Po river deep aquifers in Eastern Emilia-Romagna alluvial plain : geological and hydrogeological characterization

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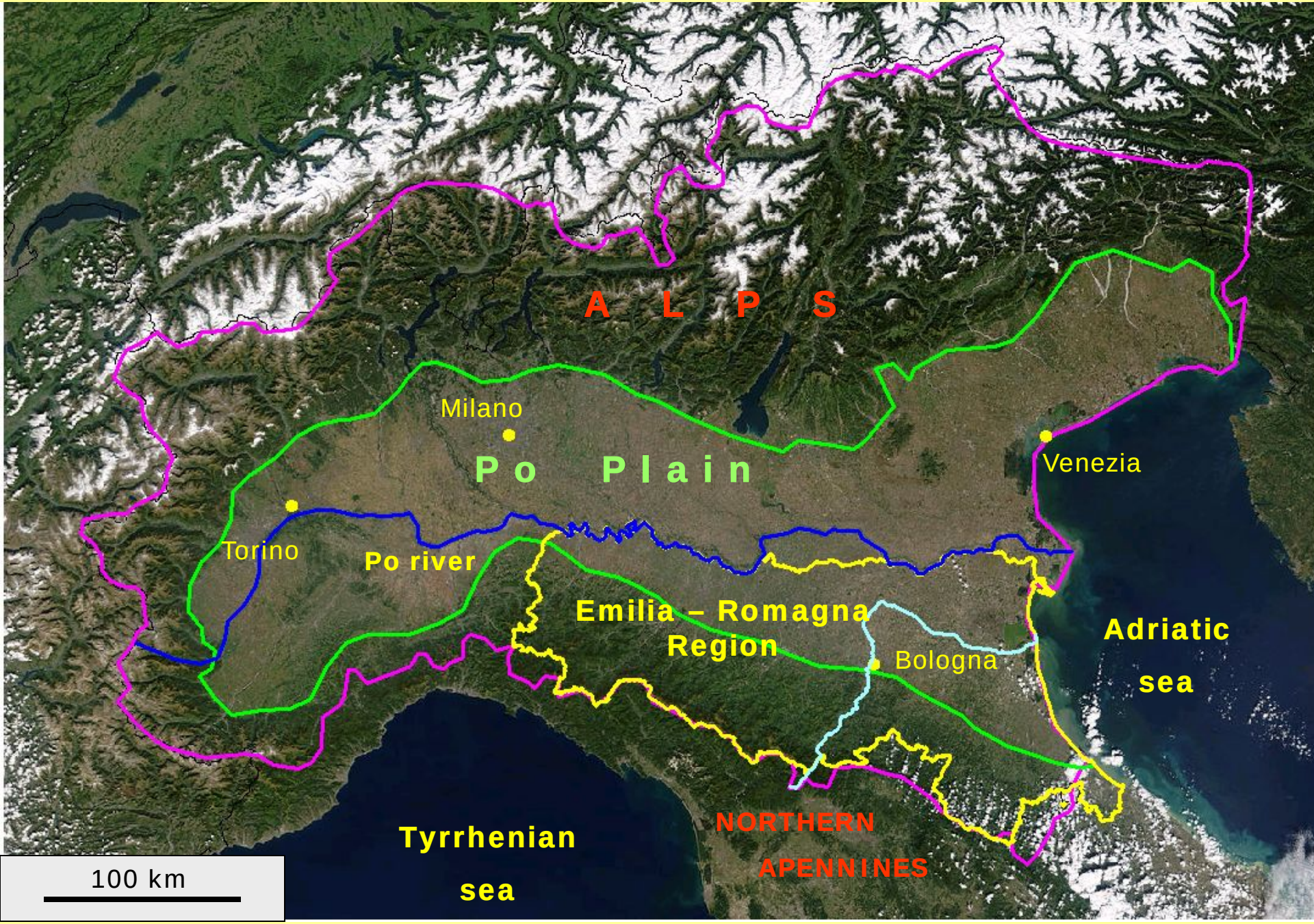
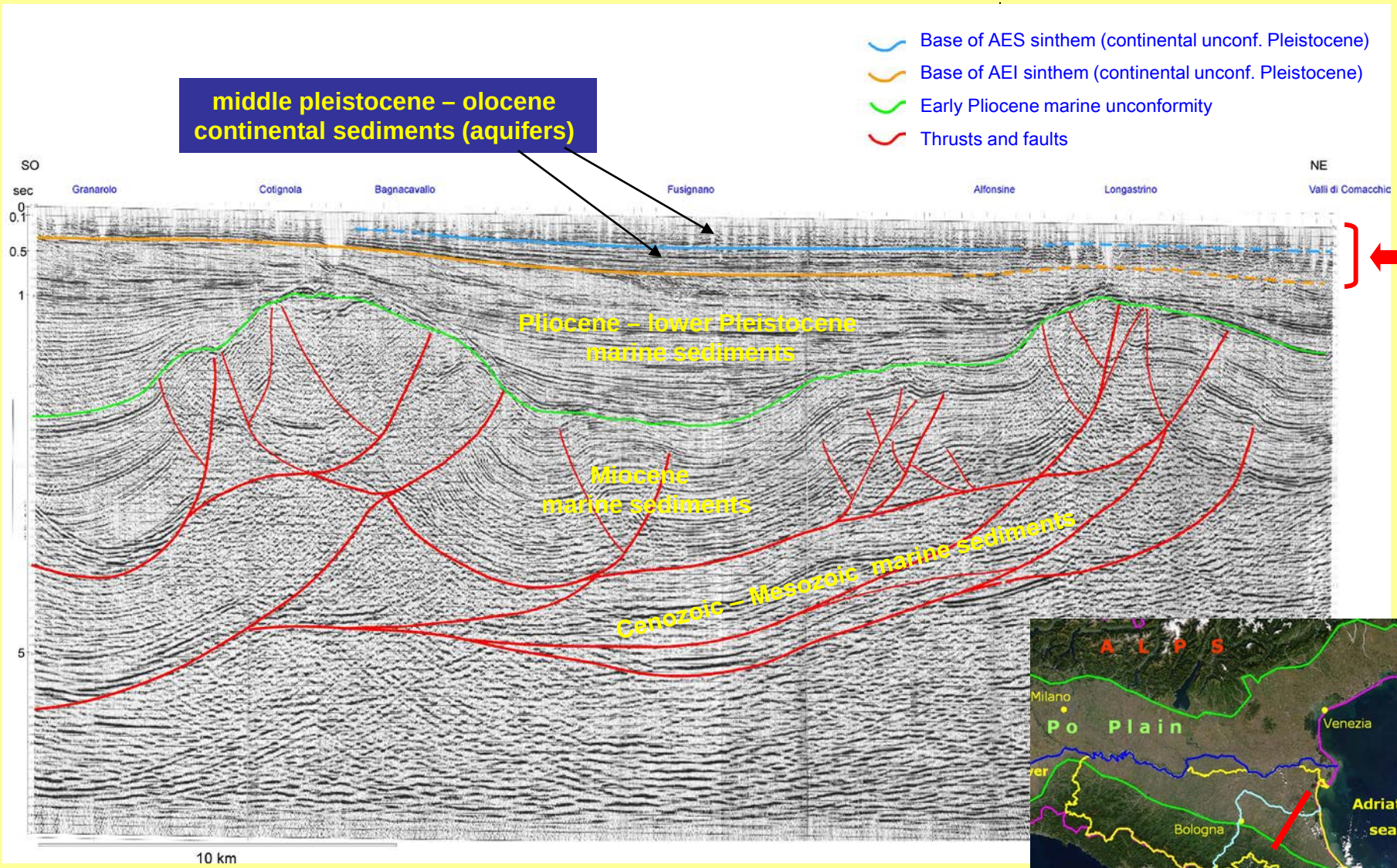
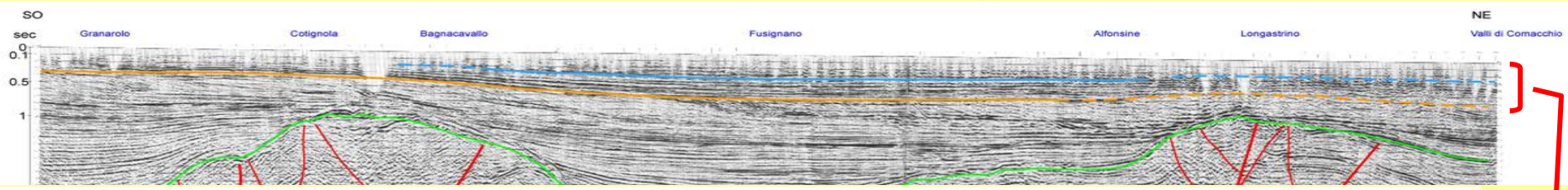

A L P S
Milano
P o P l a i n
Venezia
Torino
Po river
Emilia – Romagna
Region
Bologna
Adriatic
sea
Tyrrhenian
sea
NORTHERN
APENNINES
100 km

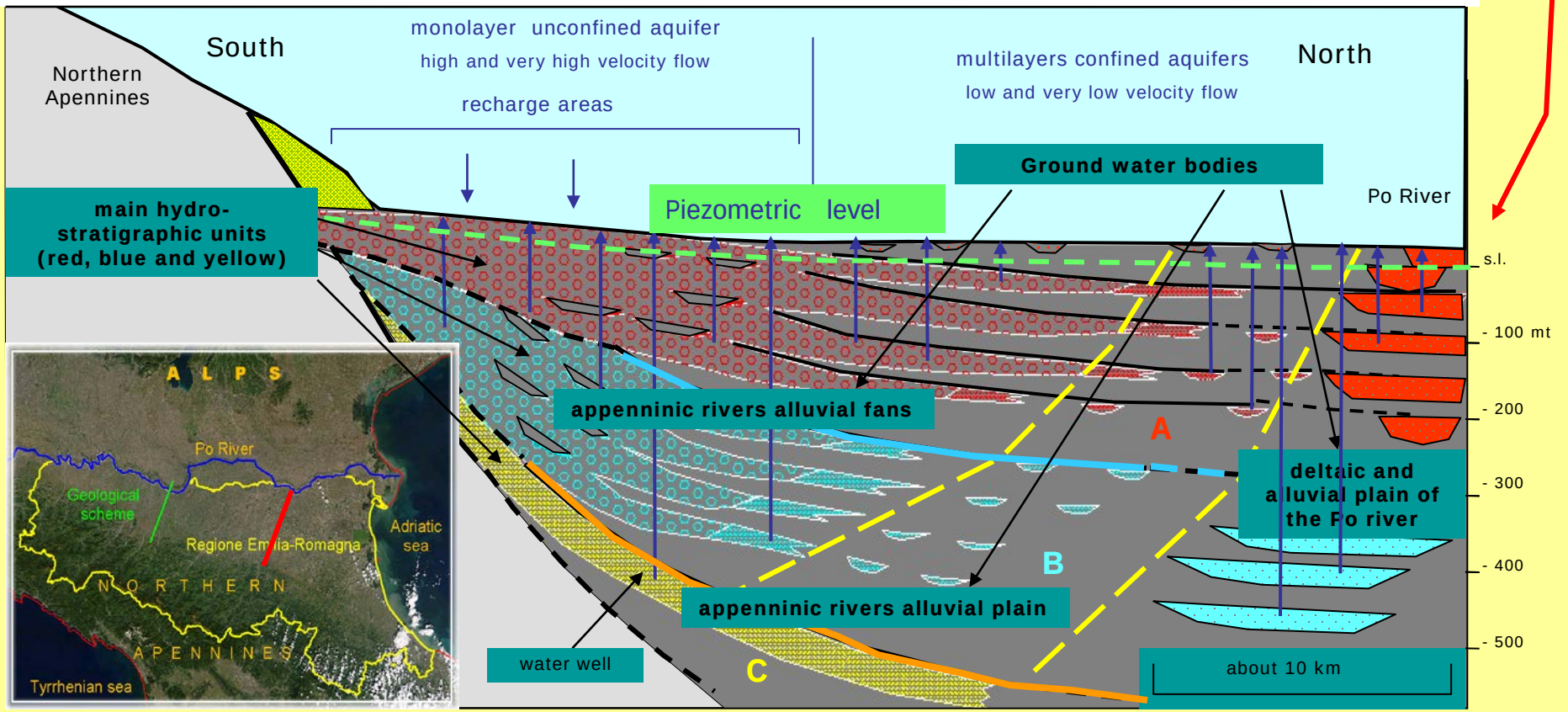
STRUCTURAL – STRATIGRAPHIC FRAMEWORK AT BASIN SCALE:
the seismic analysis *(ENI-AGIP data set)*



RegioneEmiliaRomagna



Schematic cross section and simplified **conceptual model of the Emilia-Romagna alluvial plain aquifer**

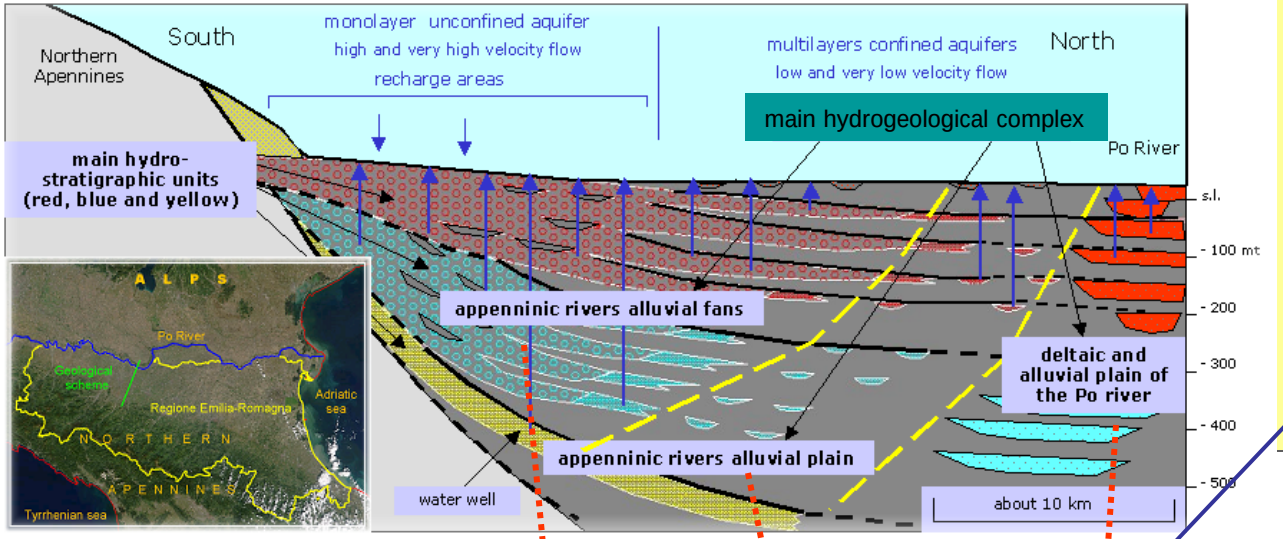


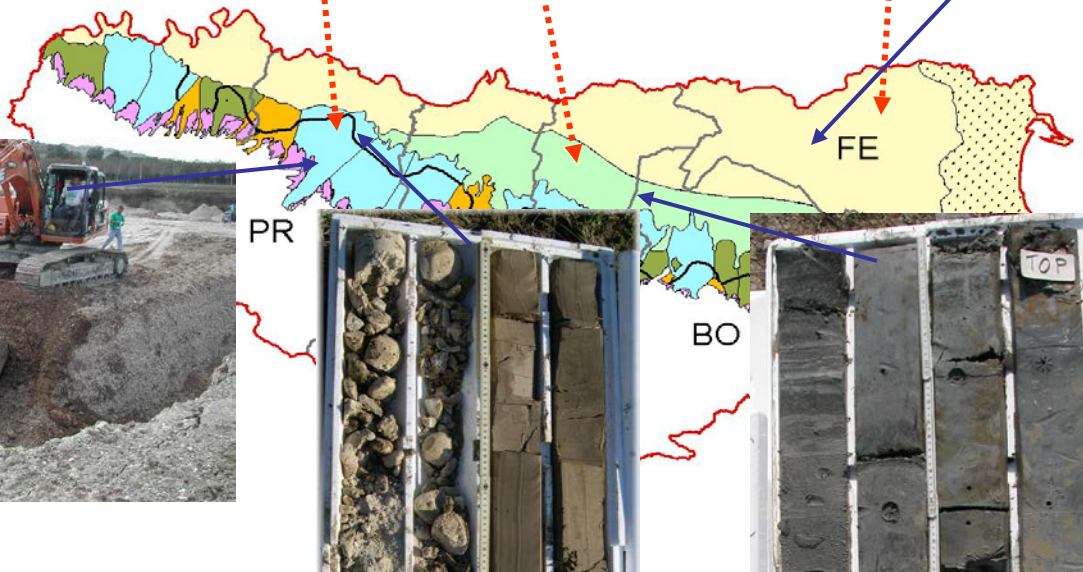
Age of the **hydro-stratigraphic units:**

A 0 – 400.000 years (middle Pleistocene)

B 400.000 – 650.000 years (middle Pleistocene)

C 650.000 – 3.900.000 years **(middle Pleistocene** – lower Pliocene**)**





Appenninic rivers alluvial

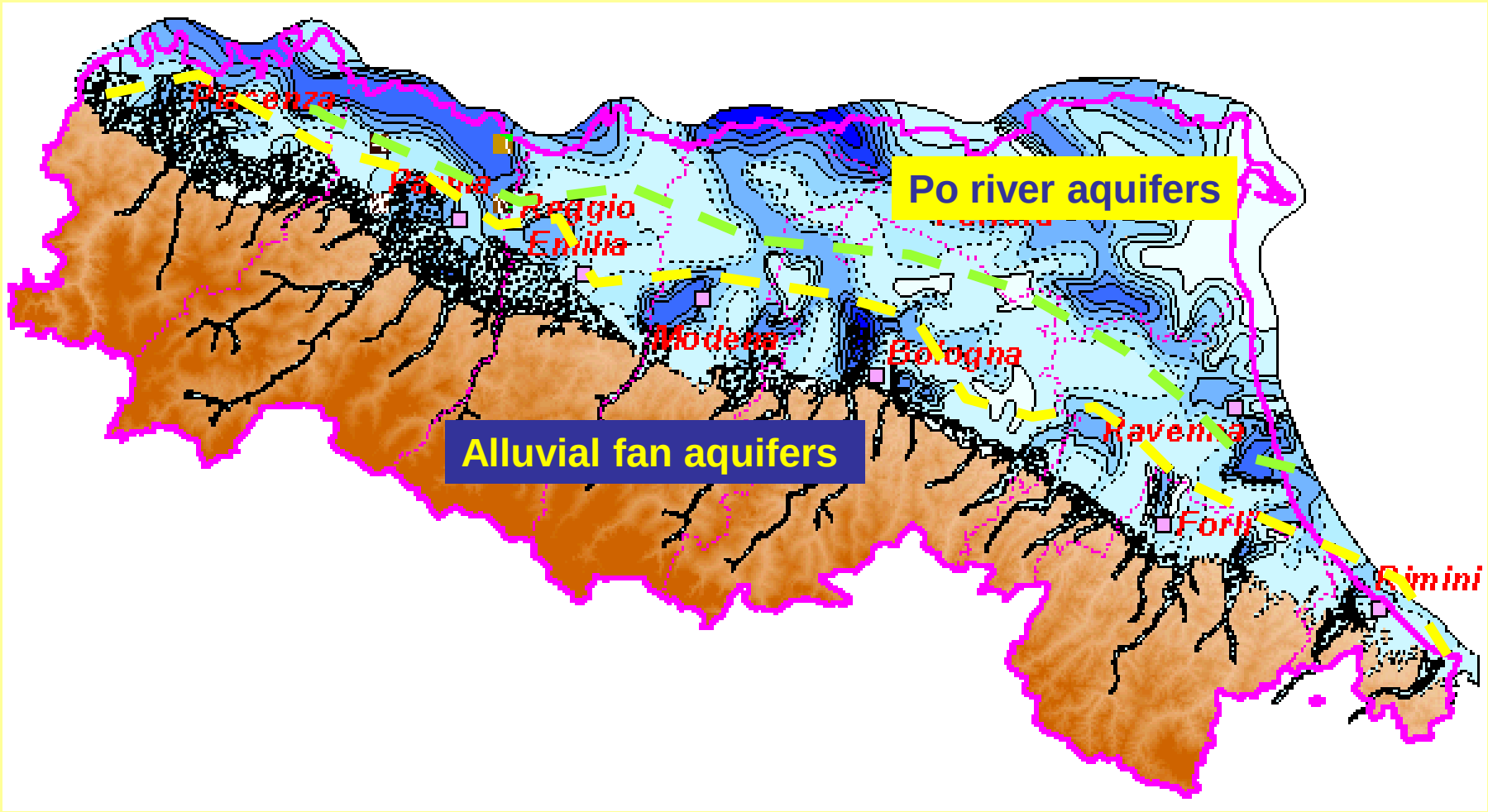
main
intermediate
minor

Costal plain

Definition of groundwater … onal … ement Plan of the Regione Emilia-Romagna

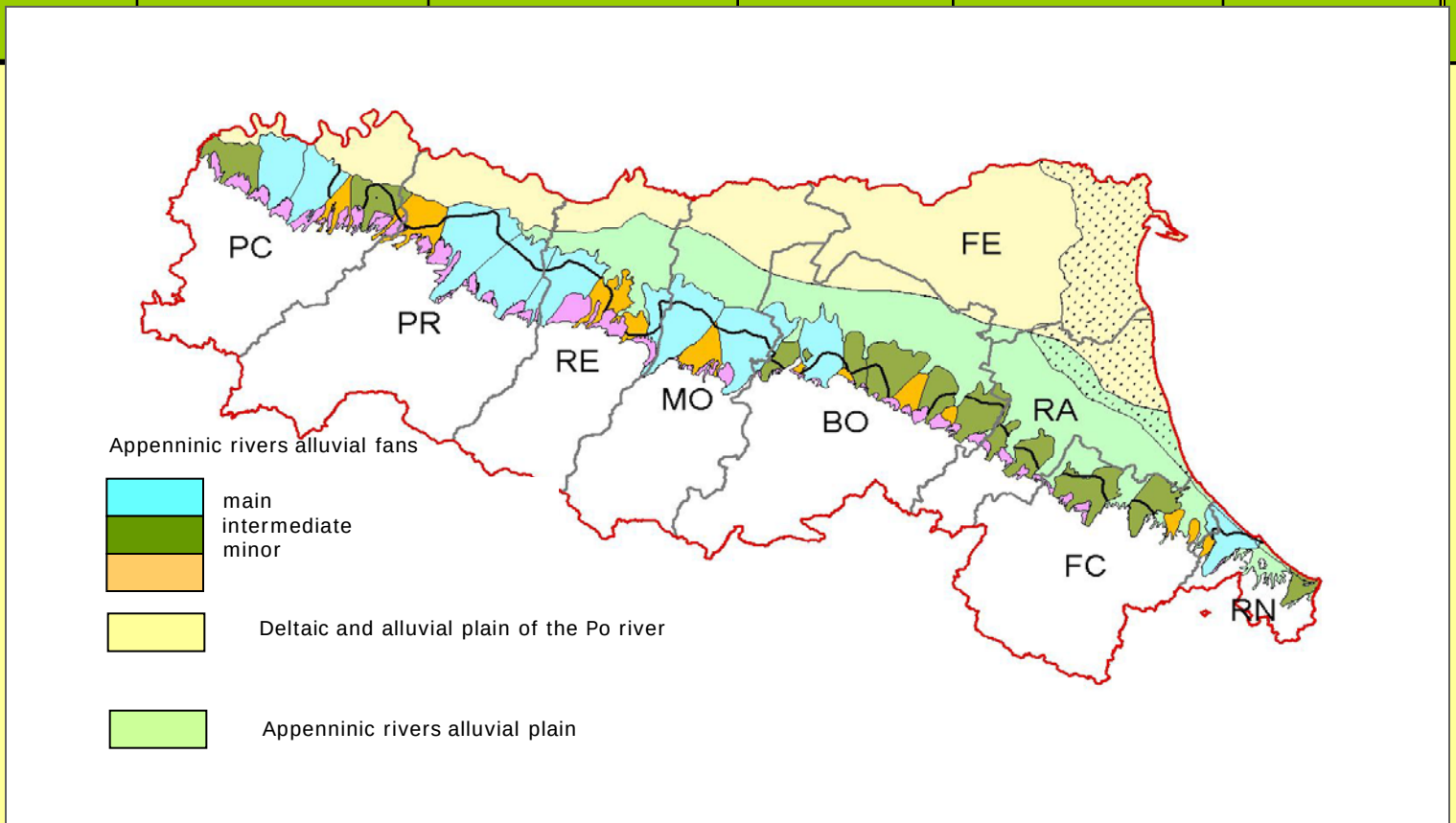
dark bleu -> greater thickness of coarse sediments :

distribution of main aquifers in Emilia-Romagna alluvial plain

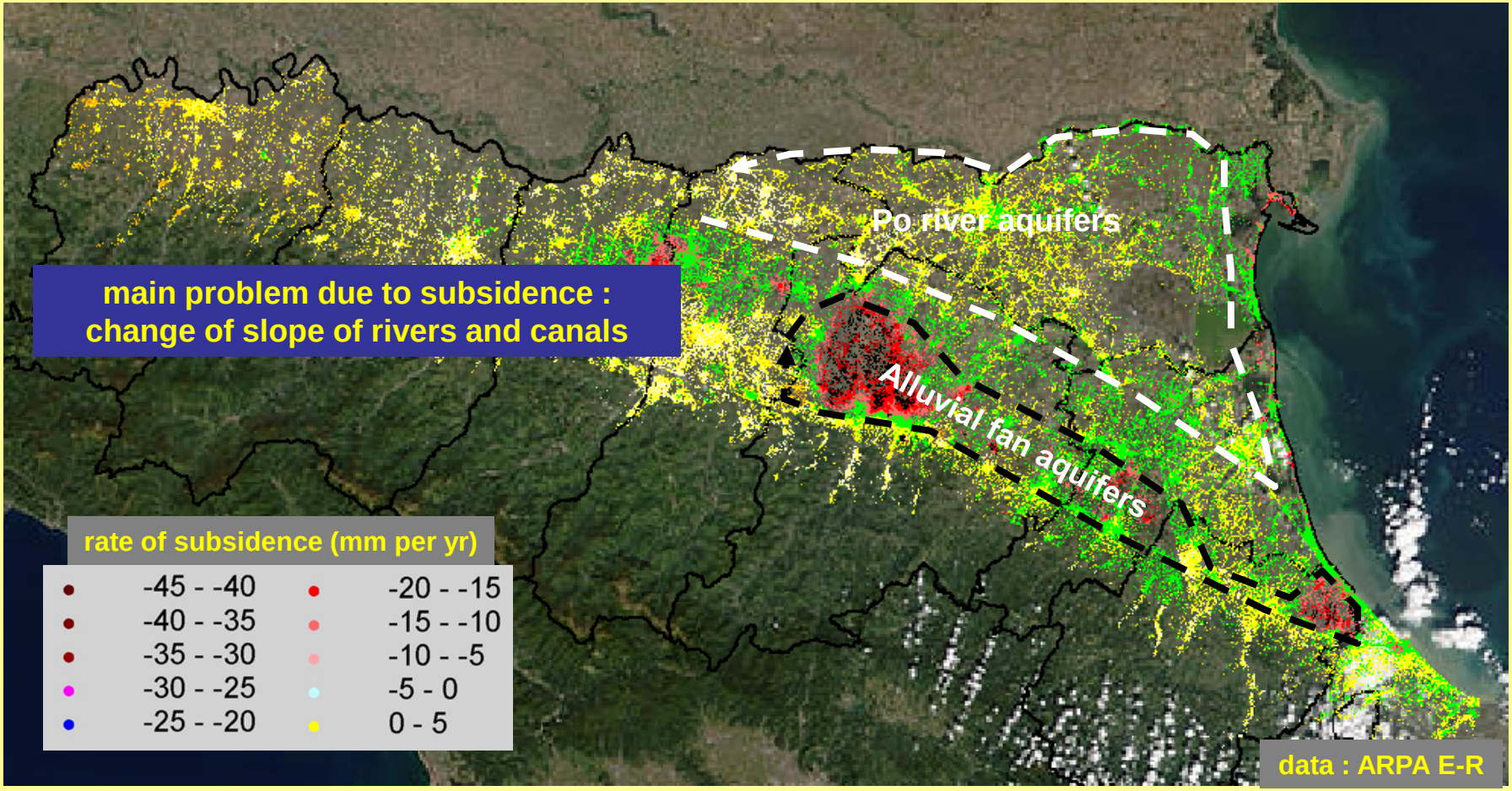


Total amount of groundwater withdrawal in Emilia-Romagna plain

Annual withdrawal from water wells (million of m^3)						
	Industrial use	Zootechnical	drinking water	Agricultural	TOTAL	%
Plain RER	**163.5**	**14.3**	**282.4**	**205.6**	**665.8**	**100**
Alluvial fan aquifers	96.2	6.8	238.7	136.2	477.9	**71.8**
Po river aquifers	67.3	7.5	43.7	69.4	187.9	**28.2**

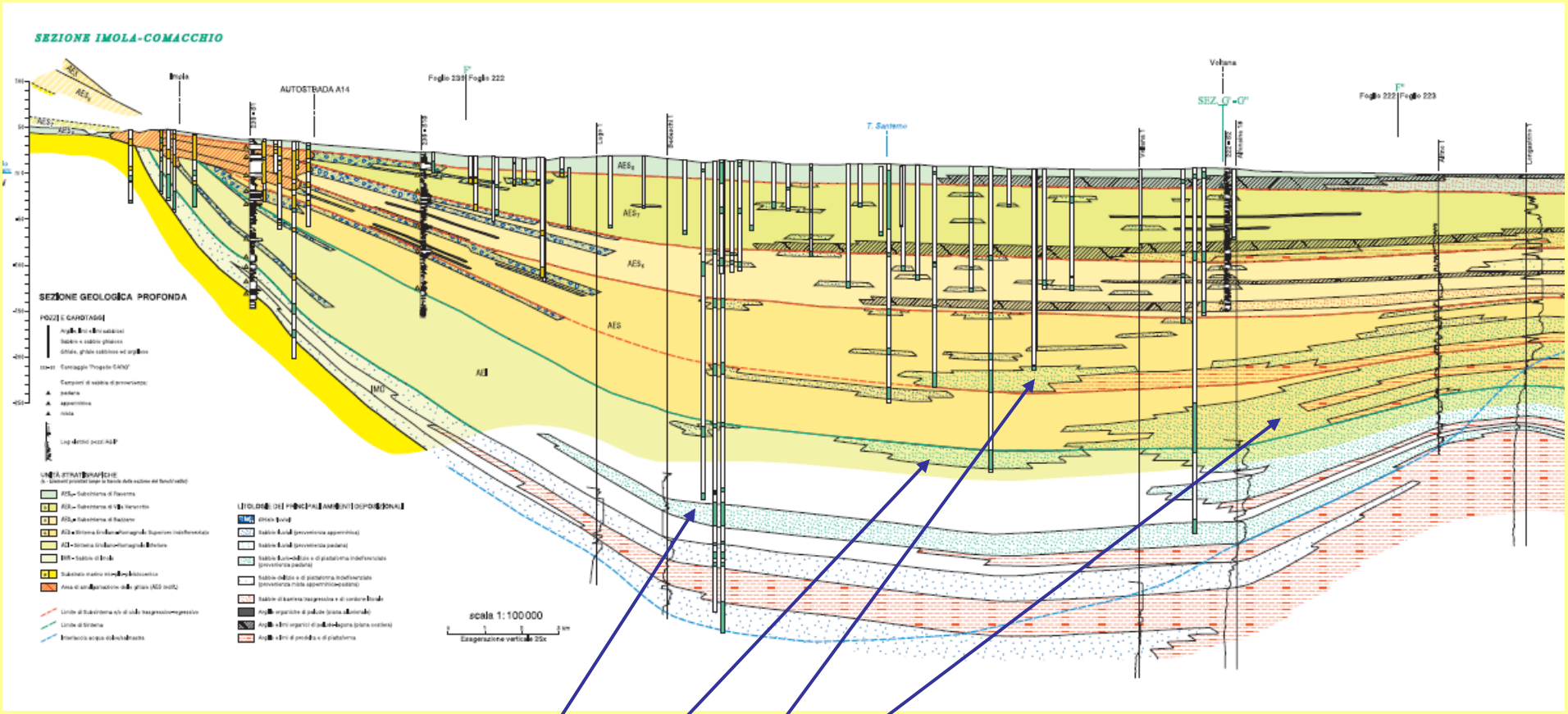


Rate of subsidence in Emilia-Romagna alluvial plain (average value in 2002 - 2006) : Areas most affected by subsidence are located in the alluvial fan areas Where groundwater withdrawal is highest



We have to decrease groundwater withdrawal in alluvial fans areas

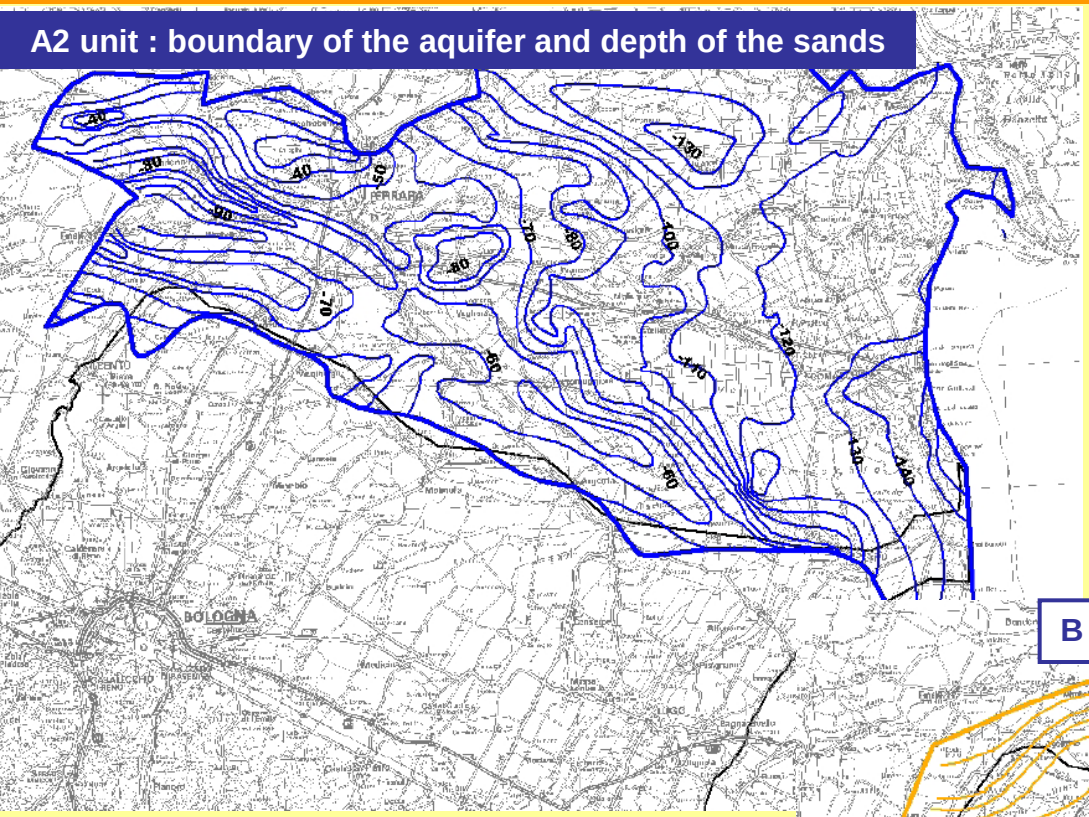
For better management of groundwater resources we must have a good knowledge of the distribution of aquifers in the subsurface of the Emilia – Romagna plain.
So it is very important to have a detailed mapping of the Po river aquifers and alluvial fan aquifers.



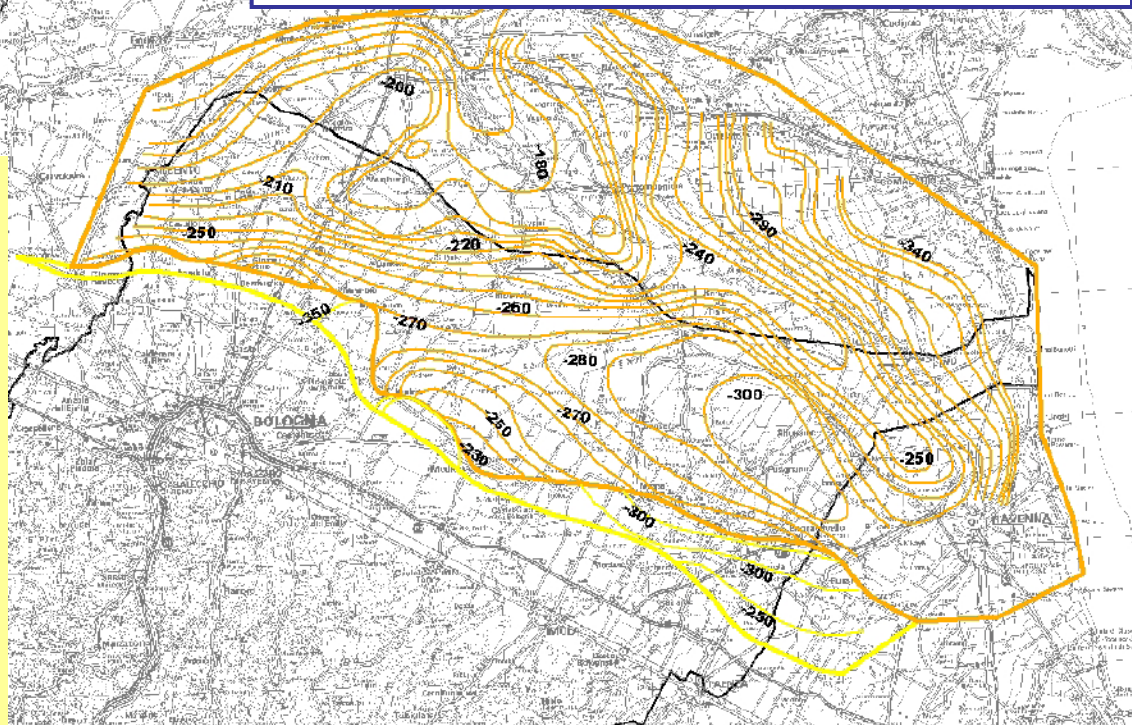
Po River aquifers : thick sandy bodies (10 to 40 meters) and very continuous laterally for many kilometers

Studying a lot of geological cross sections we was able to map every single layer of Po river aquifers

A2 unit : boundary of the aquifer and depth of the sands



B unit : boundary of the aquifer and depth of the sands



Moraine deposits with local aquifer

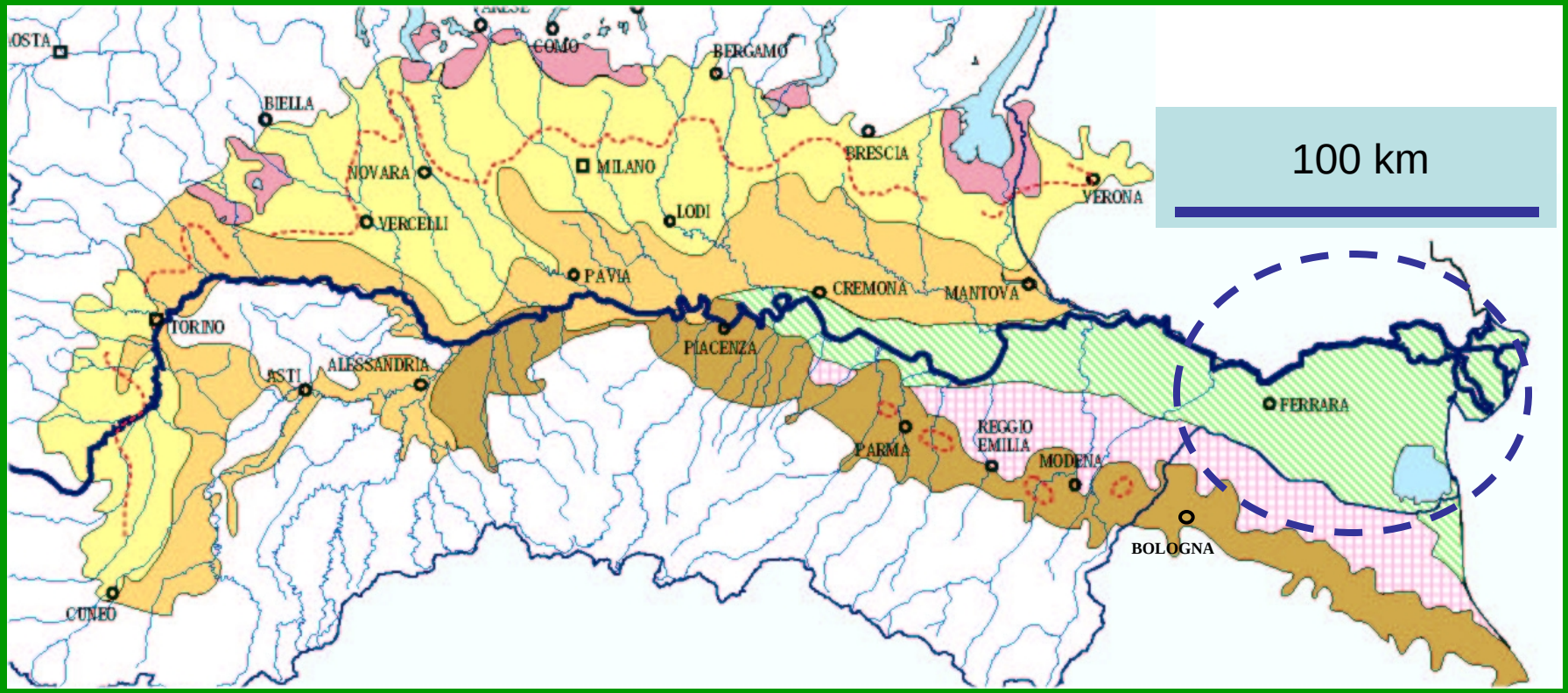
Recharge areas of Po river aquifer Fluvial - glacial and fluvial deposits with unconfined aquifer and very high permeability

Fluvial - glacial and fluvial deposits with unconfined or confined aquifer

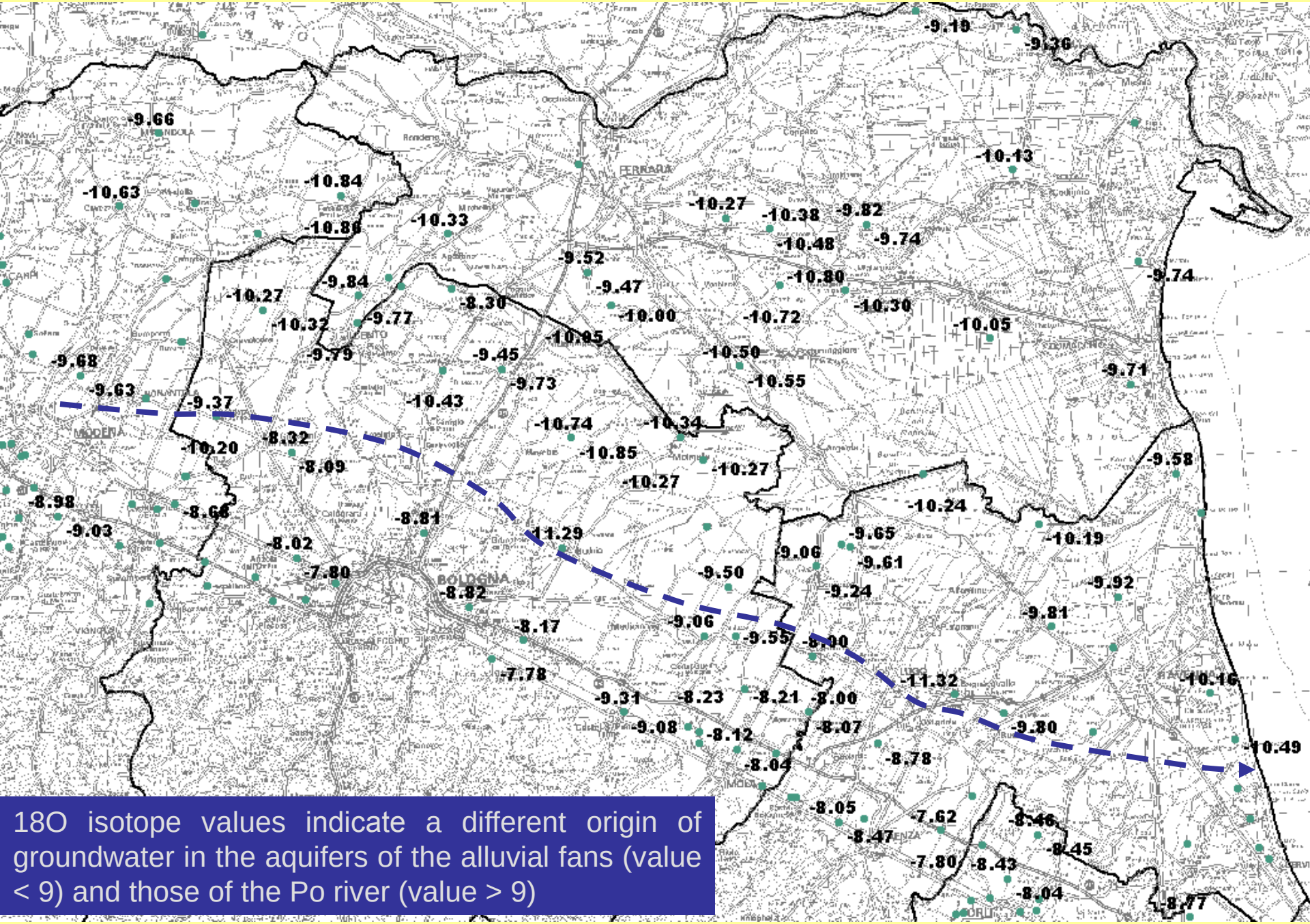
Po river aquifers

Alluvial fan aquifers

Fluvial deposits with confined aquifer and very low permeability

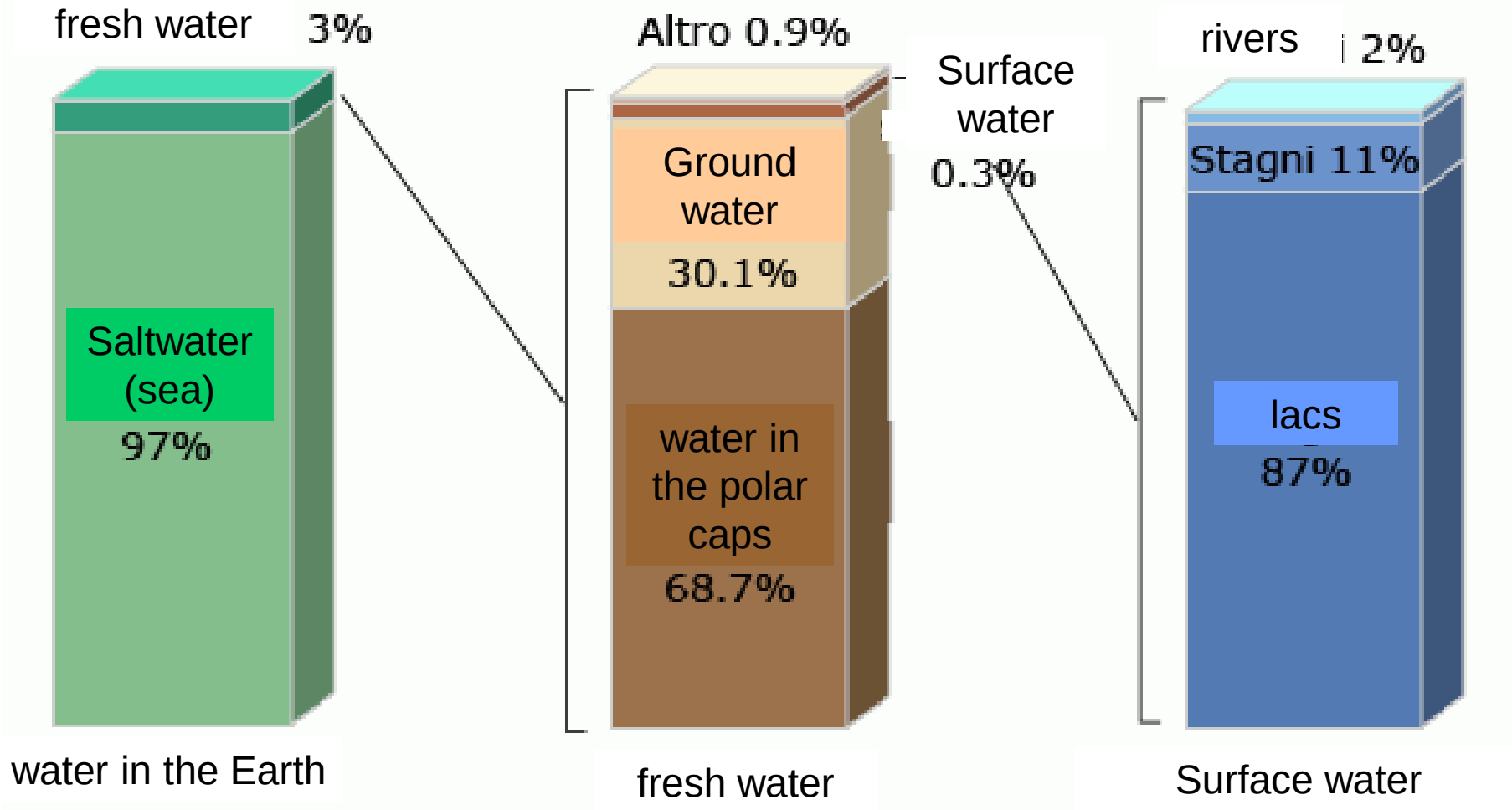


then groundwater in the Po aquifers are much older than the groundwaters in alluvial fans and have a different provenience (from the Alps region)



18O isotope values indicate a different origin of groundwater in the aquifers of the alluvial fans (value < 9) and those of the Po river (value > 9)

Global distribution of water



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Thank you for the attention !!!