

4D electrical resistivity monitoring of cyclic aquifer thermal energy storage

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1 Representative illustrations

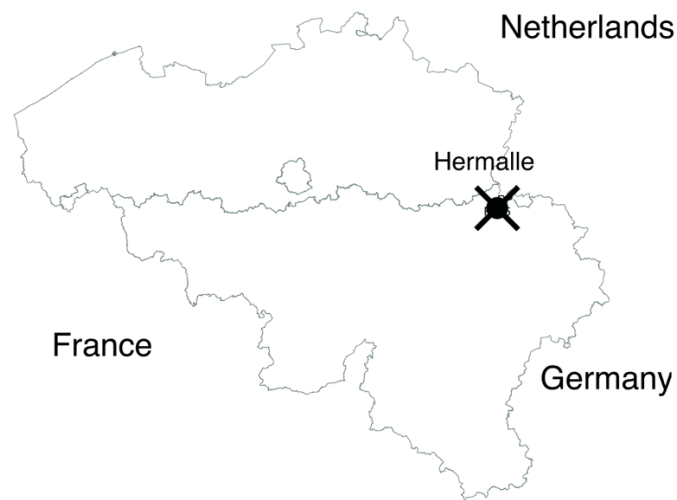


Figure 1. Hermalle-sous-Argenteau location in Belgium.



Figure 2. Time bar of the aquifer thermal energy storage cyclic experiment.

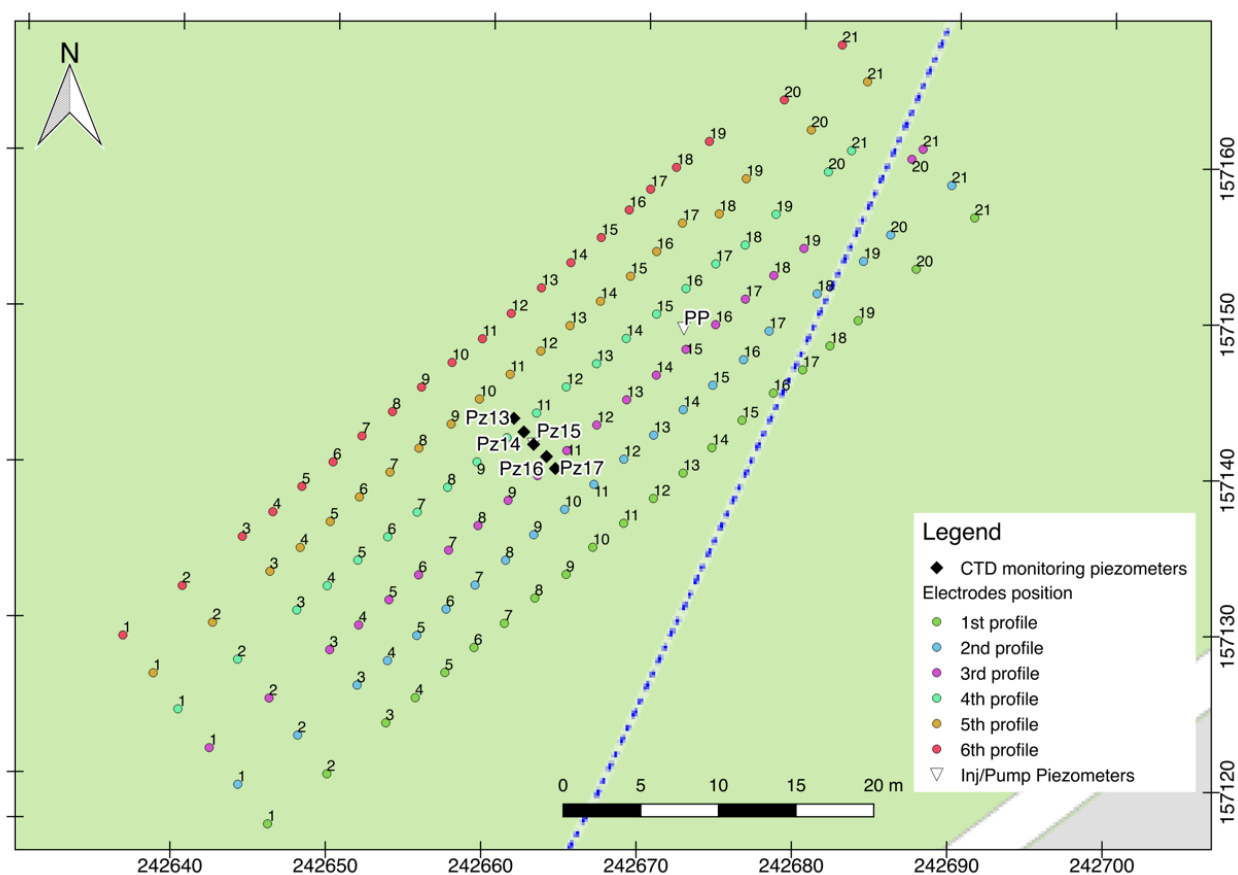


Figure 3. Hermalle site with monitoring piezometers, wells and ERT grid (with Belgian Lambert cartographic coordinates).

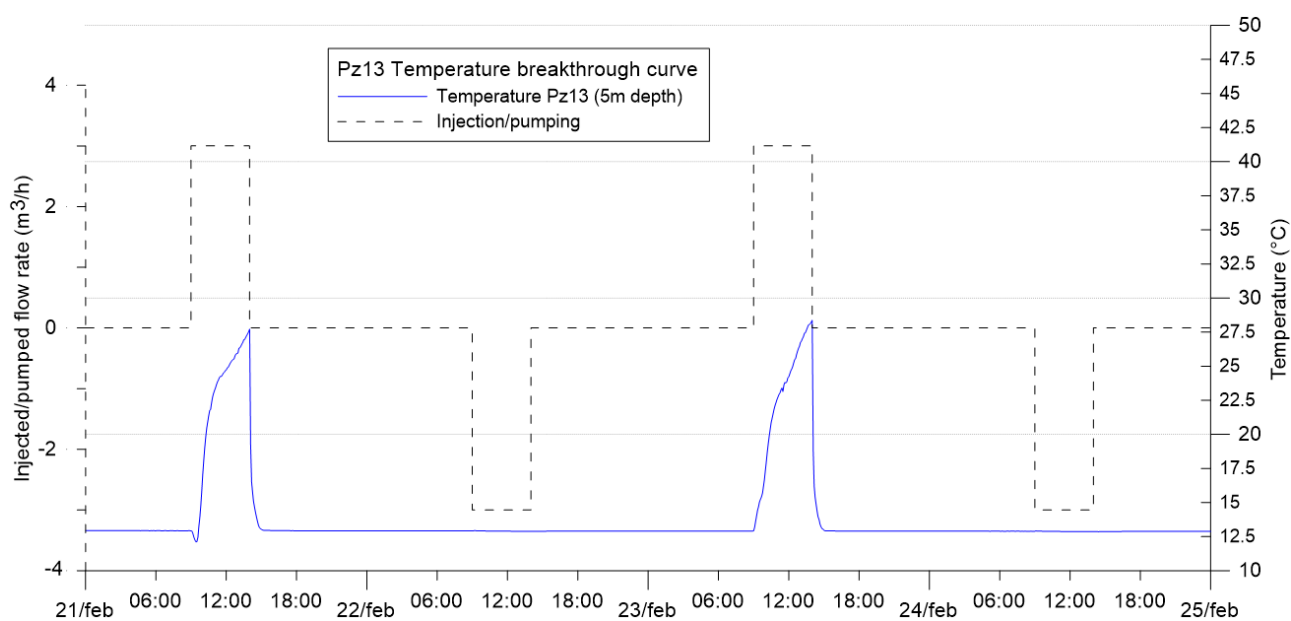


Figure 4. Temperature breakthrough curve of "Pz13" probe.

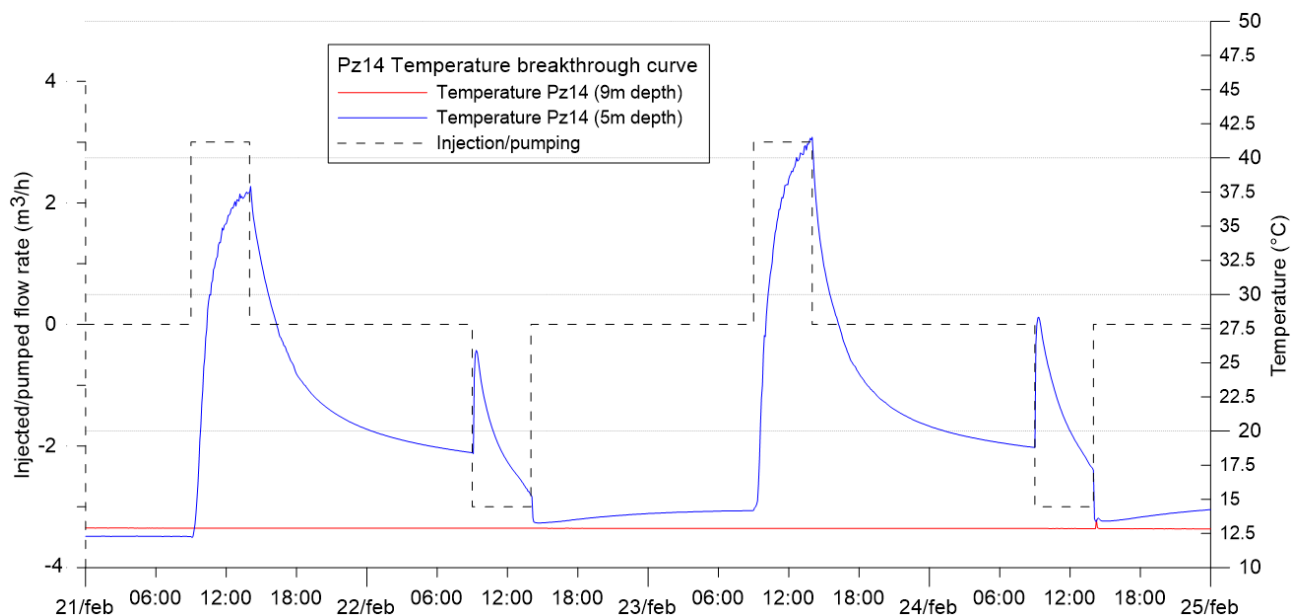


Figure 5. Temperature breakthrough curve of "Pz14" probes.

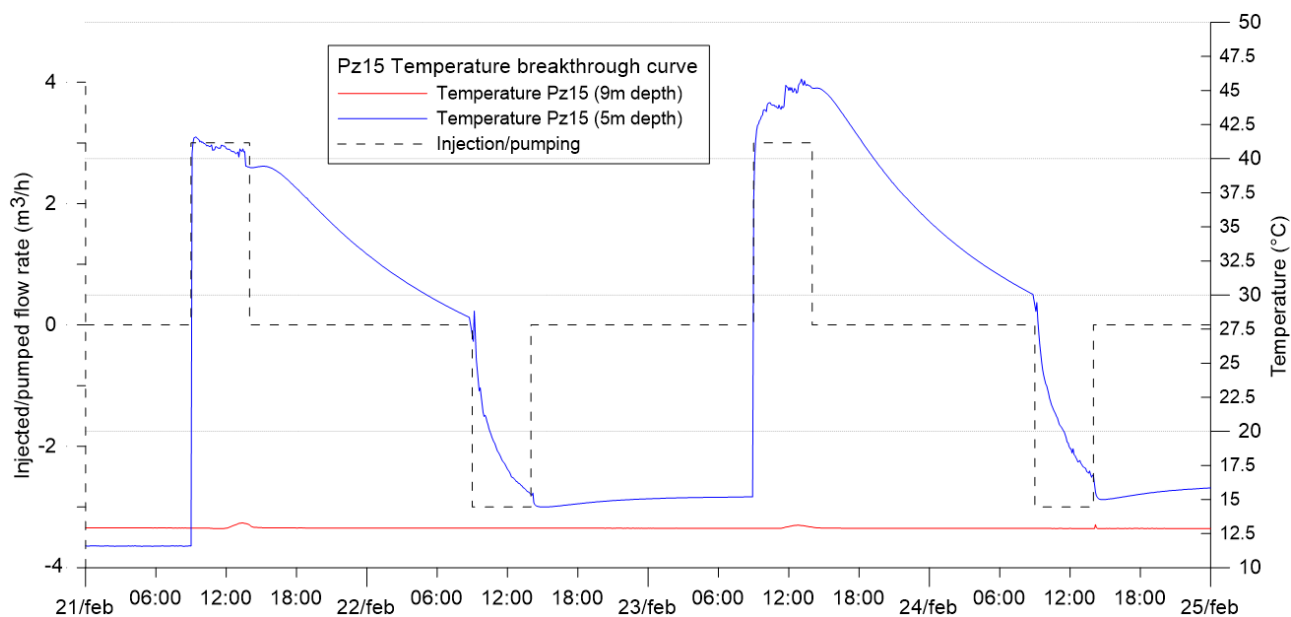


Figure 6. Temperature breakthrough curve of "Pz15" probes.

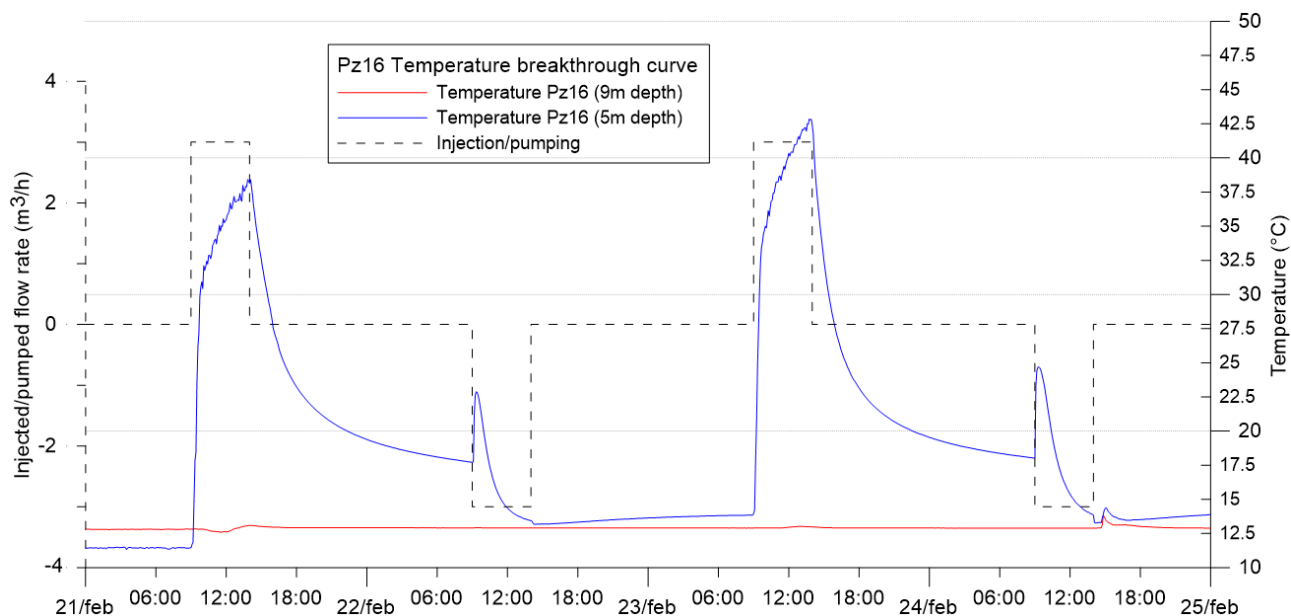


Figure 7. Temperature breakthrough curve of "Pz16" probes.

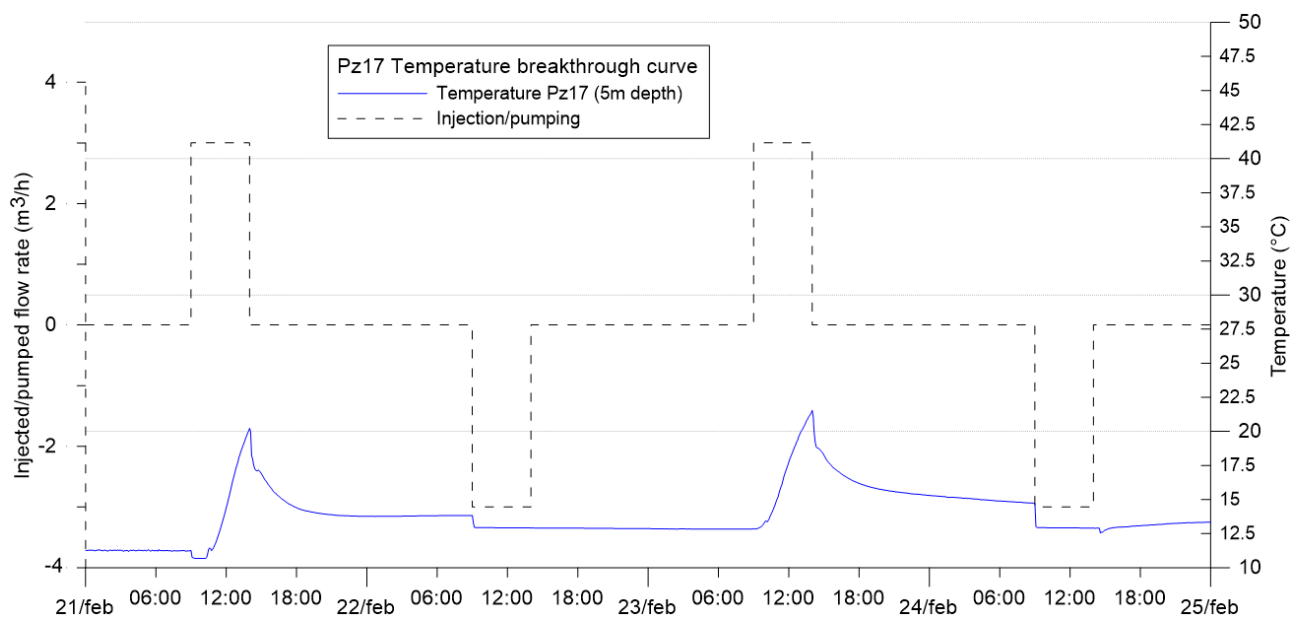


Figure 8. Temperature breakthrough curve of "Pz17" probe.

Background models (time step 5)

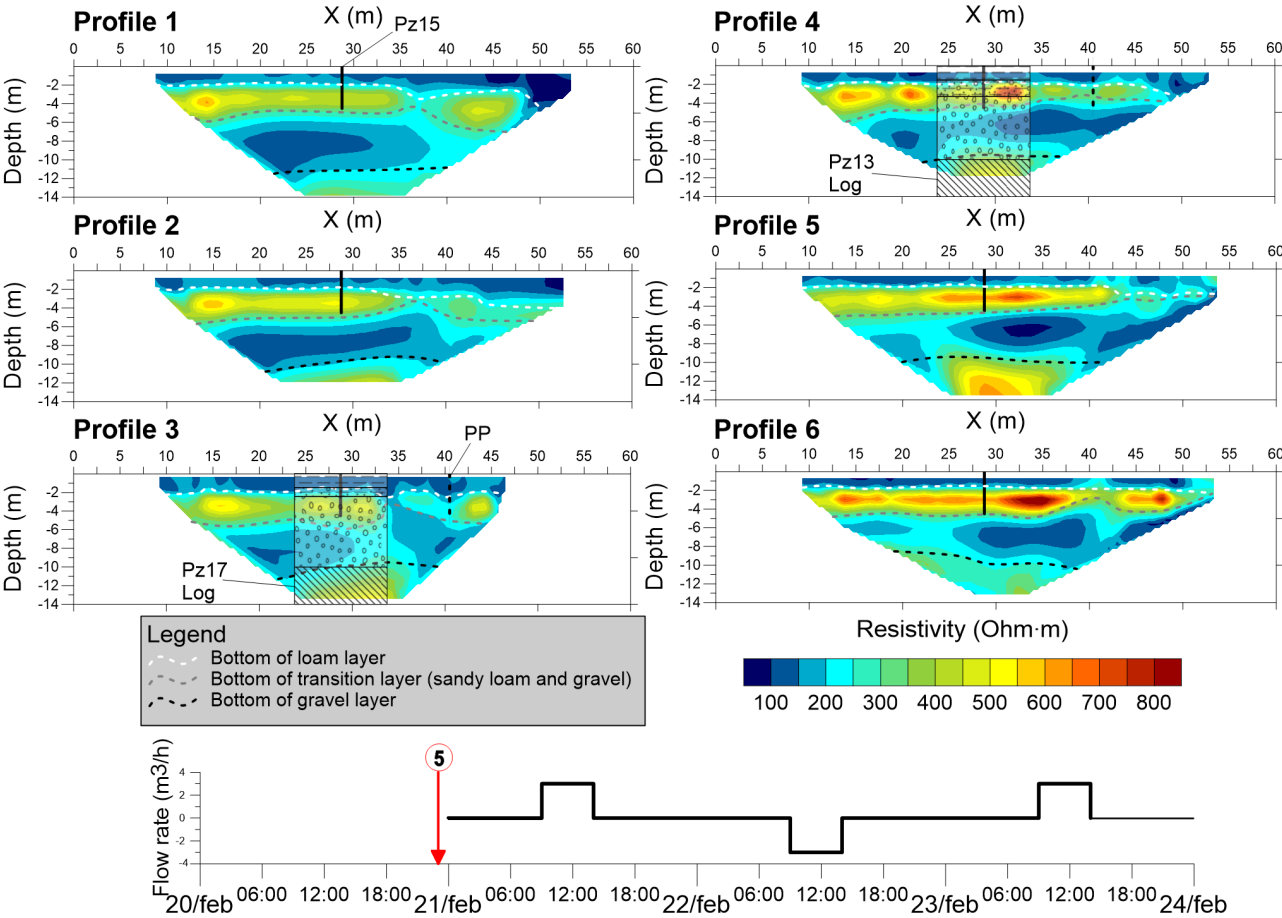


Figure 9. Interpreted background 2D resistivity models (at time step 5).

Injection 1 models (1)

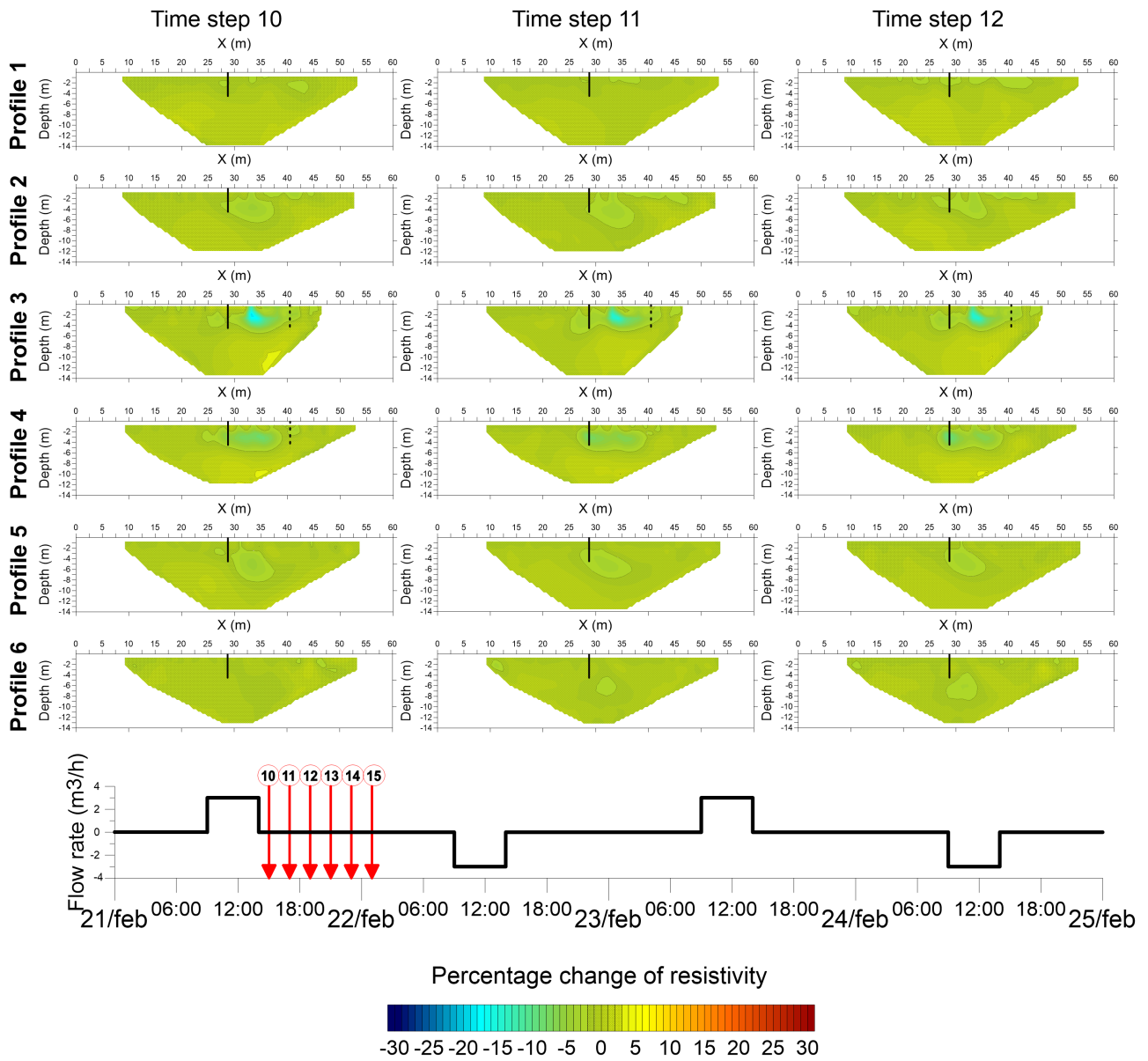


Figure 10. 2D Time-lapse resistivity models of Injection 1 (part 1).

Injection 1 models (2)

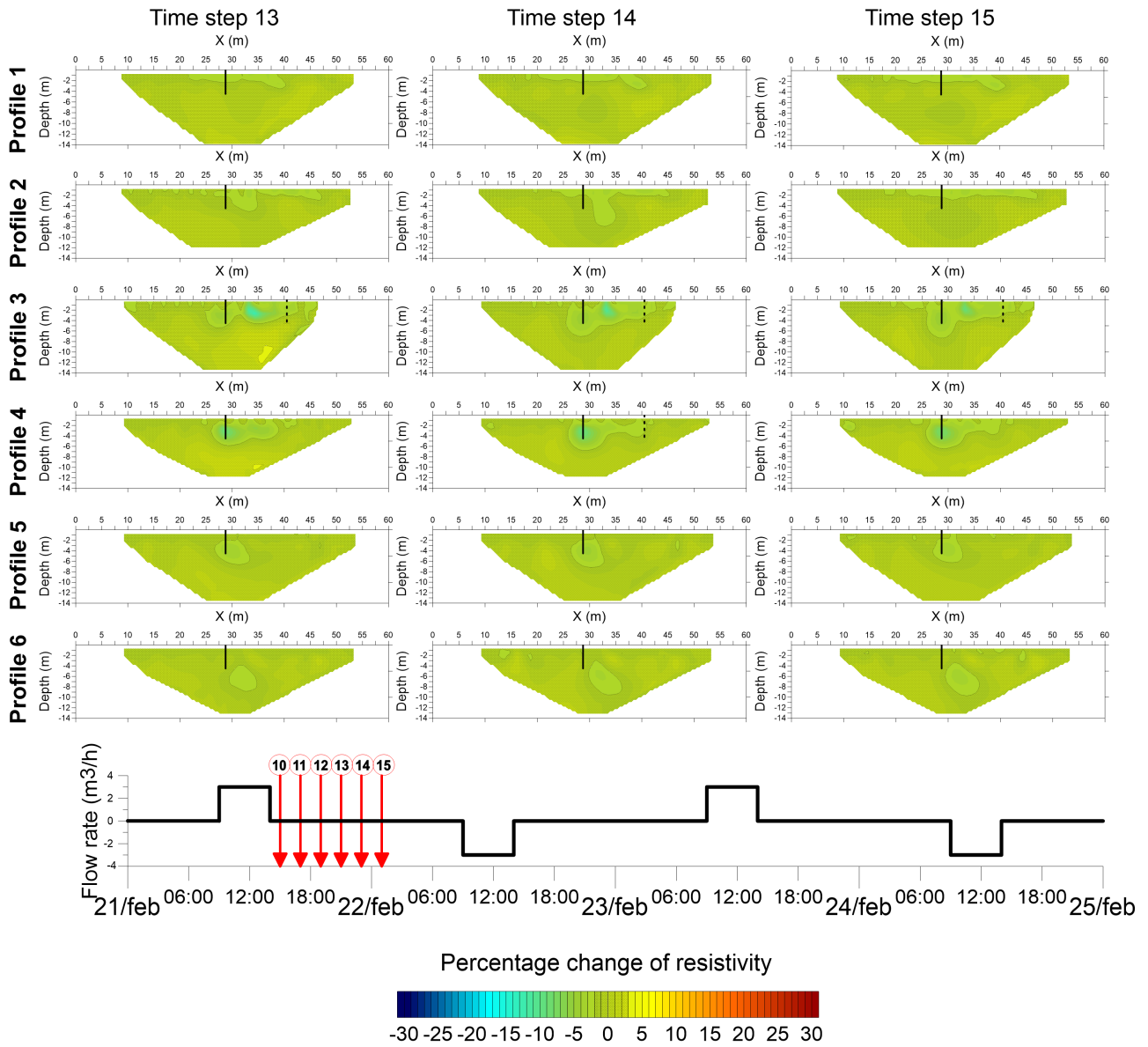


Figure 11. 2D Time-lapse resistivity models of Injection 1 (part 2).

Pumping 1 models (1)

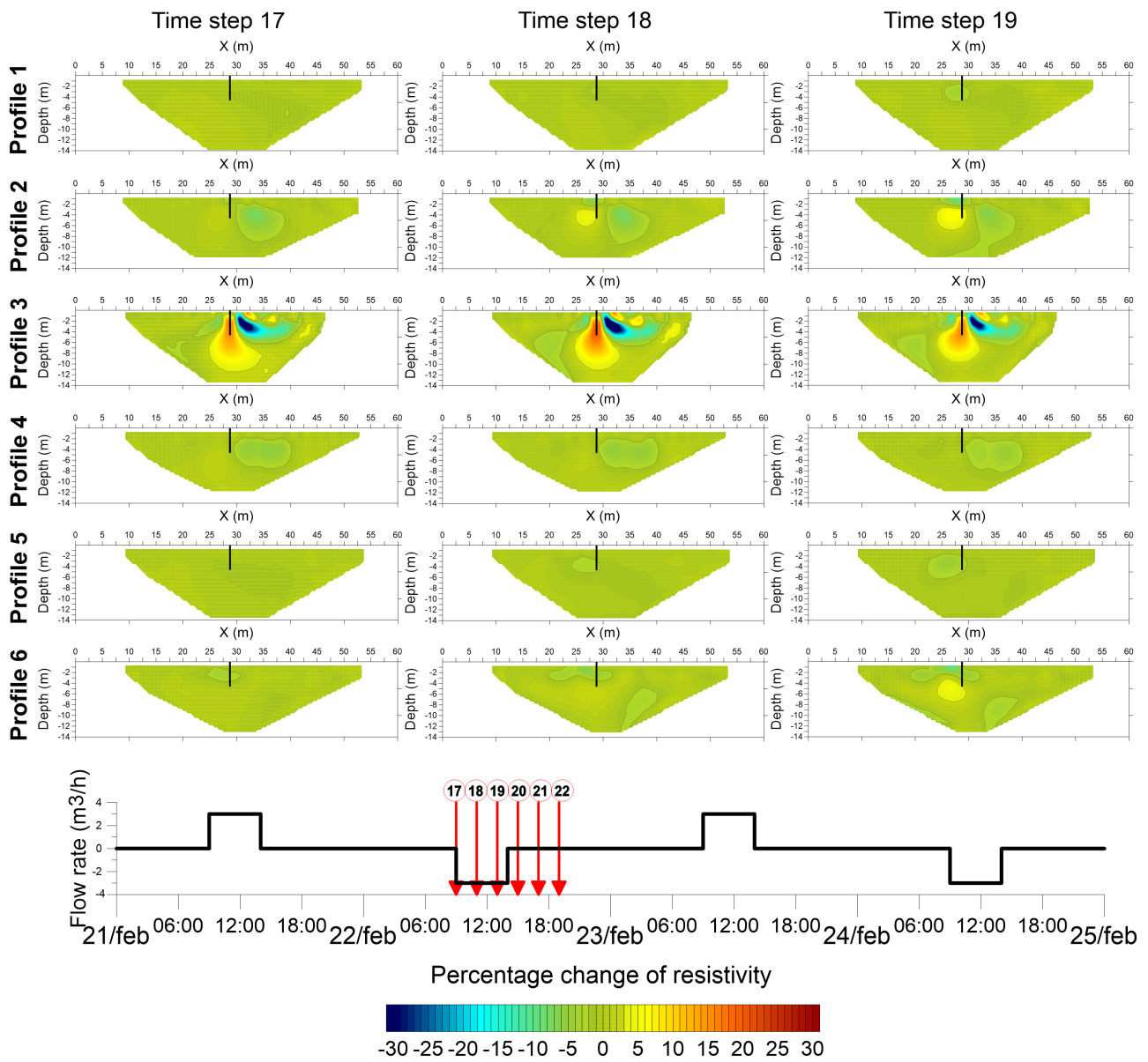


Figure 12. 2D Time-lapse resistivity models of Pumping 1 (part 1)

Pumping 1 models (2)

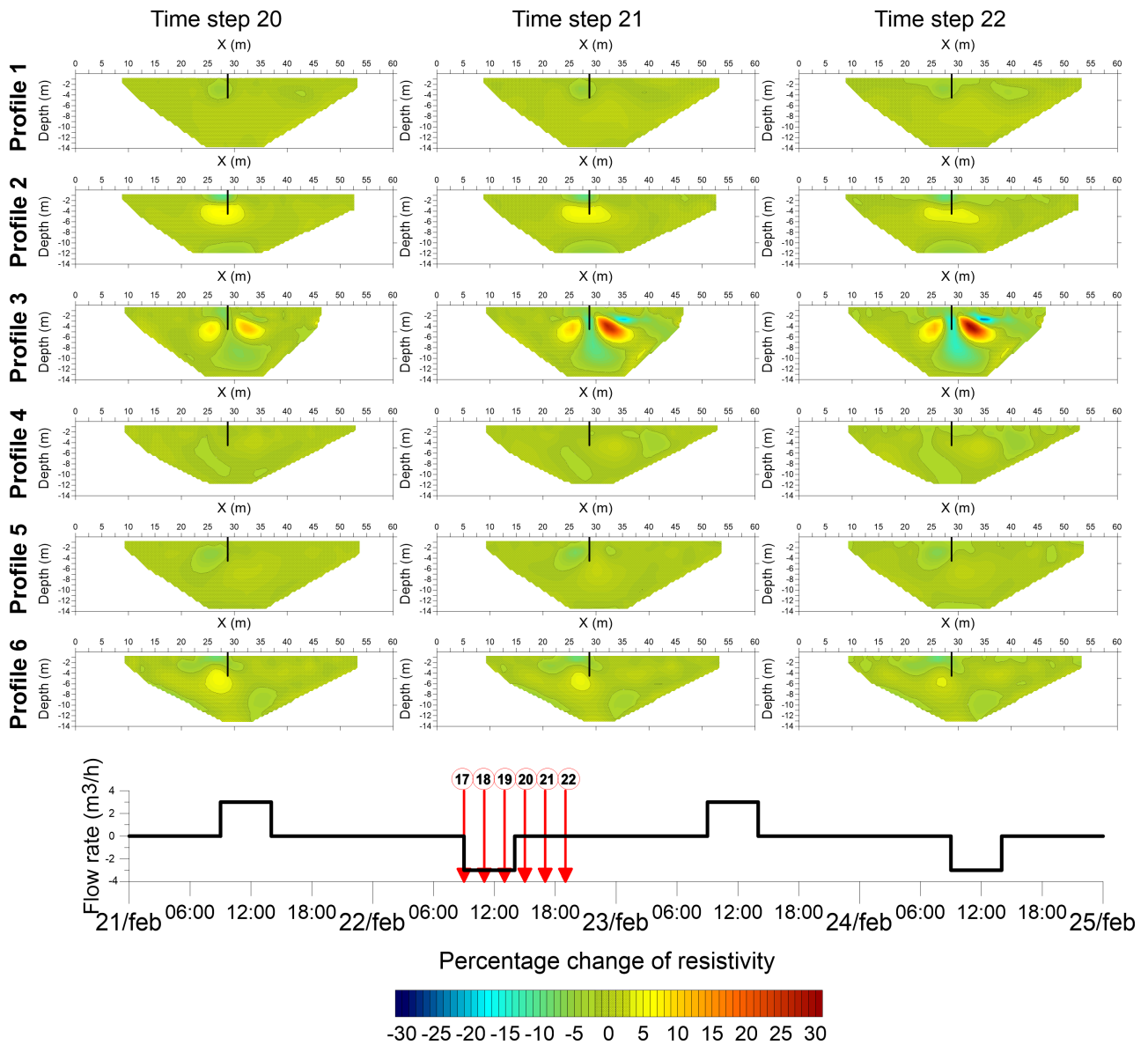


Figure 13. 2D Time-lapse resistivity models of Pumping 1 (part 2)

conclusion, so such results confirm what the direct measurements have already detected.

Injection 2 models (1)

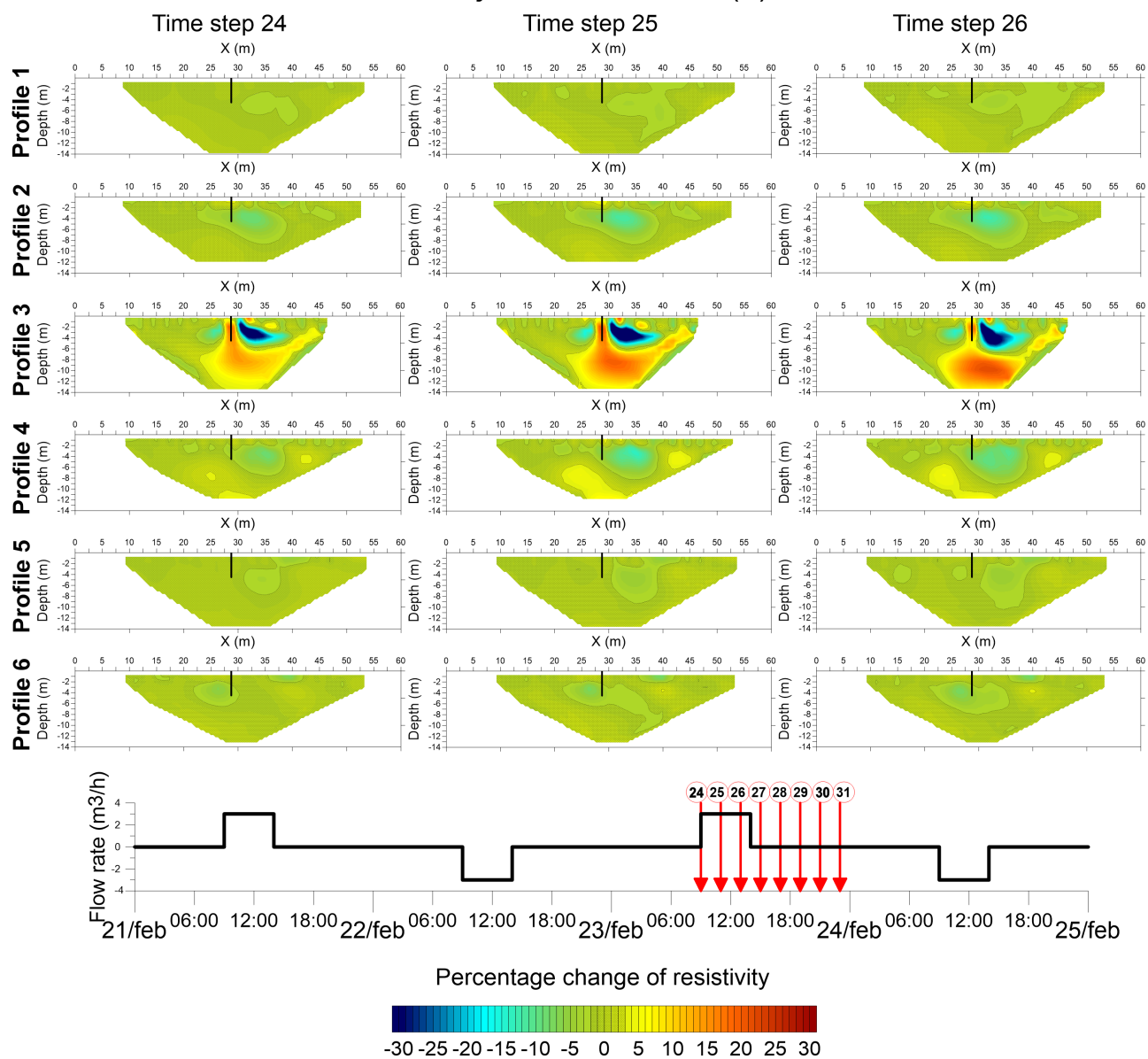


Figure 14. 2D Time-lapse resistivity models of Injection 2 (part 1)

Injection 2 models (2)

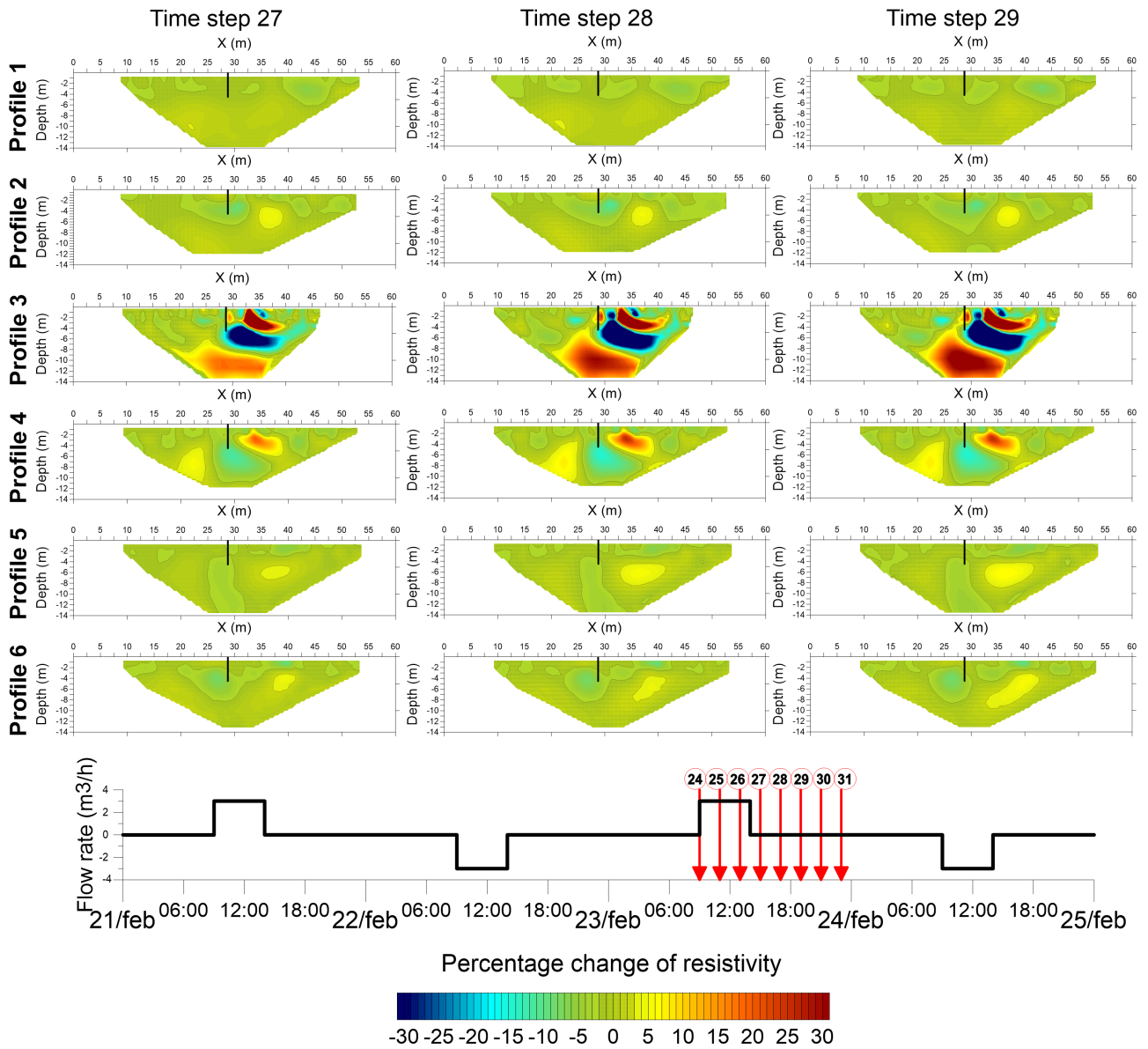


Figure 15. 2D Time-lapse resistivity models of Injection 2 (part 2)

Injection 2 models (3)

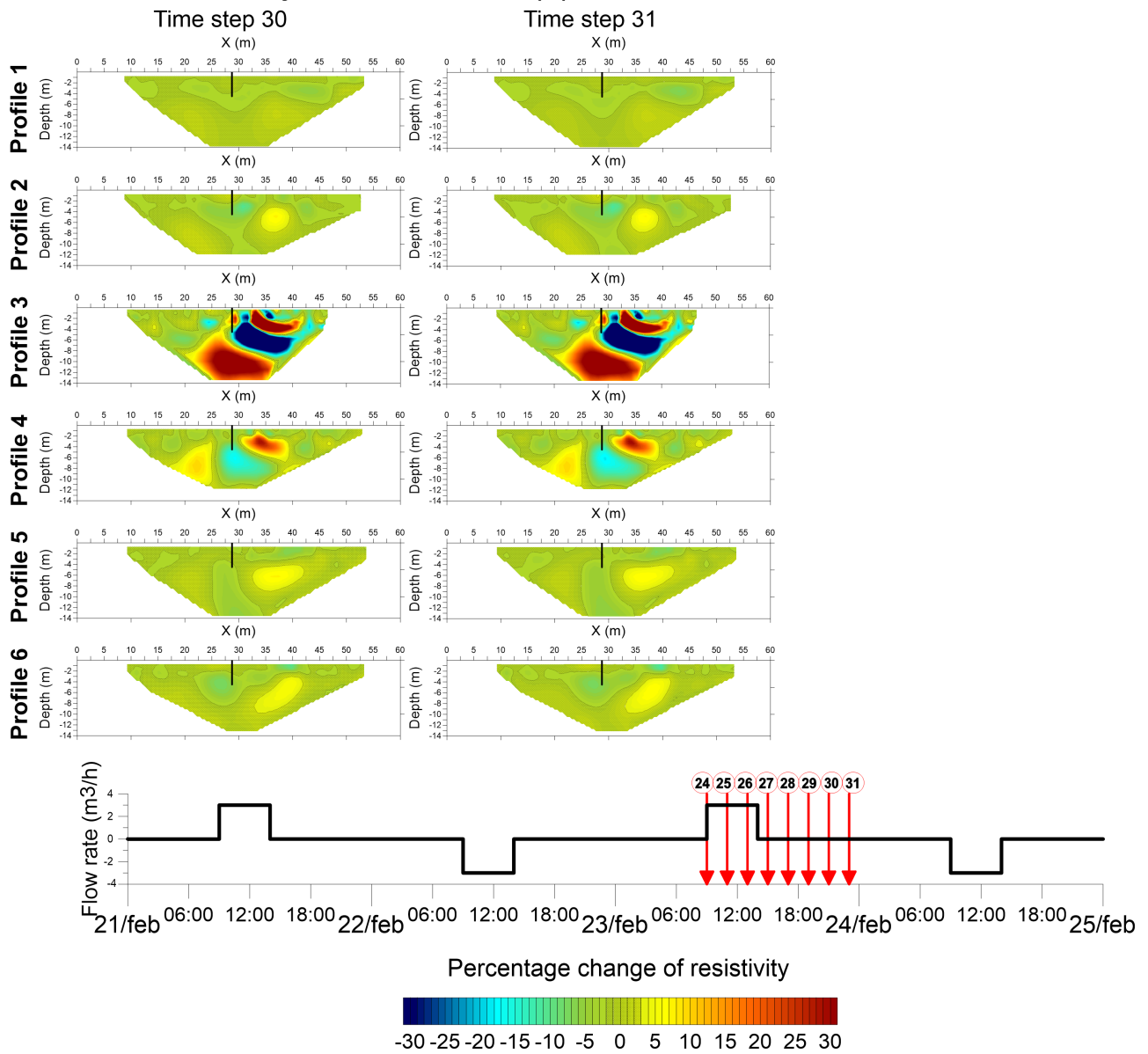


Figure 16. 2D Time-lapse resistivity models of Injection 2 (part 3)

Pumping 2 models (1)

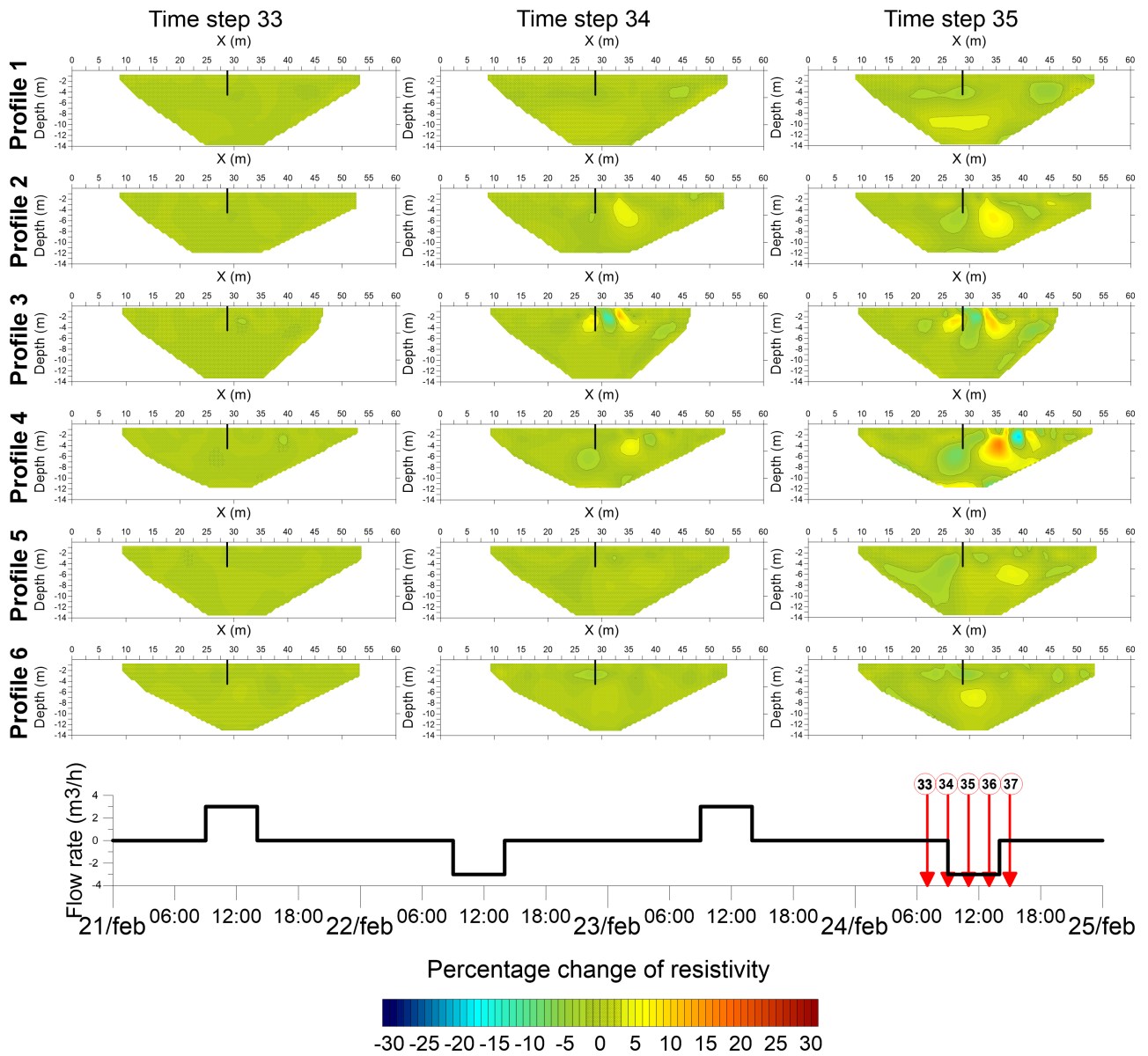


Figure 17. 2D Time-lapse resistivity models of Pumping 2 (part 1)

Pumping 2 models (2)

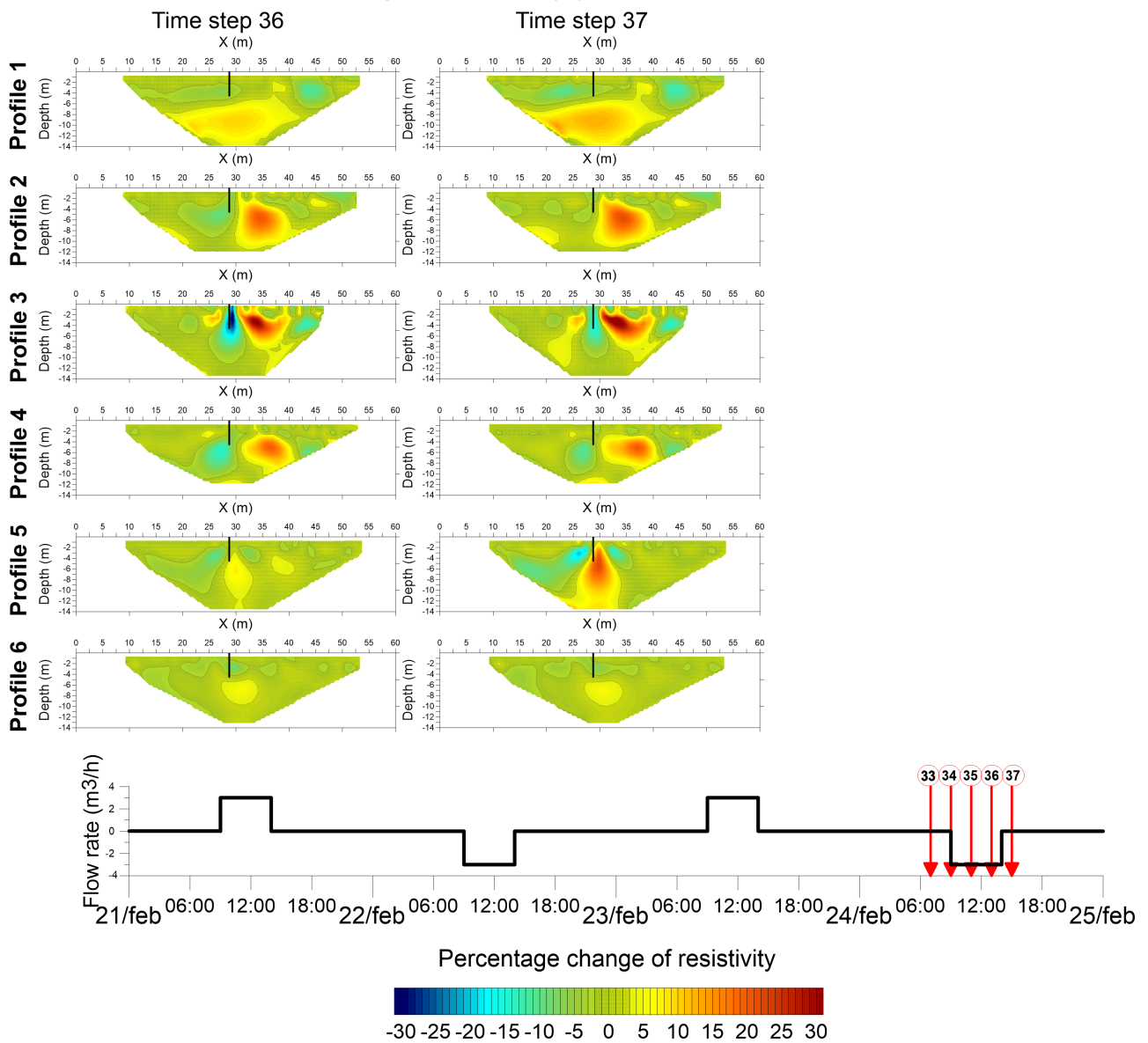


Figure 18. 2D Time-lapse resistivity models of Pumping 2 (part 2)

Injection 1 models (1)

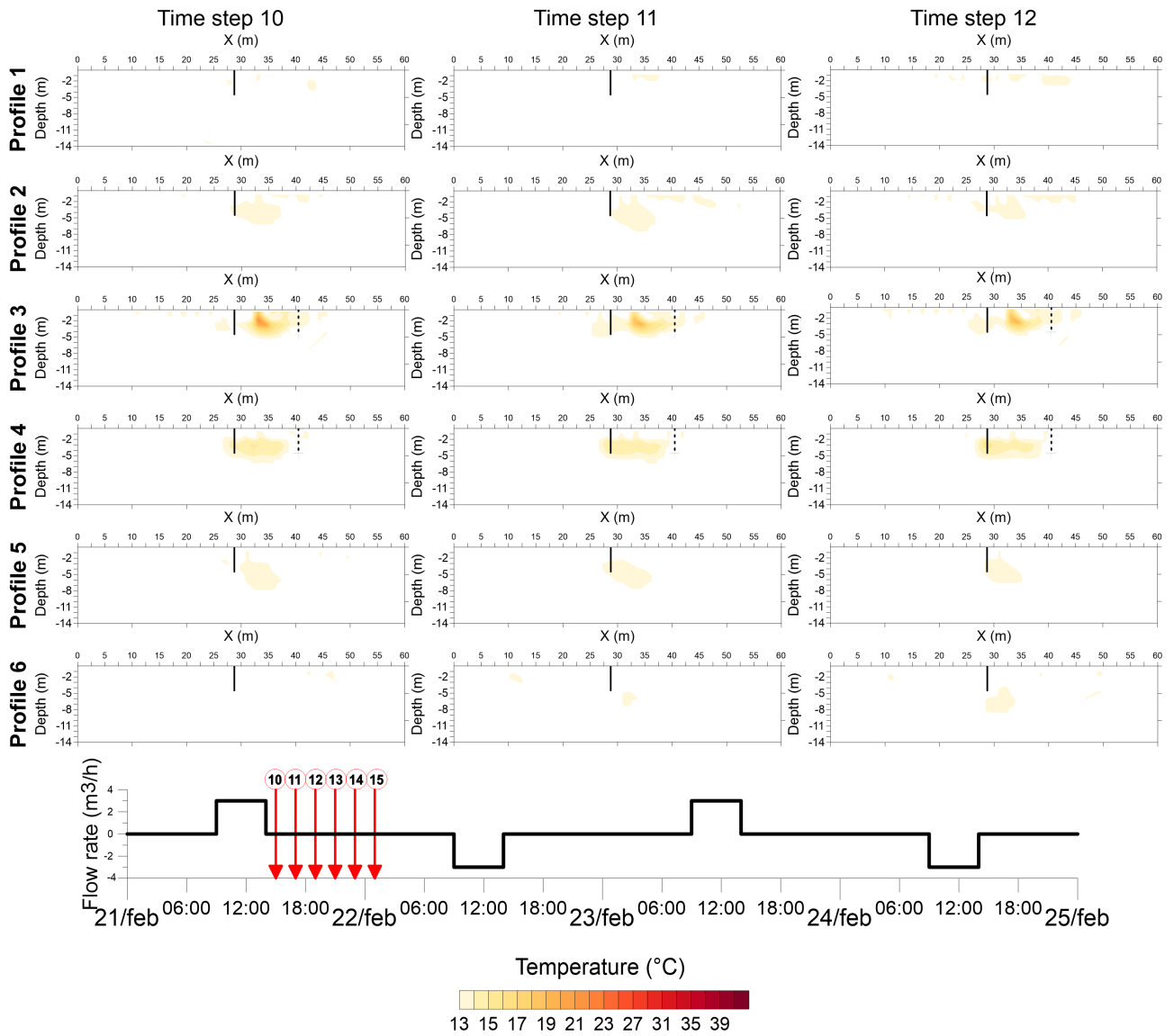


Figure 19. 2D Temperature conversion models of Injection 1 (part 1)

Injection 1 models (2)

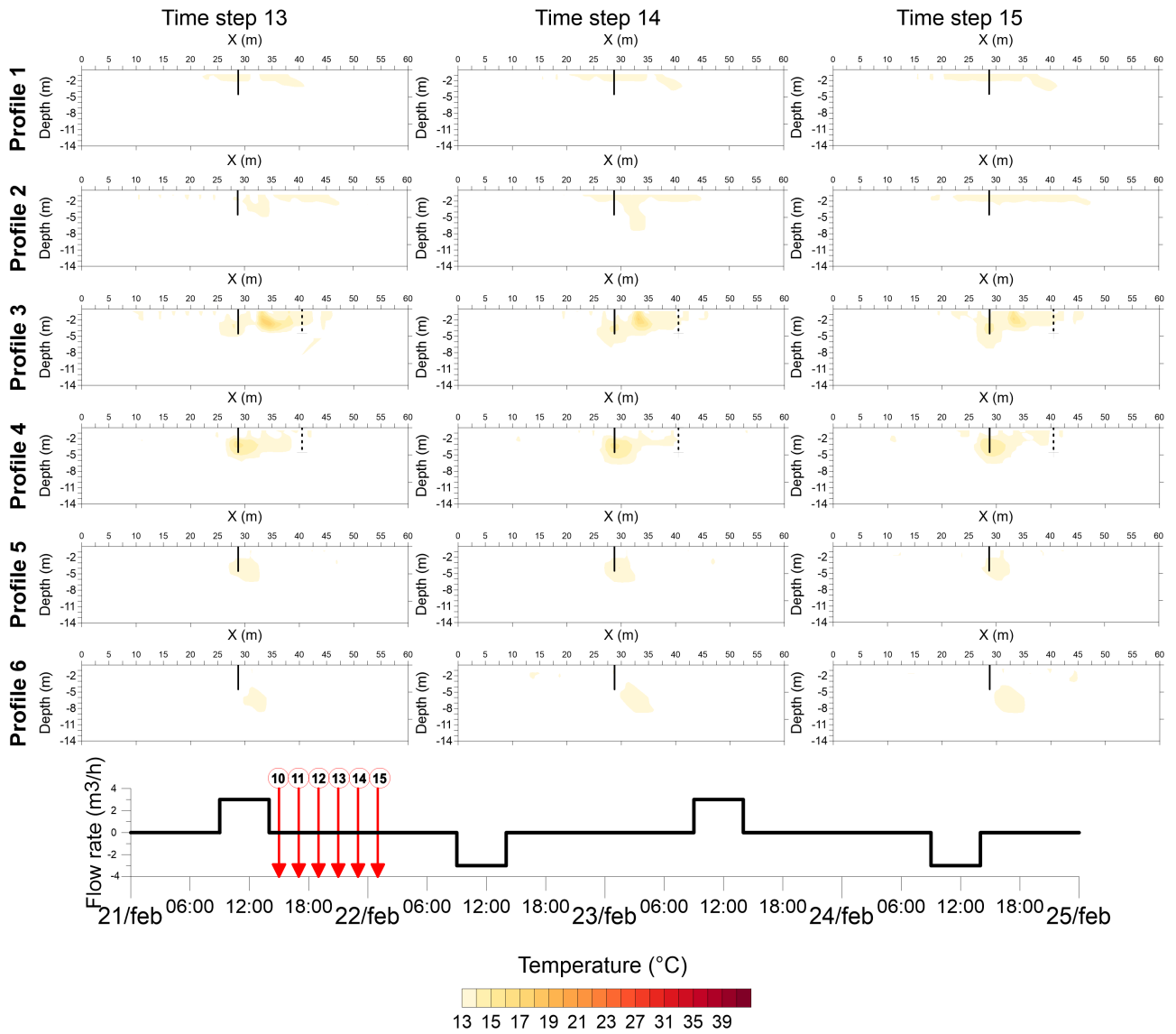


Figure 20. 2D Temperature conversion models of Injection 1 (part 2)

Pumping 1 models (1)

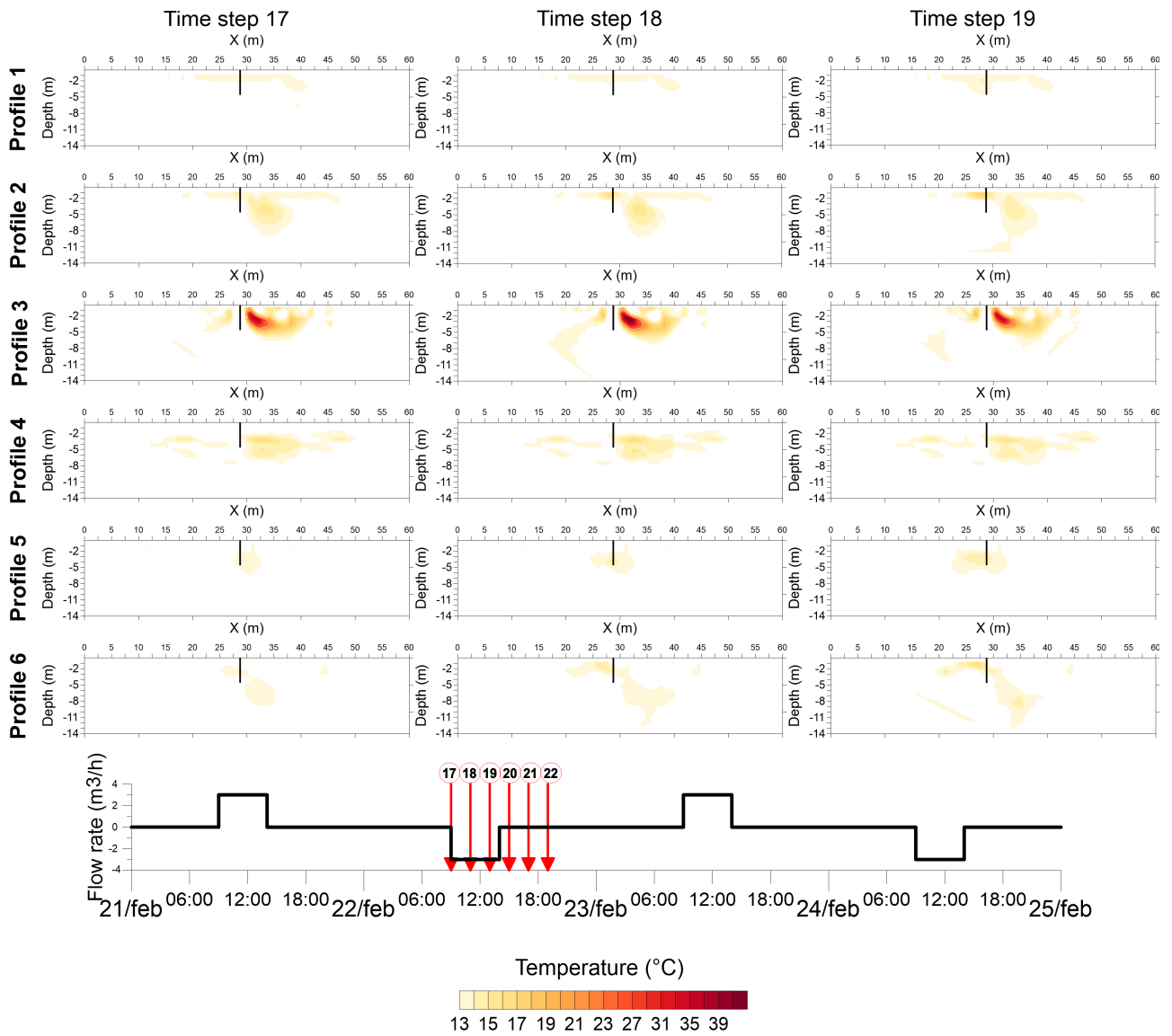


Figure 21. 2D Temperature conversion models of Pumping 1 (part 1)

Pumping 1 models (2)

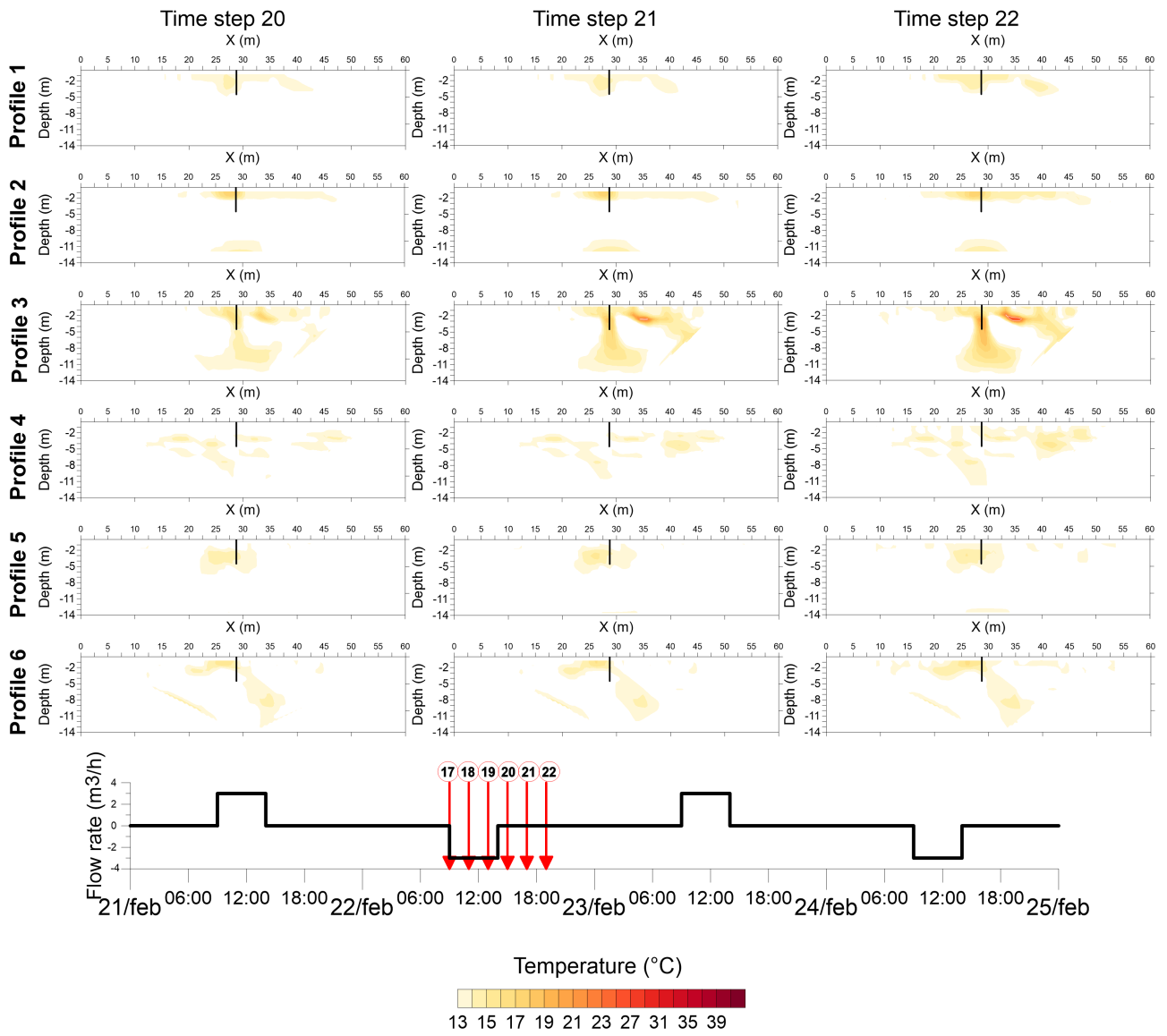


Figure 22. 2D Temperature conversion models of Pumping 1 (part 2)

Injection 2 models (1)

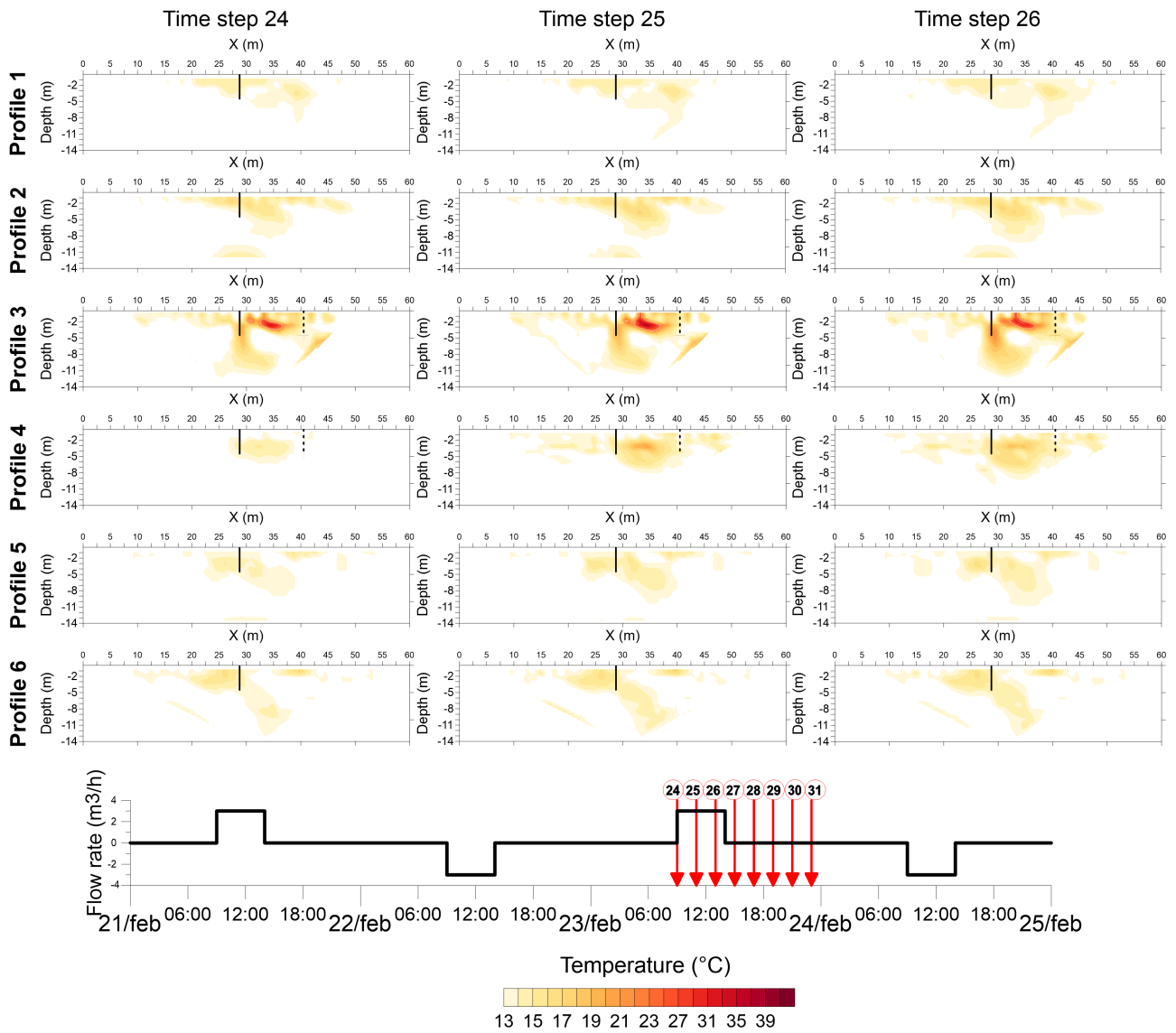


Figure 23. 2D Temperature conversion models of Injection 2 (part 1)

Injection 2 models (2)

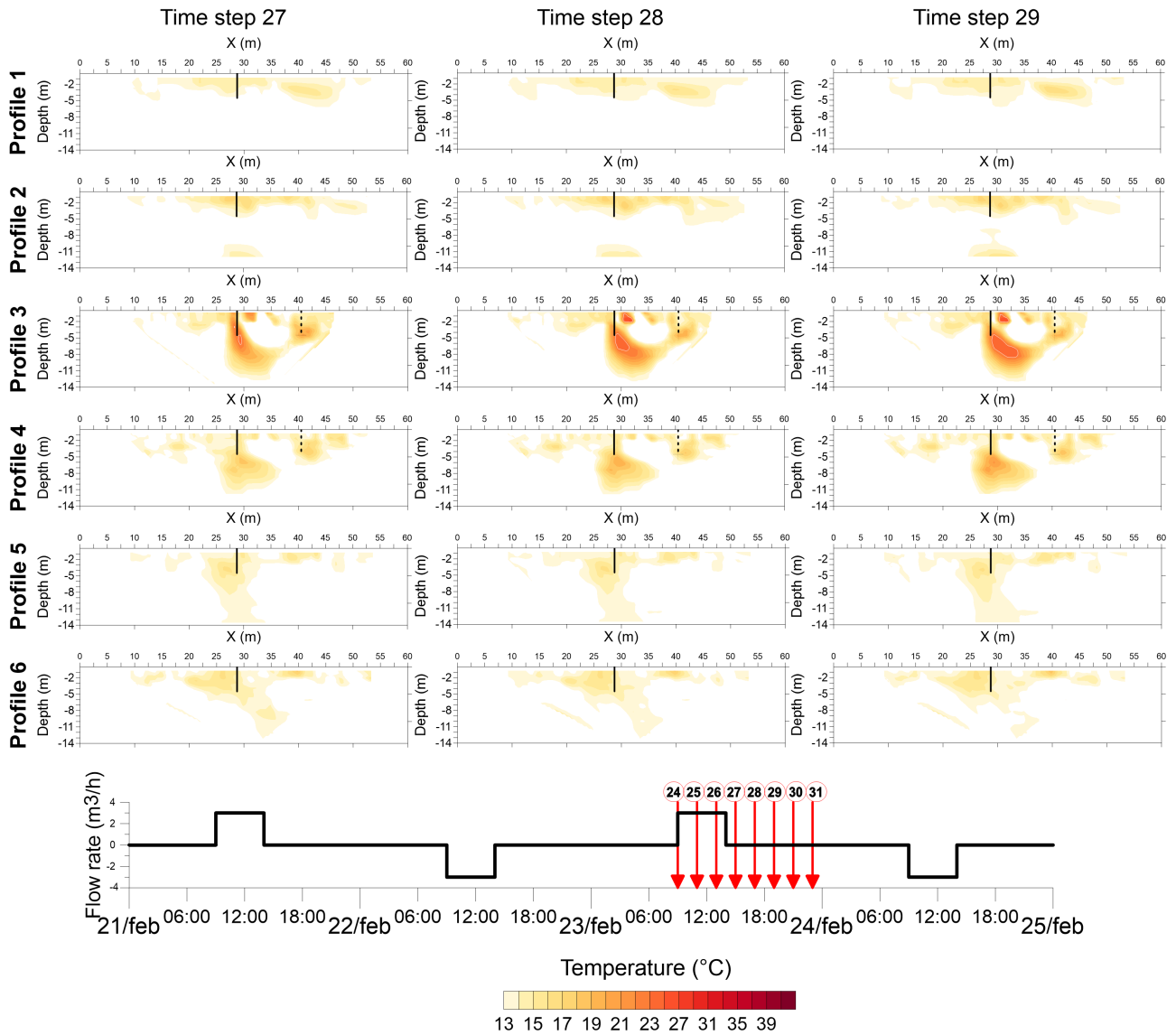


Figure 24. 2D Temperature conversion models of Injection 2 (part 2)

Injection 2 models (3)

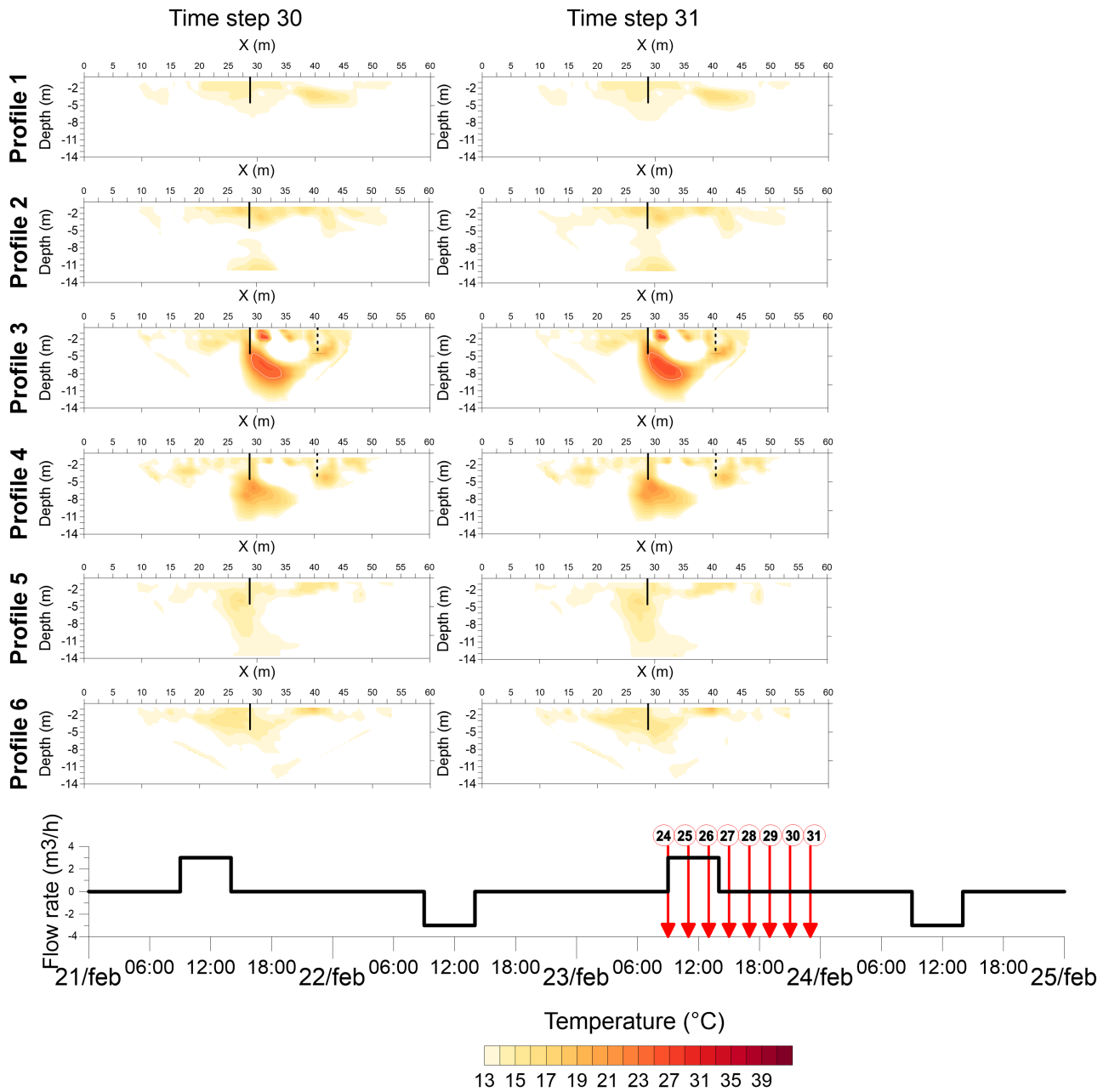


Figure 25. 2D Temperature conversion models of Injection 2 (part 3)

Pumping 2 models (1)

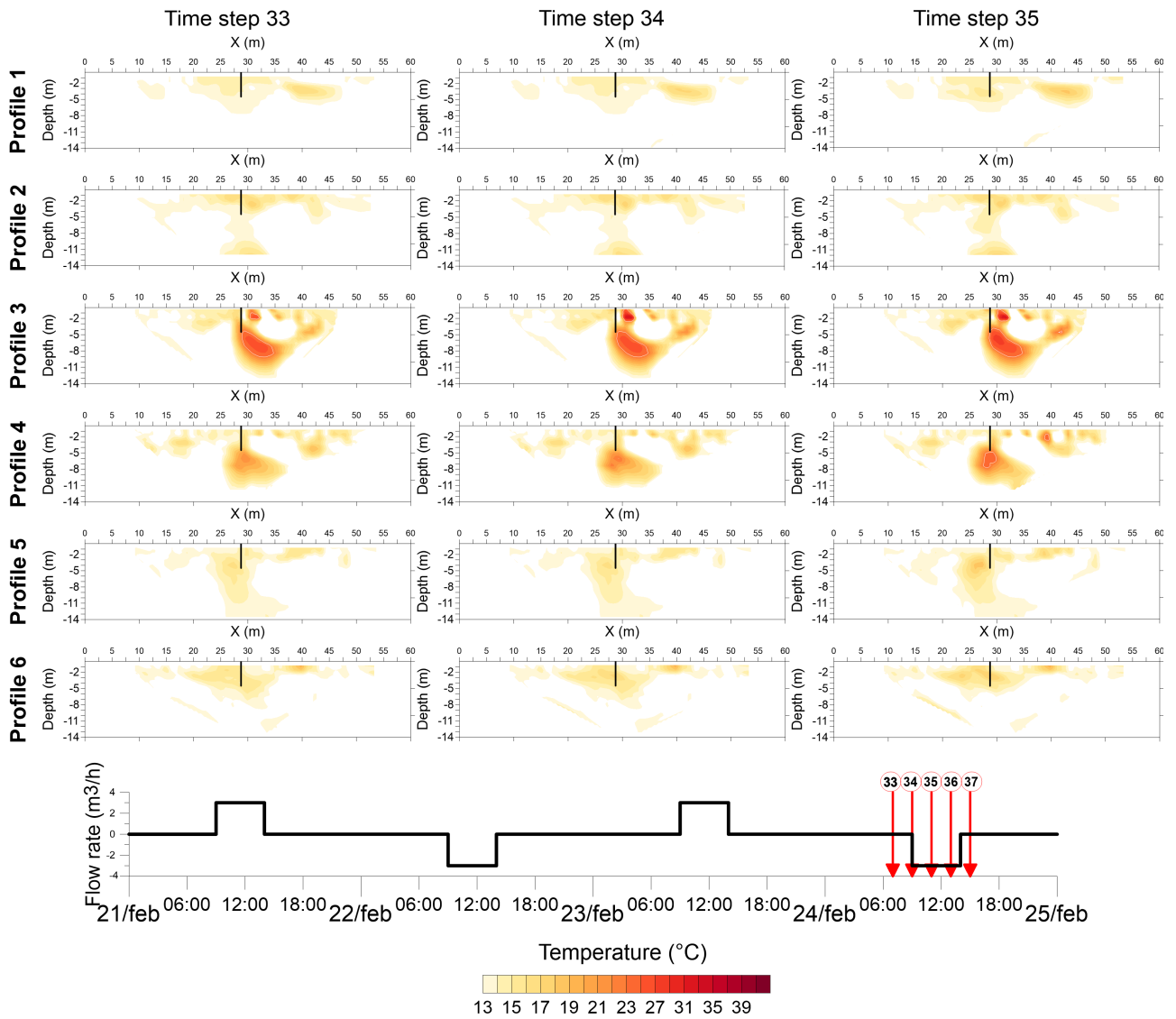


Figure 26. 2D Temperature conversion models of Pumping 2 (part 1)

Pumping 2 models (2)

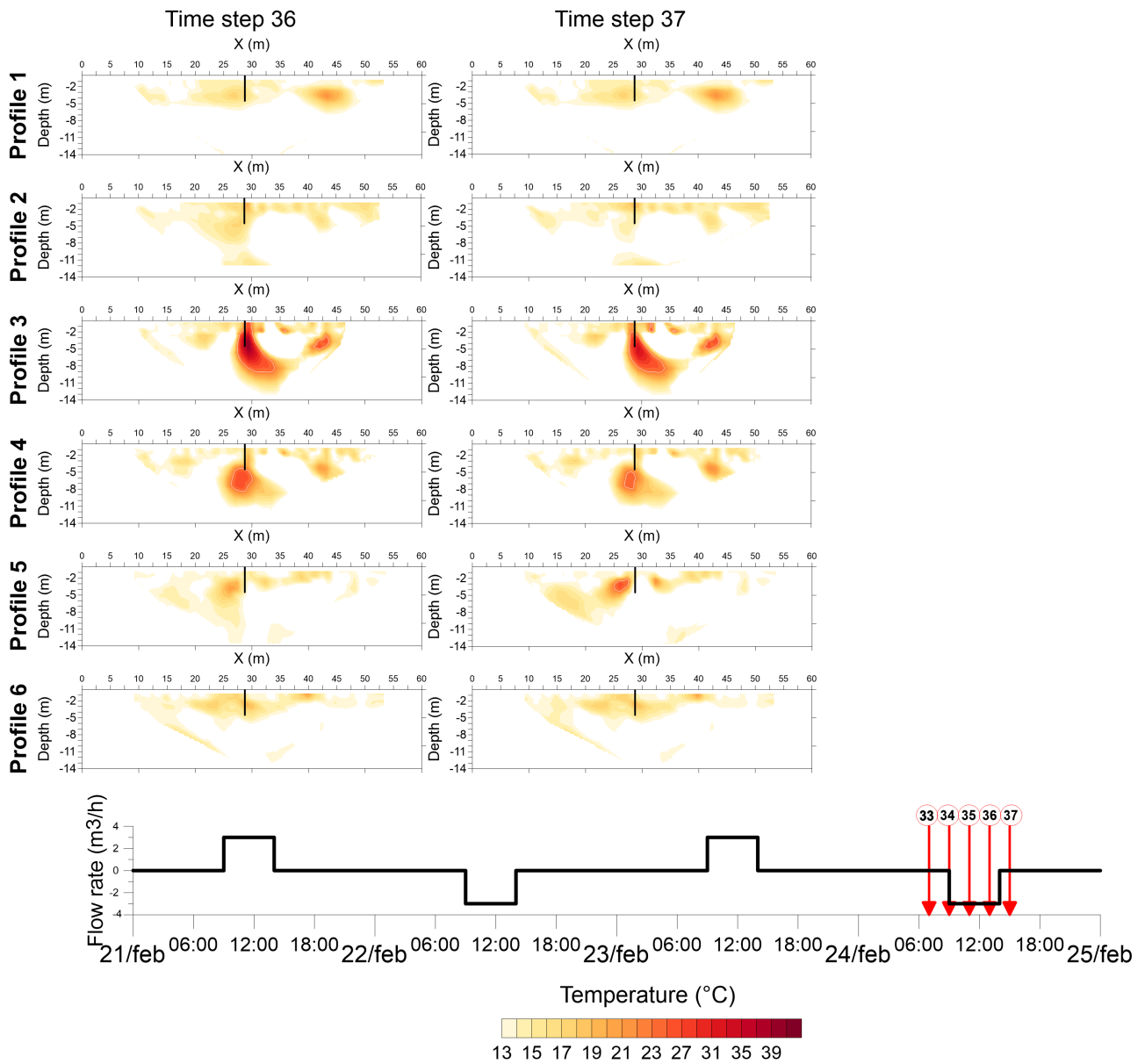


Figure 27. 2D Temperature conversion models of Pumping 2 (part 2)

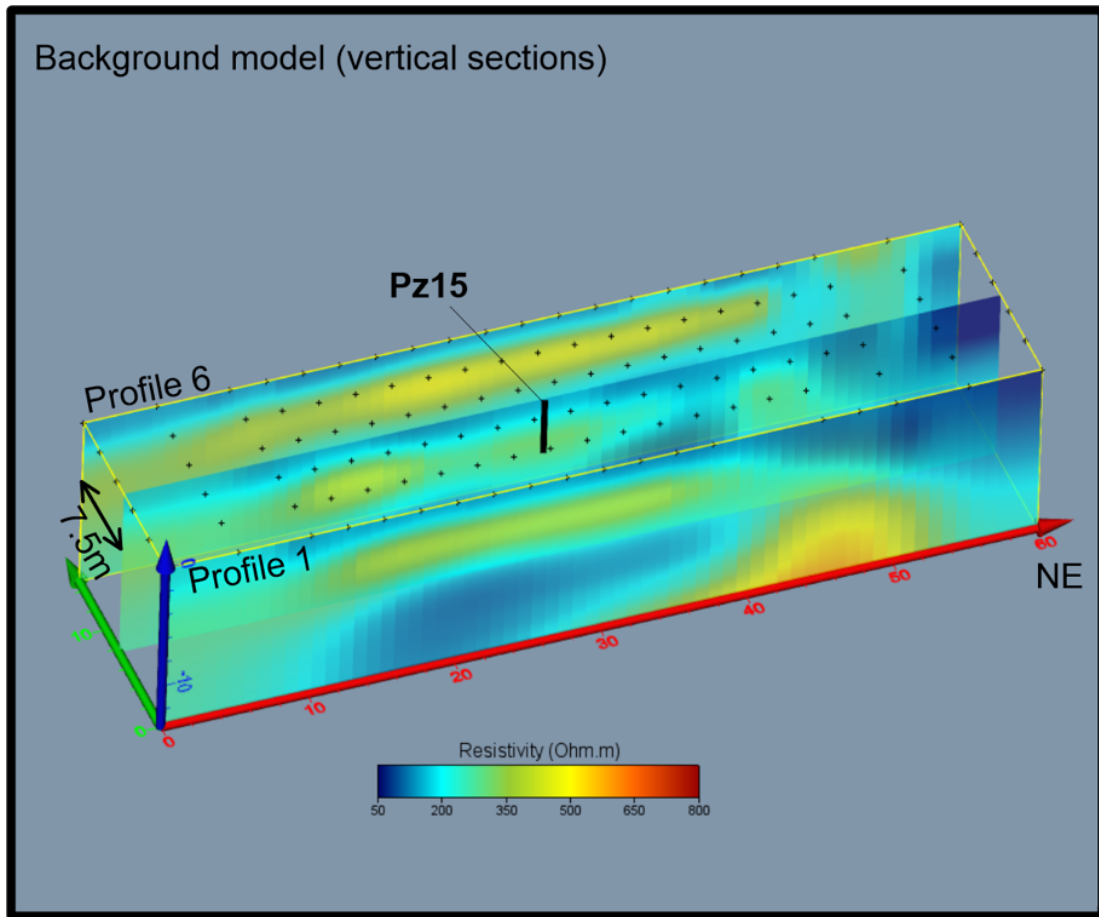


Figure 28. 3D Background resistivity model (vertical sections are 3 XZ planes with equation $Y=0$, $Y=7.5$, $Y=15$)

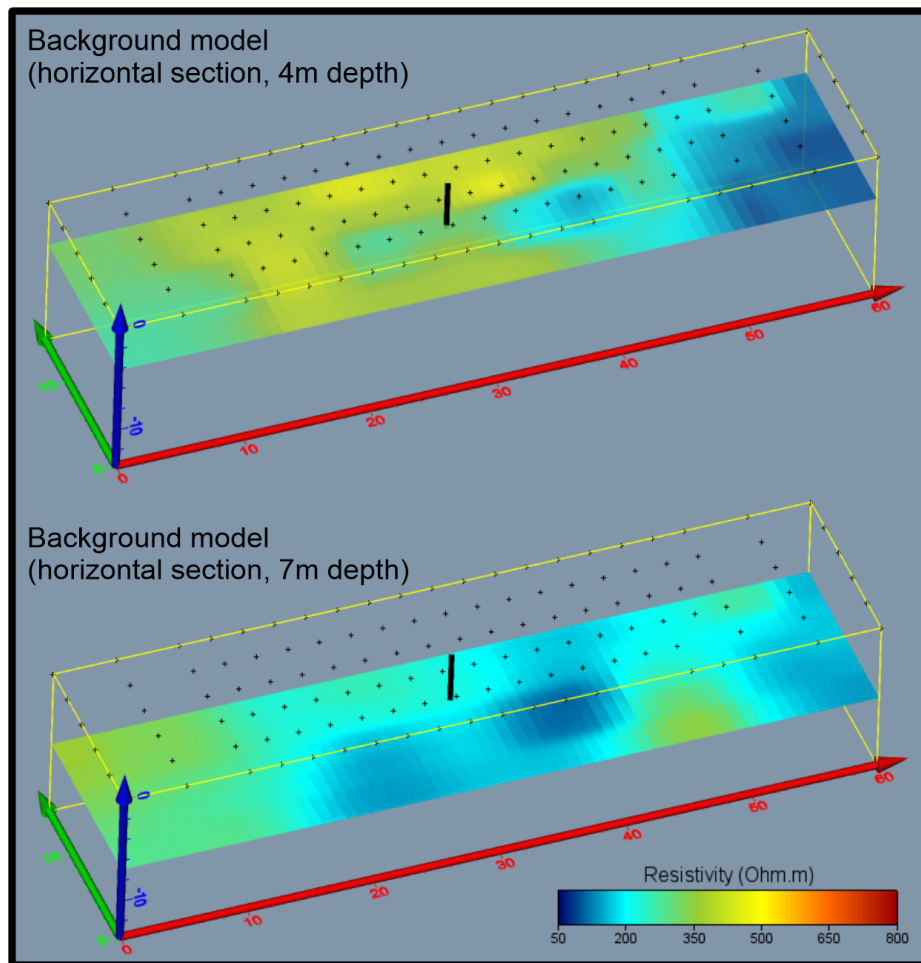


Figure 29. 3D Background resistivity model (horizontal sections are 2 XY planes with equations $Z=4$ and $Z=7$)

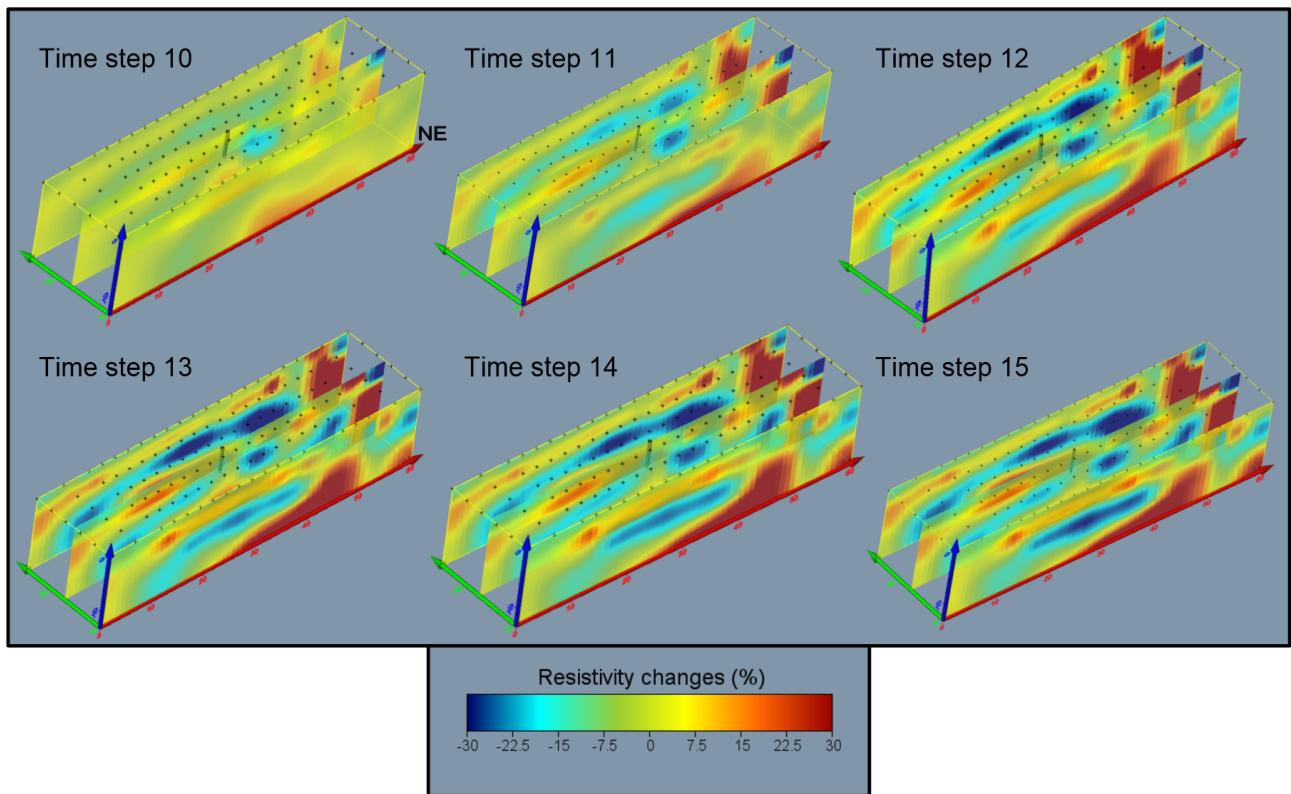


Figure 30. 3D Time-lapse resistivity models of Injection 1