace
-  T2
-  T3
-  T4
-  T5
-  this study samples
-  ^{10}Be exposure ages (Fernandes et al., 2021)

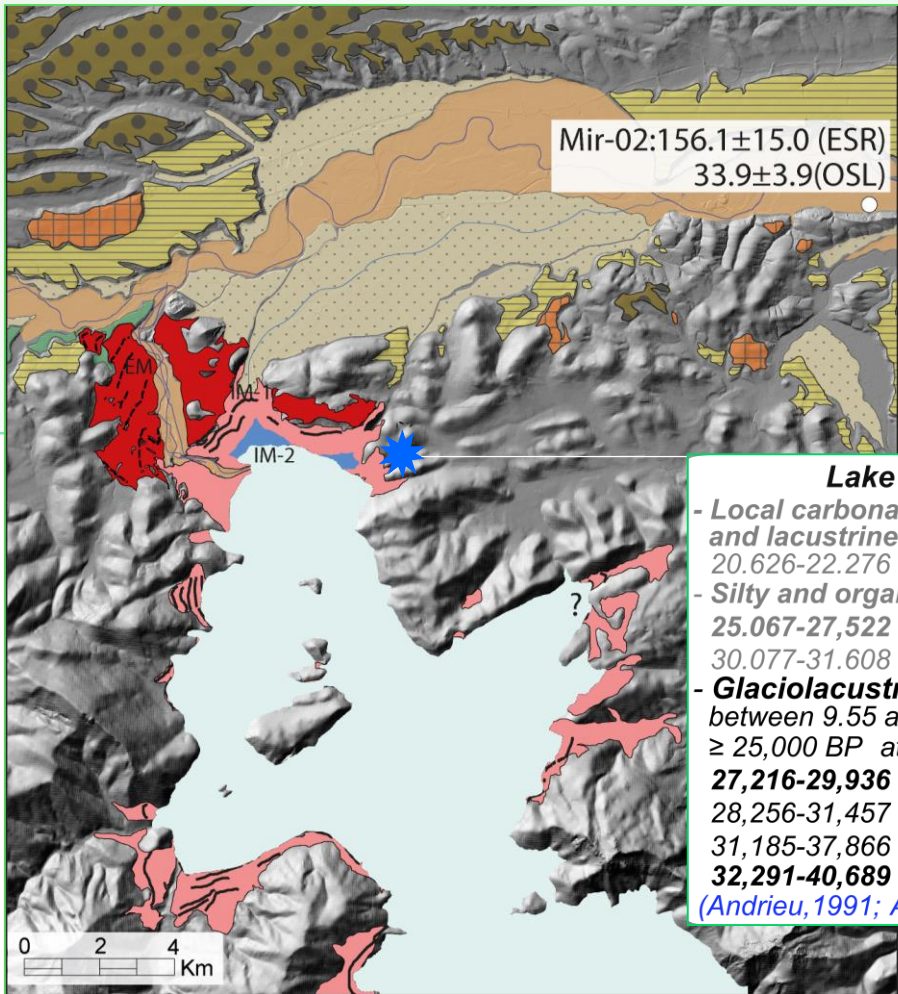


Paleolake post 100-80 ka reconstruction and T1 incision













-  PGC moraine and moraine ridges
-  LGC moraine and moraine ridges
-  T1
-  T2
-  T3
-  T4
-  T5
-  Garonne paleolake

40-30 ka glacier reconstruction and lower T1 aggradation



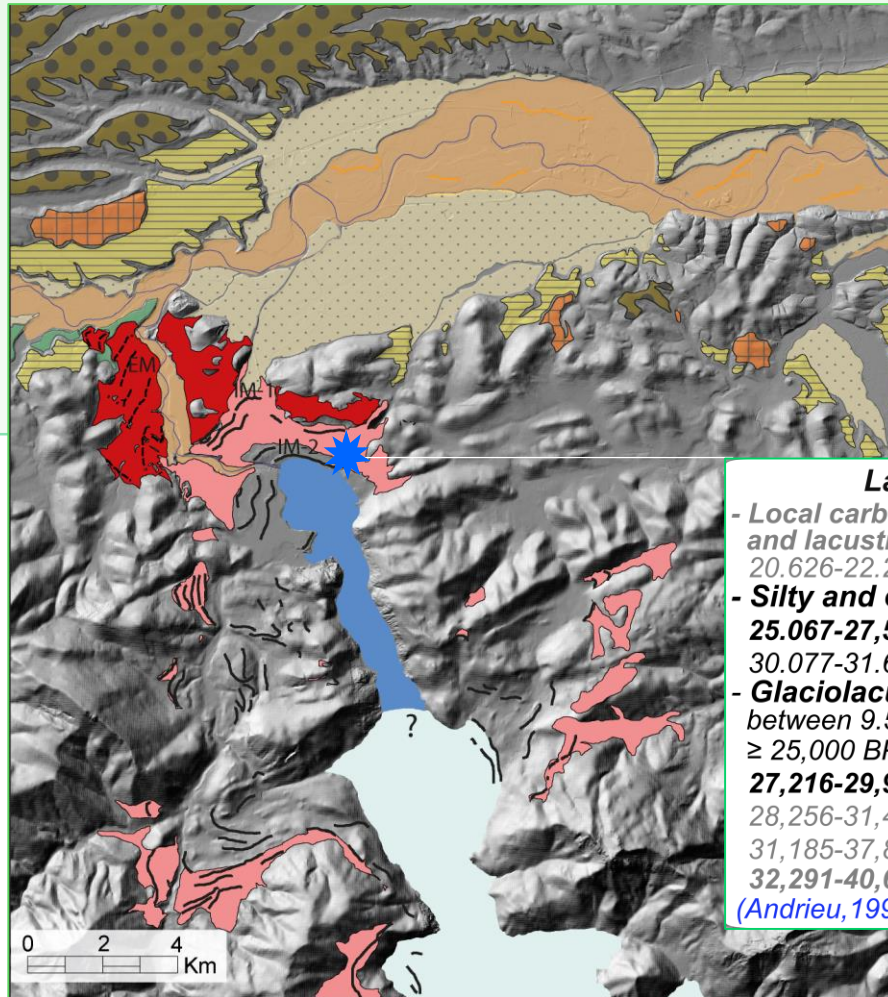
Mir-02: 156.1 ± 15.0 (ESR)
 33.9 ± 3.9 (OSL)











-  T1inf
-  T1
-  T2
-  T3
-  T4
-  T5
-  PGC moraine
-  LGC moraine
-  40-30 ka glacier
-  proglacial lake
- this study samples

Lake Barbazan (^{14}C yr cal BP)

- Local carbonate- and organic-rich palustrine and lacustrine marls between 2.11 and 9.12 m
 $20,626-22,276$ BP at 9.08–9.12 cm depth
- Silty and organic laminae between 9.55 and 9.12 m
 $25,067-27,522$ cal BP at 9.27–9.29 m
 $30,077-31,608$ cal BP at 9.51–9.55 m
- **Glaciolacustrine rhythmites and diamicton** between 9.55 and 23.1 m
 $\geq 25,000$ BP at 10.84–10.95 m depth
 $27,216-29,936$ cal BP at 12.27–12.31 m
 $28,256-31,457$ cal BP at 12.5–12.61 m
 $31,185-37,866$ cal BP at 19.44–19.54 m
 $32,291-40,689$ cal BP at 22.63–22.74 m
(Andrieu, 1991; Andrieu et al., 1988; Jalut et al., 1992)

Glacial and paleolake deconnexion and lower T1 incision

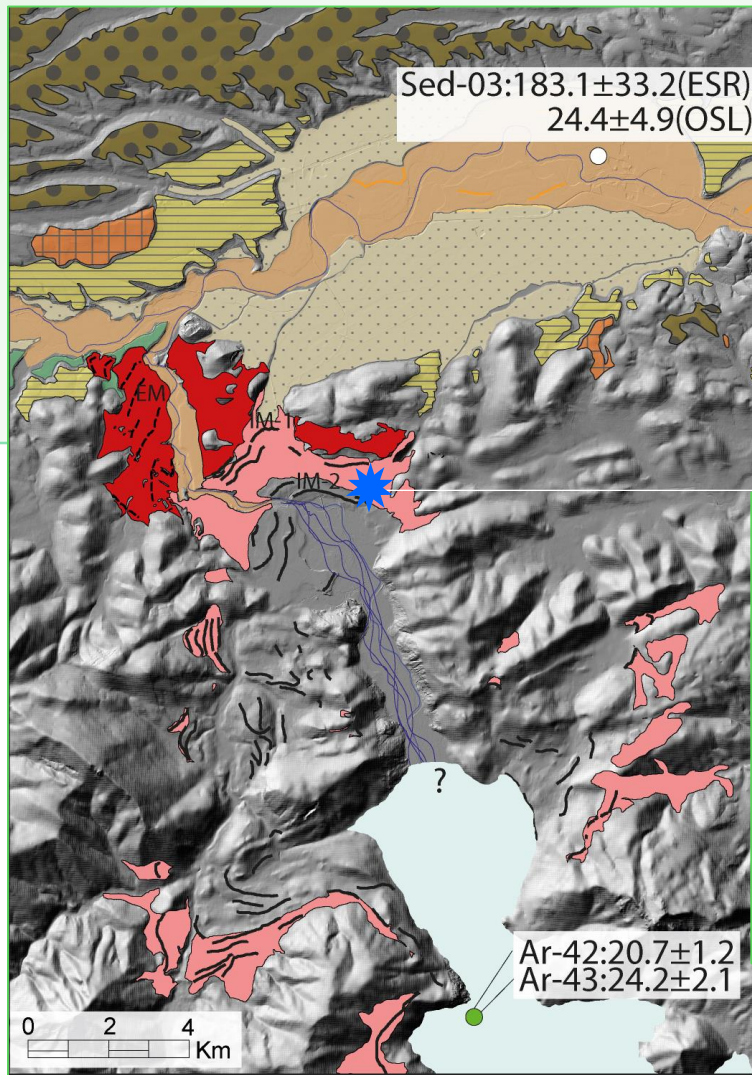











-  T1inf
-  T1
-  T2
-  T3
-  T4
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-  PGC moraine
-  LGC moraine
-  GLGM glacier
-  proglacial lake

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GLGM glacier reconstruction and lower T1 aggradation



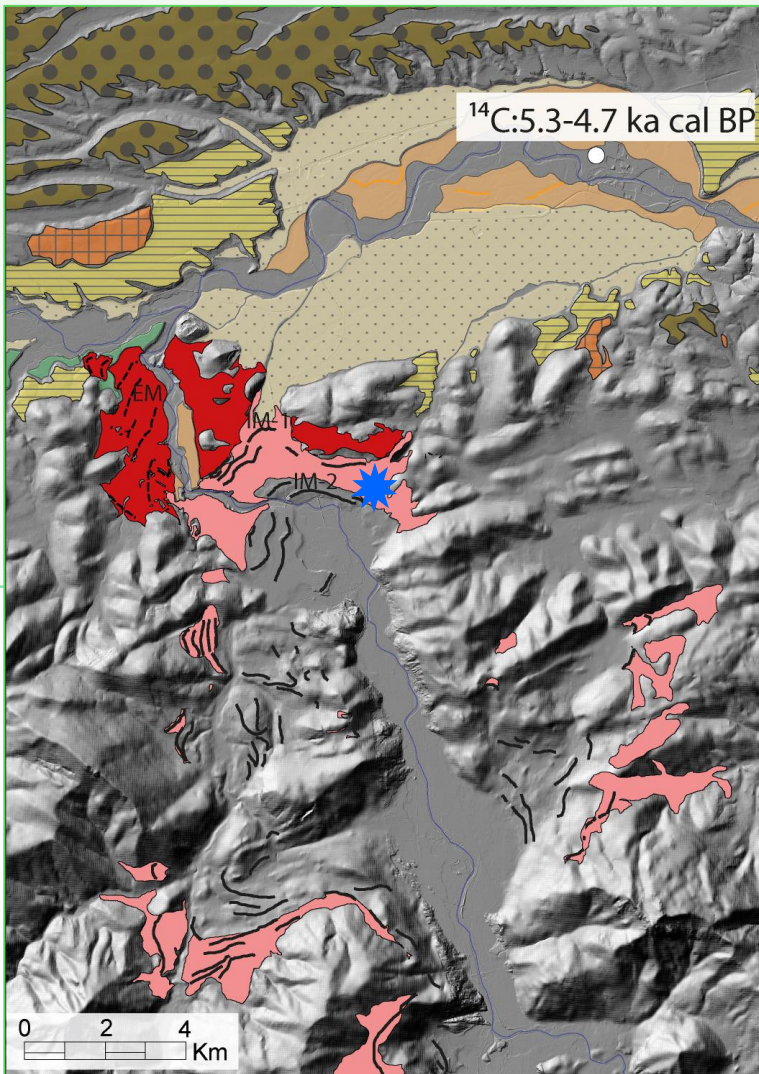
-  T1inf
-  T1
-  T2
-  T3
-  T4
-  T5
-  PGC moraine
-  LGC moraine
-  GLGM glacier









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LGIT reconstruction



-  T1inf
-  T1
-  T2
-  T3
-  T4
-  T5
-  PGC moraine
-  LGC moraine
- this study samples

CONCLUSION

- On the upstream part of the Garonne:
 - External moraine complex and aggradation of T2 at MIS 6
 - Local LGM and T1 aggradation at the beginning of the Upper Pleistocene
 - Glacial regression and lower T1-T1 incision
 - Glacial advance and lower T1 aggradation at MIS 3
- Expected complementary ages (OSL) on T1, T2 and T3 and ^{10}Be on erratic boulders.



View of the Serre morainic complex, Hte Garonne