

Plots of Departure Reroute Maneuver Candidates for Conflict Resolution



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The following plots show departure reroute maneuver candidates for conflict resolution. In these plots, all maneuvers are computed and assigned shortly before takeoff. The original route for each flight is shown as a dashed blue line, and the reroute candidates are shown as solid gray lines. The red dashed rectangle around DFW airport is a restricted zone (that was defined for this study) to keep DAL flights from getting too close to DFW.

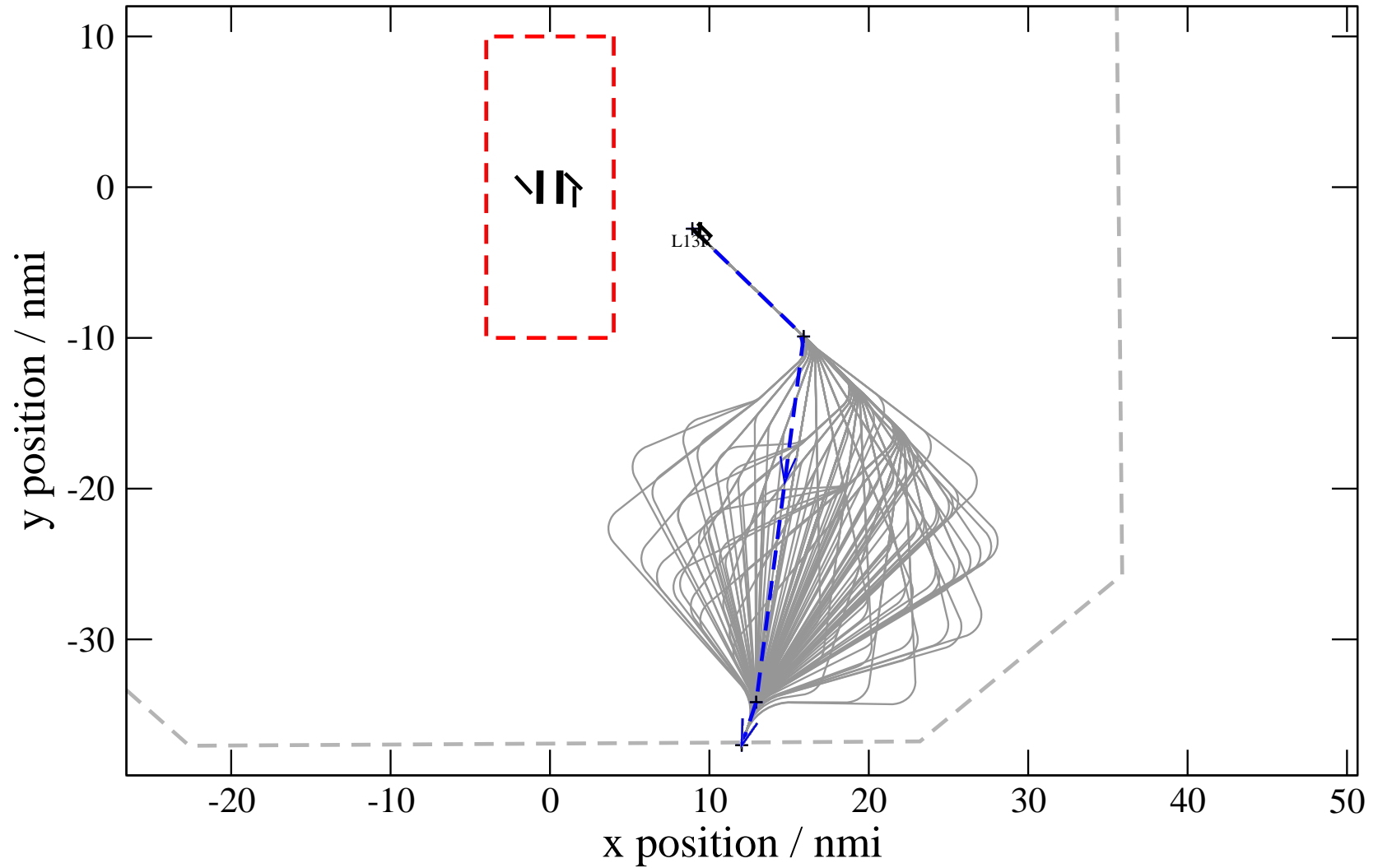
The candidate routes are generated by permuting each of three parameters through a set of values. The three parameters are: (1) the length of the initial takeoff leg, (2) the initial turn angle, and (3) the length of the next leg before the turn back to the original departure fix. Routes that have turn angles greater than a specified threshold are rejected, as are routes that exit the TRACON boundary, or DAL departures that enter the restricted space around DFW airport. The resulting number of candidate routes is shown in the subtitle. The resulting delay is computed for each candidate, and the one with the least estimated delay is selected from those that resolve the conflict, if any do.

The altitude and along-track distance plots that follow the route plots were used to help verify correctness of the rerouting algorithm. The original altitudes and along-track profiles are shown in a wide black line, and the values for the rerouted trajectories are shown in red. The fact that they are the same shows that the longitudinal profiles of the rerouted trajectories are identical to the original for its entire length, as they should be.

[generated with plot/RerouteDepPlots.scala]

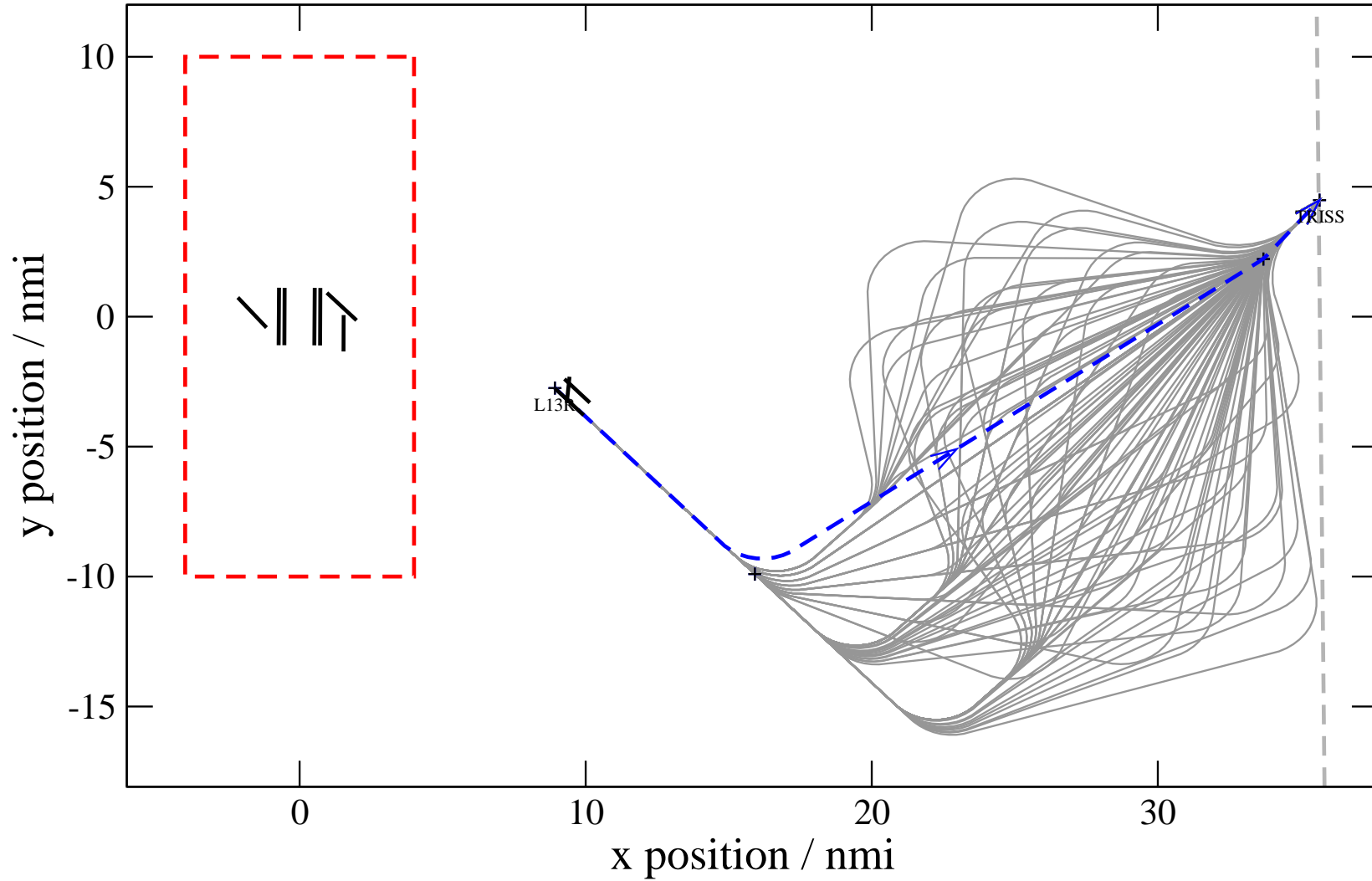
Departure Reroute Candidates

2167 (CRJ7 E DAL/13R Dep) 132 candidates



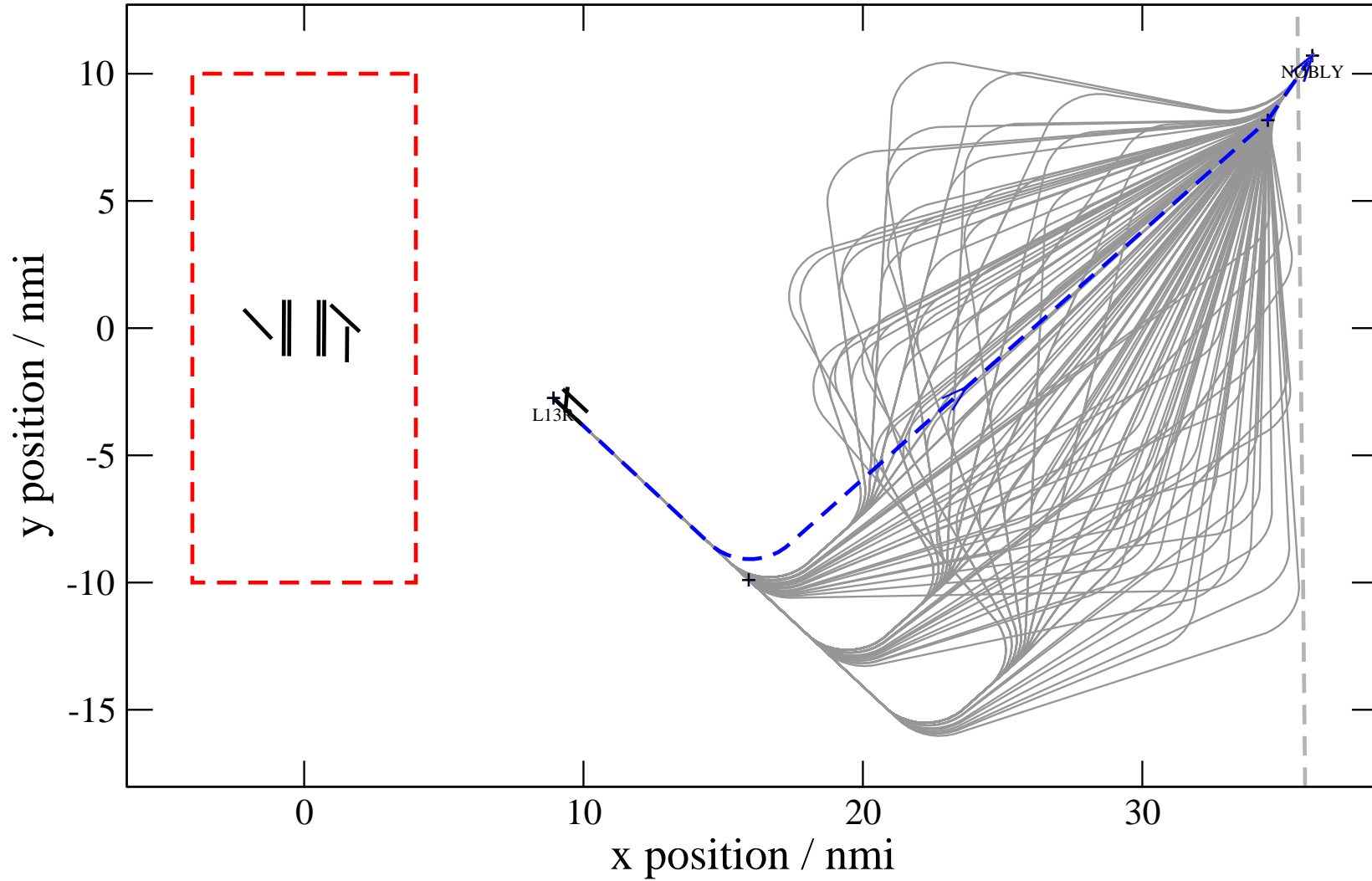
Departure Reroute Candidates

2168 (CRJ2 E DAL/13R Dep) 107 candidates



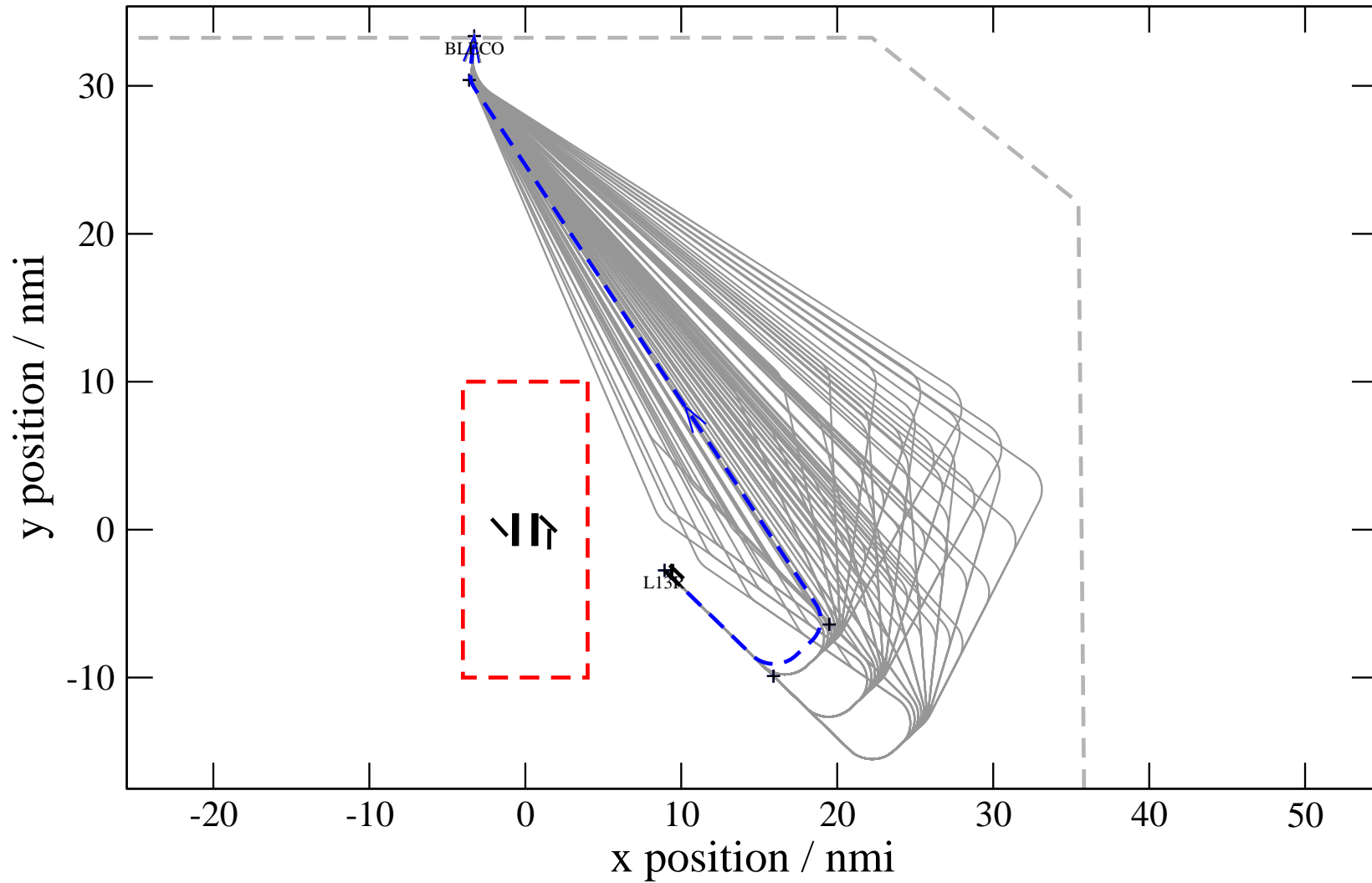
Departure Reroute Candidates

2172 (B737 D DAL/13R Dep) 127 candidates



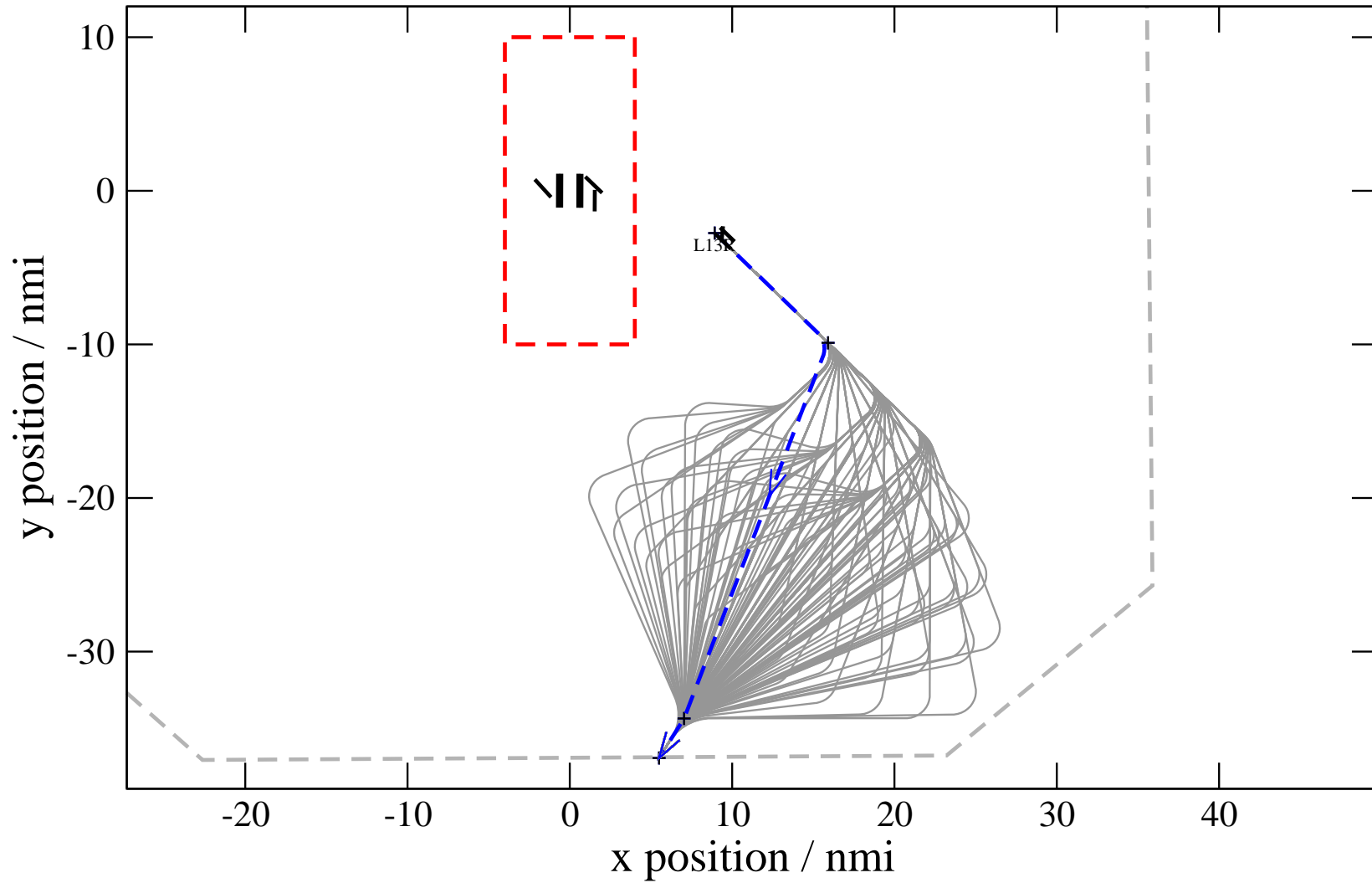
Departure Reroute Candidates

2173 (B733 D DAL/13R Dep) 107 candidates



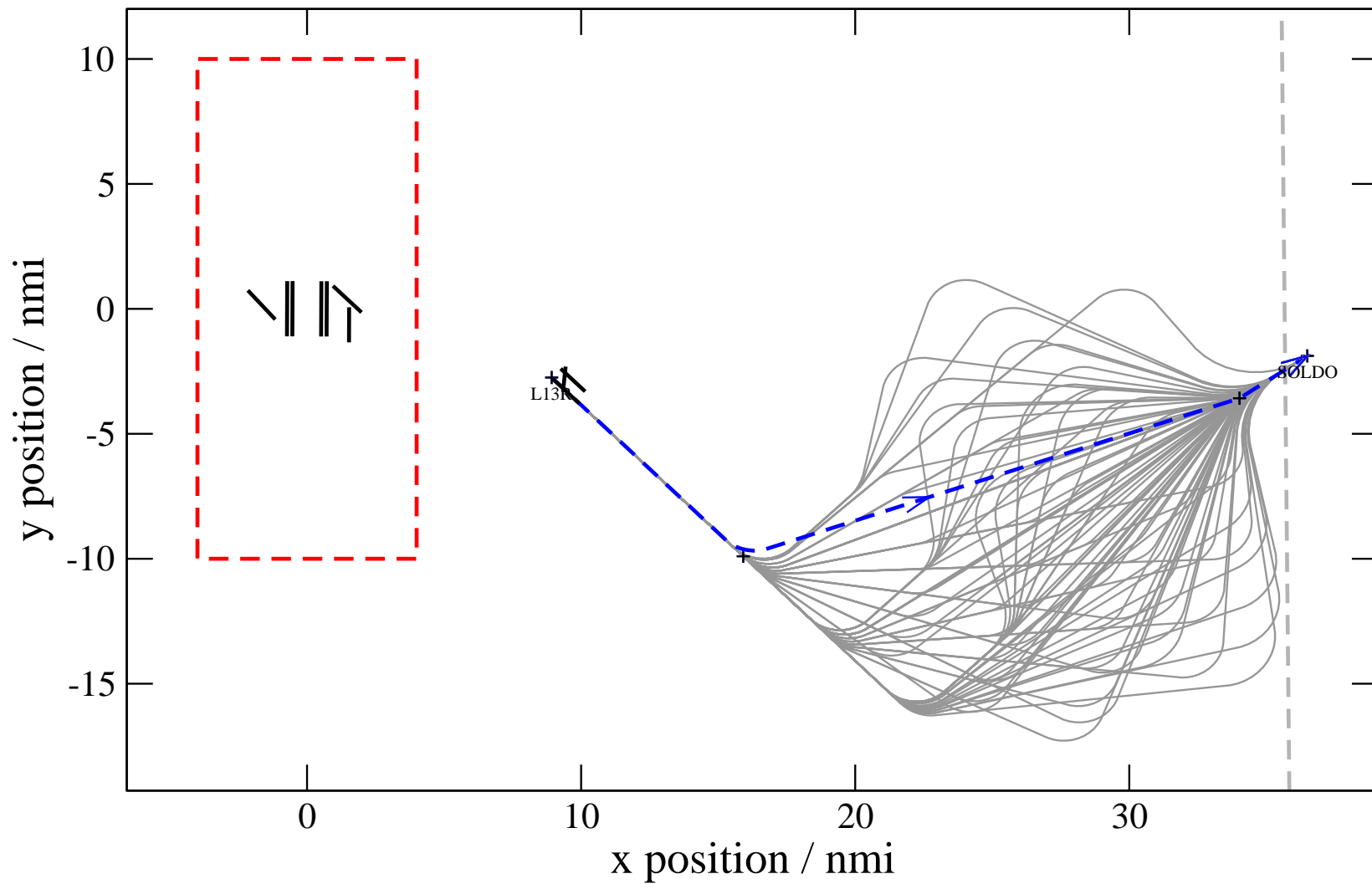
Departure Reroute Candidates

2174 (B737 D DAL/13R Dep) 137 candidates



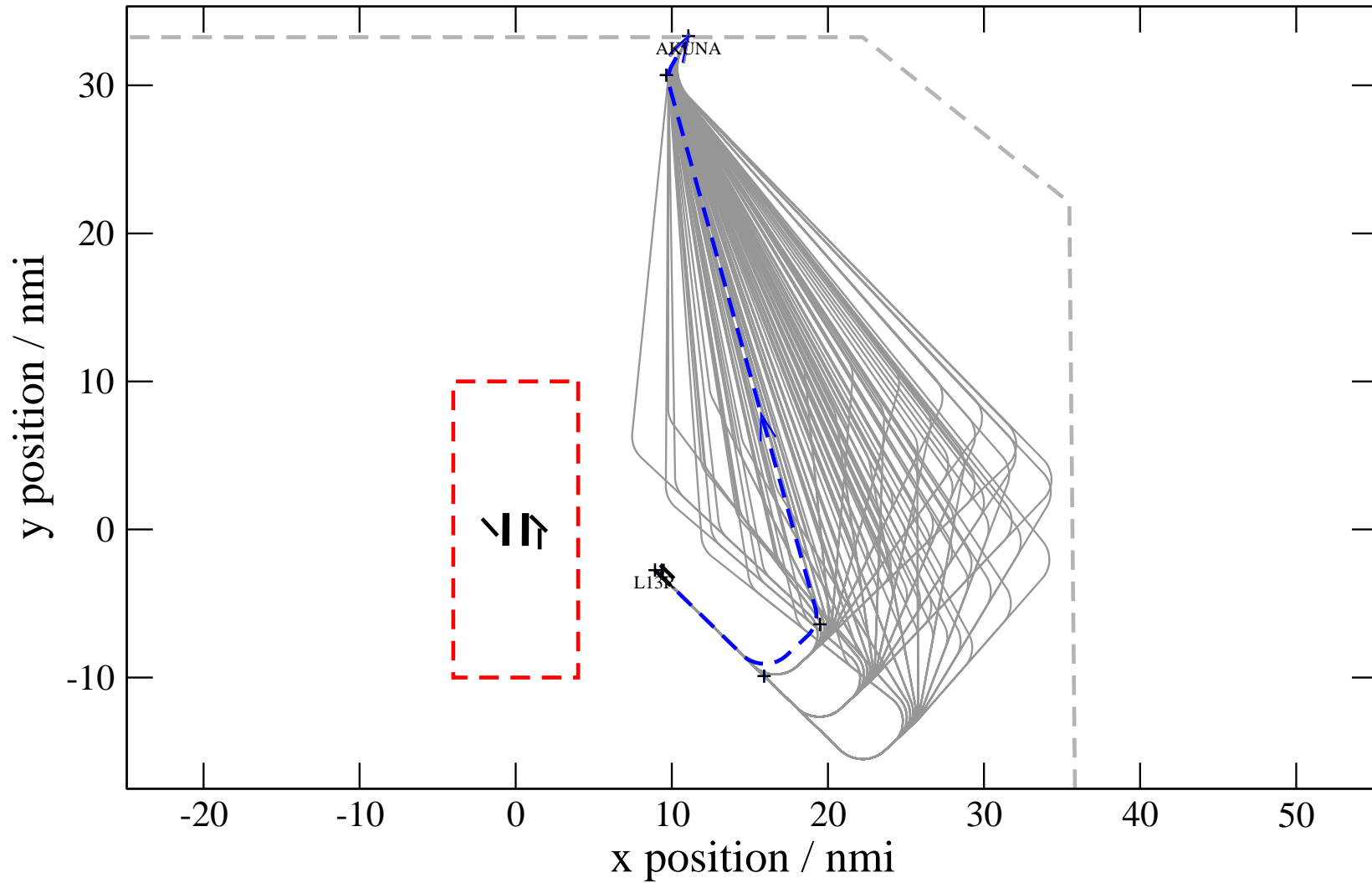
Departure Reroute Candidates

2175 (B733 D DAL/13R Dep) 94 candidates



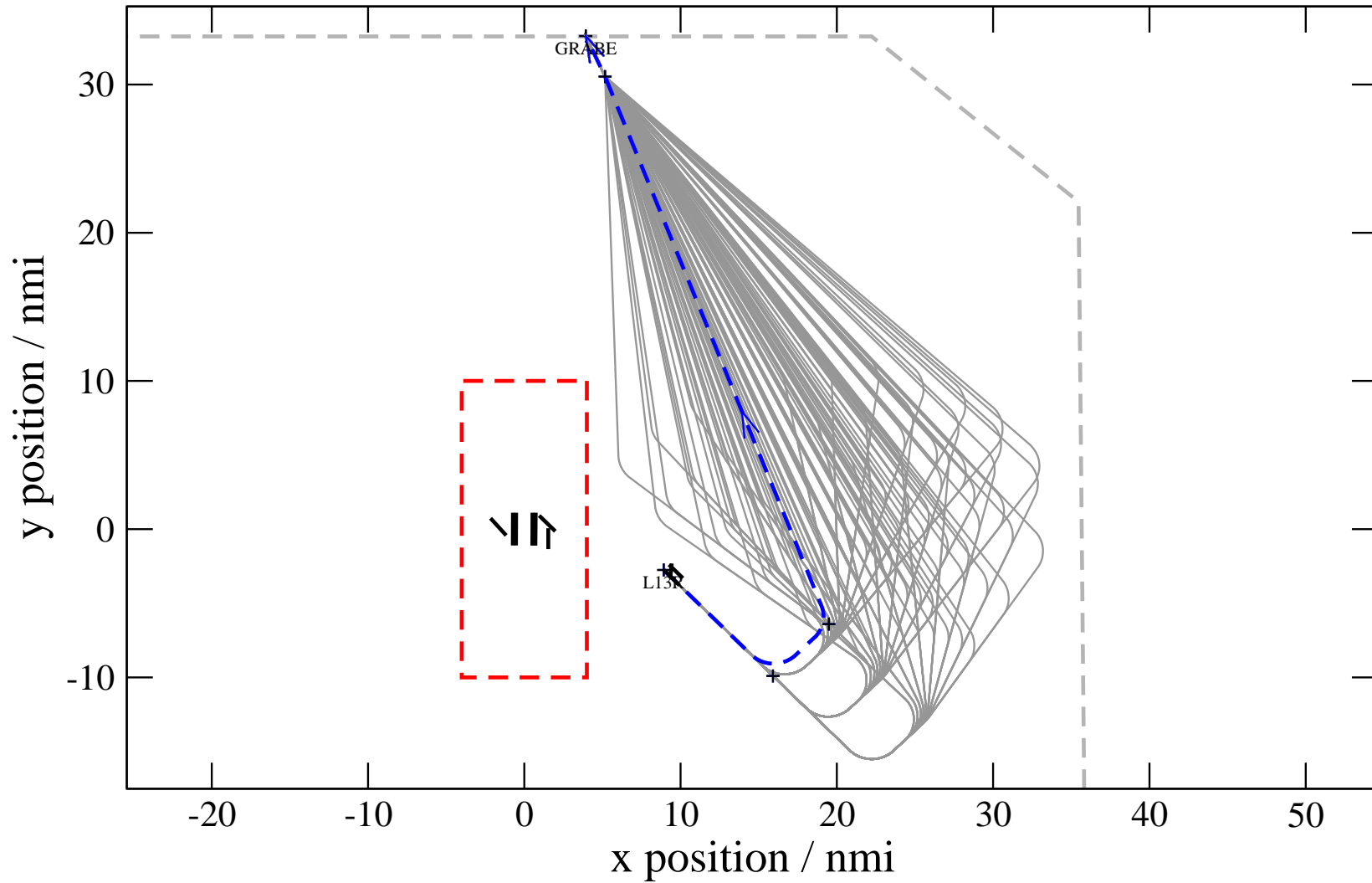
Departure Reroute Candidates

2181 (B733 D DAL/13R Dep) 119 candidates



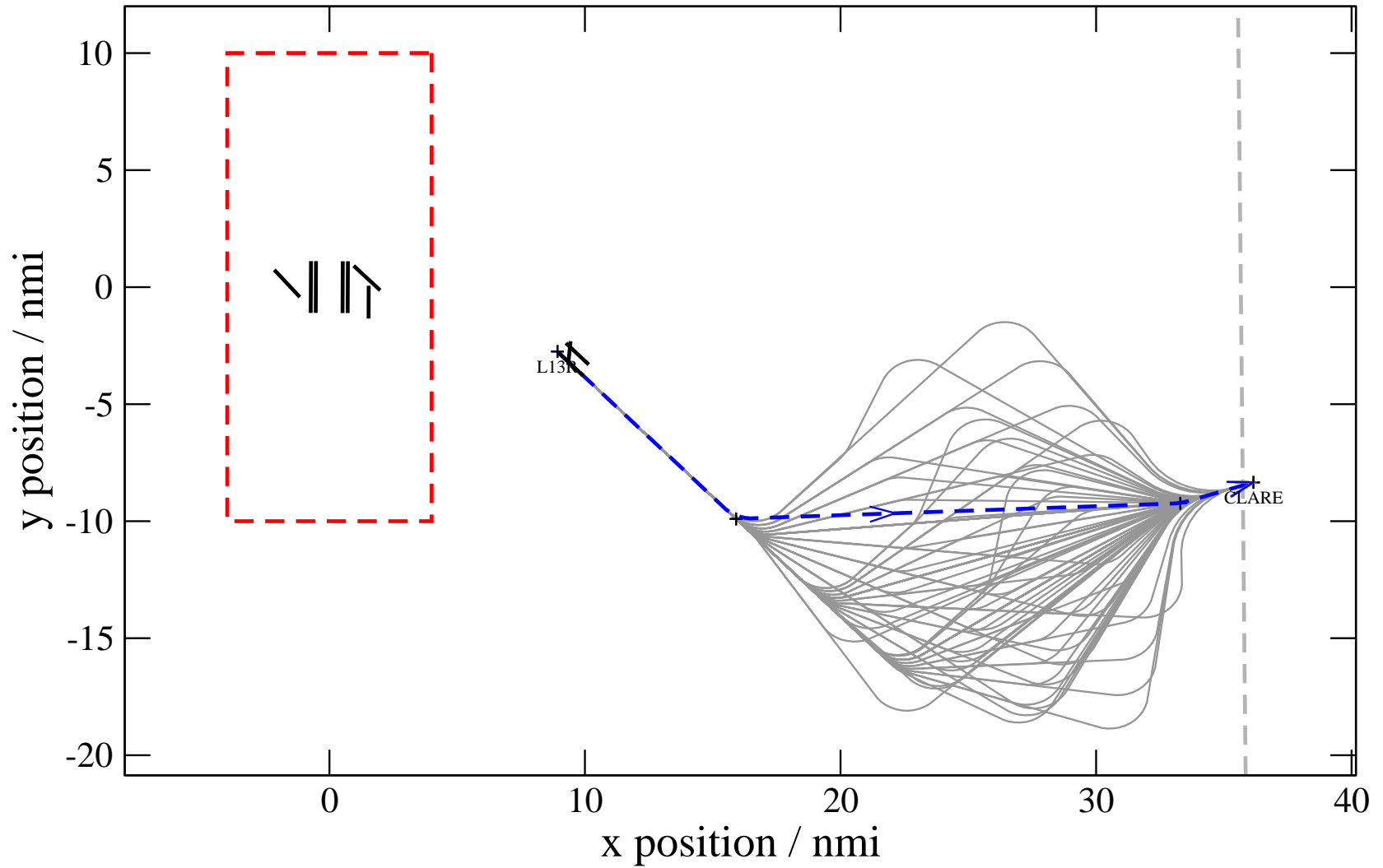
Departure Reroute Candidates

2182 (B737 D DAL/13R Dep) 115 candidates



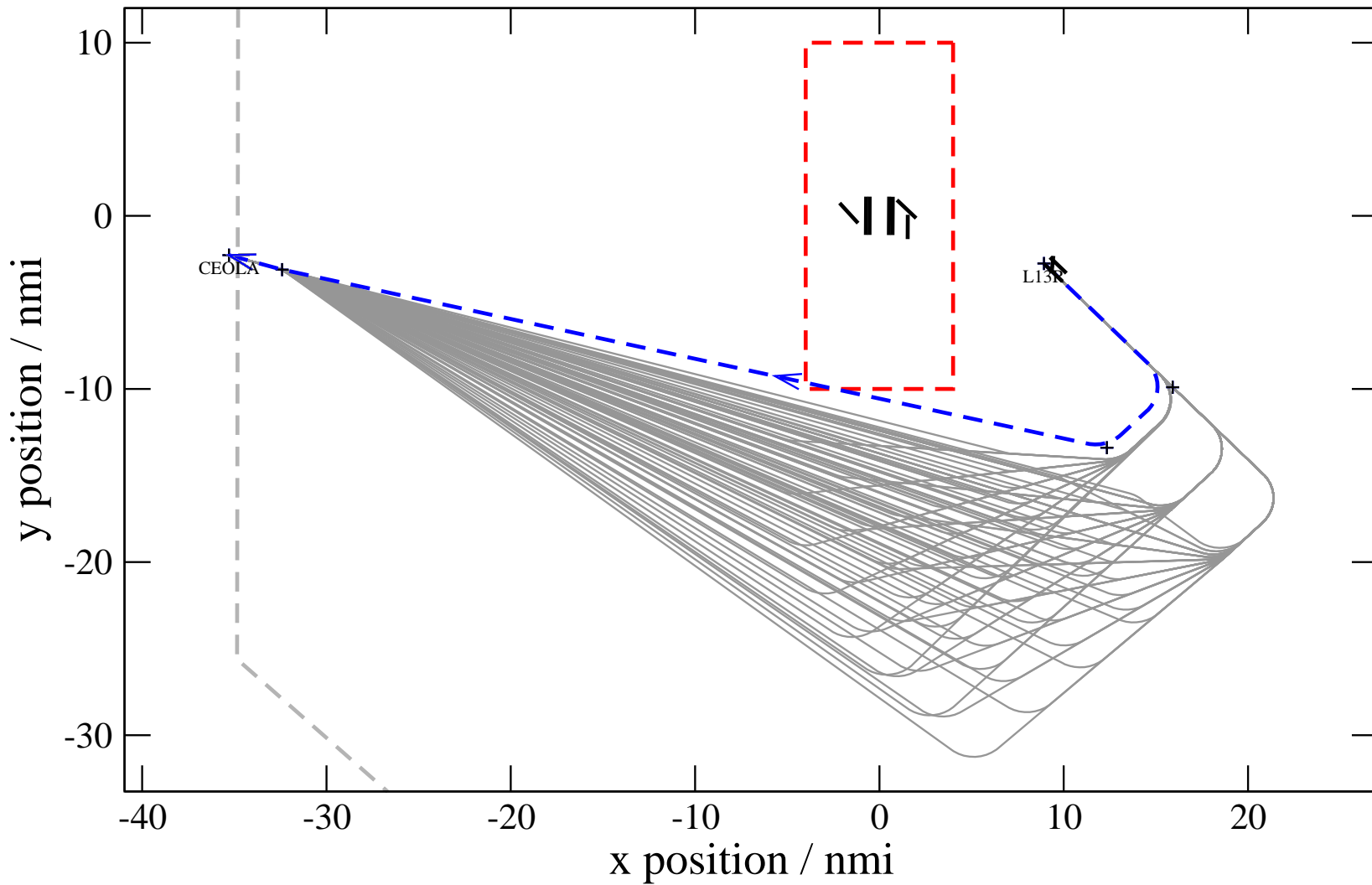
Departure Reroute Candidates

2183 (WW24 F DAL/13R Dep) 82 candidates



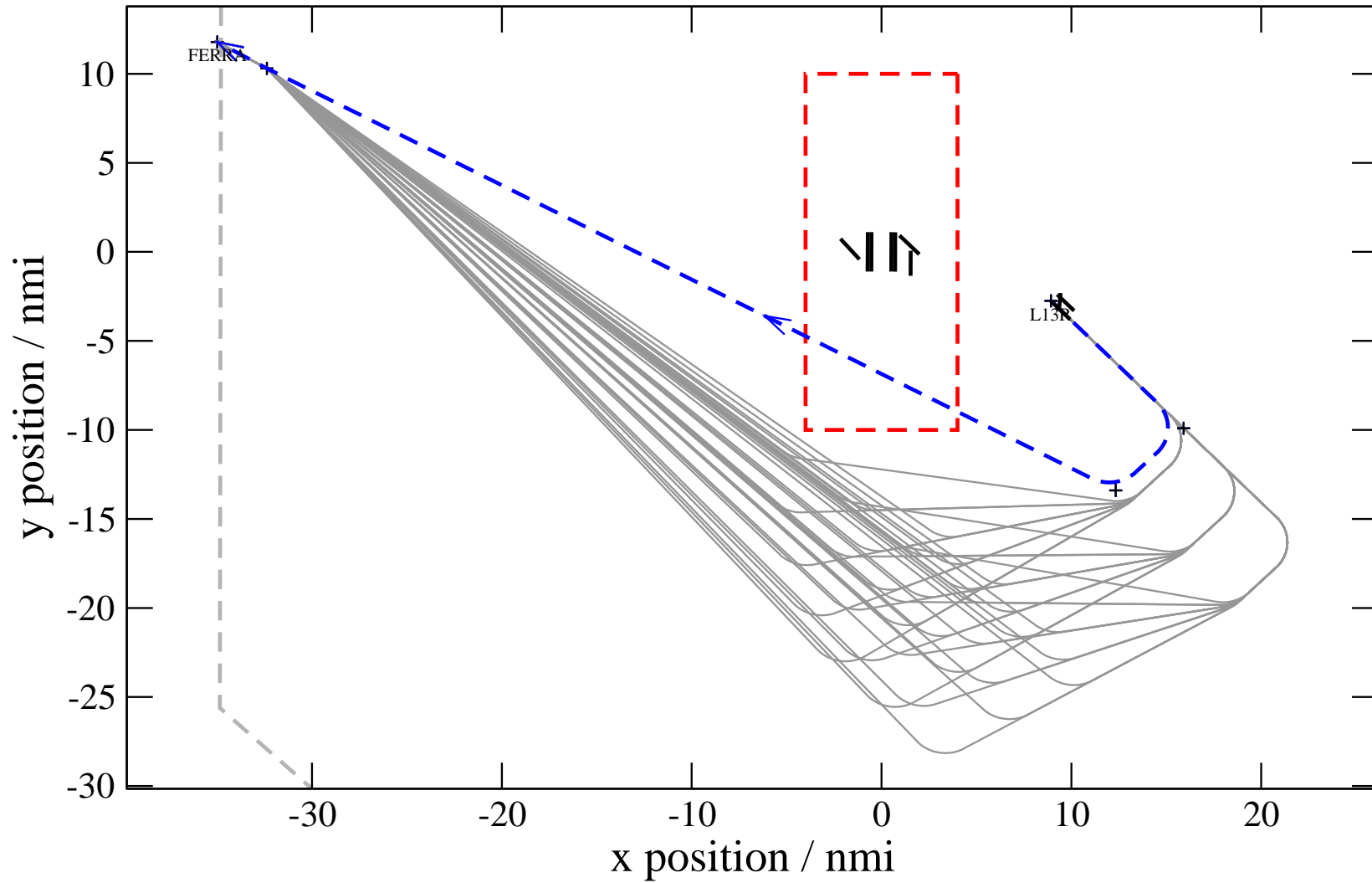
Departure Reroute Candidates

2187 (C560 F DAL/13R Dep) 83 candidates



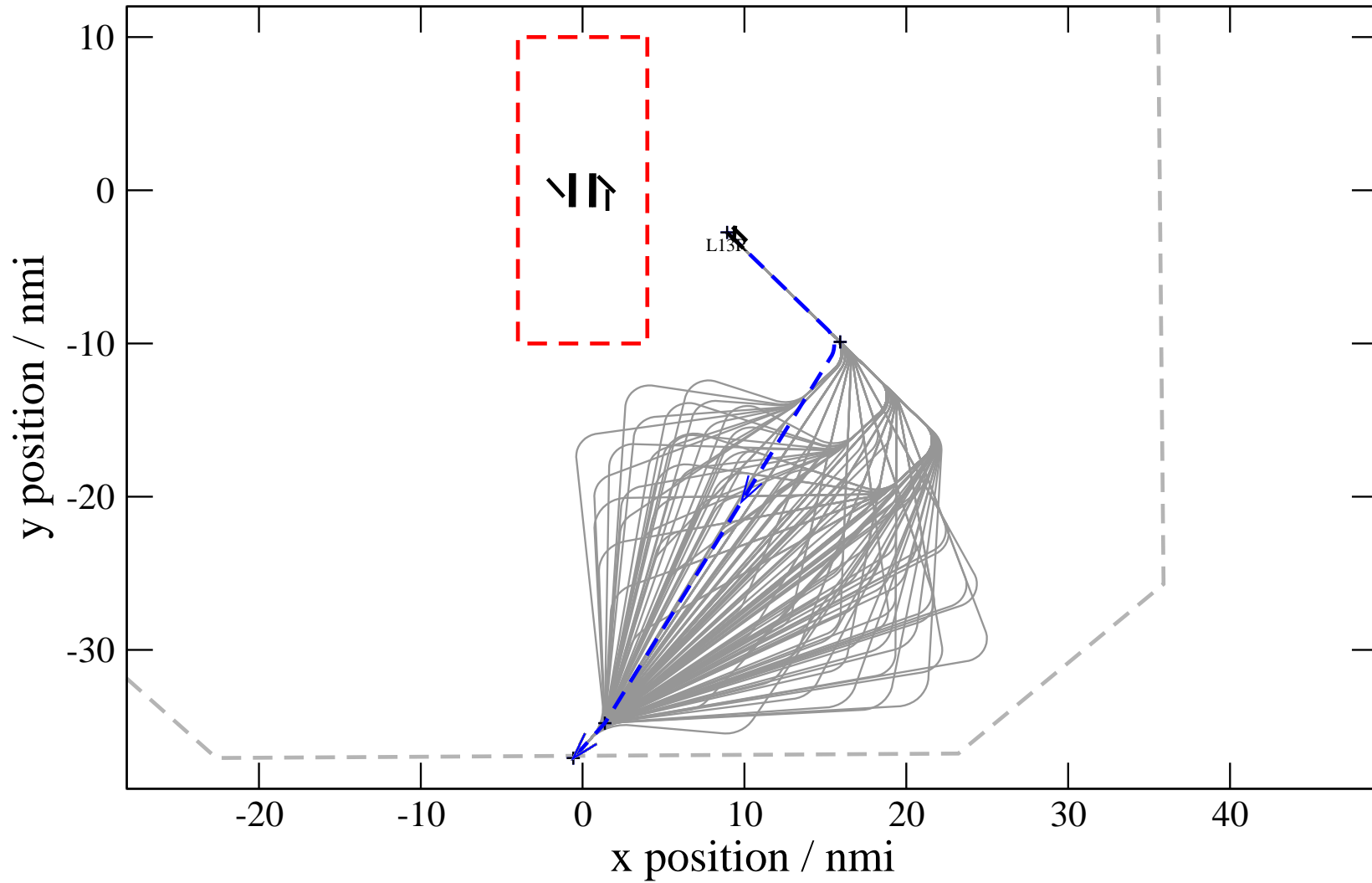
Departure Reroute Candidates

2189 (B737 D DAL/13R Dep) 36 candidates



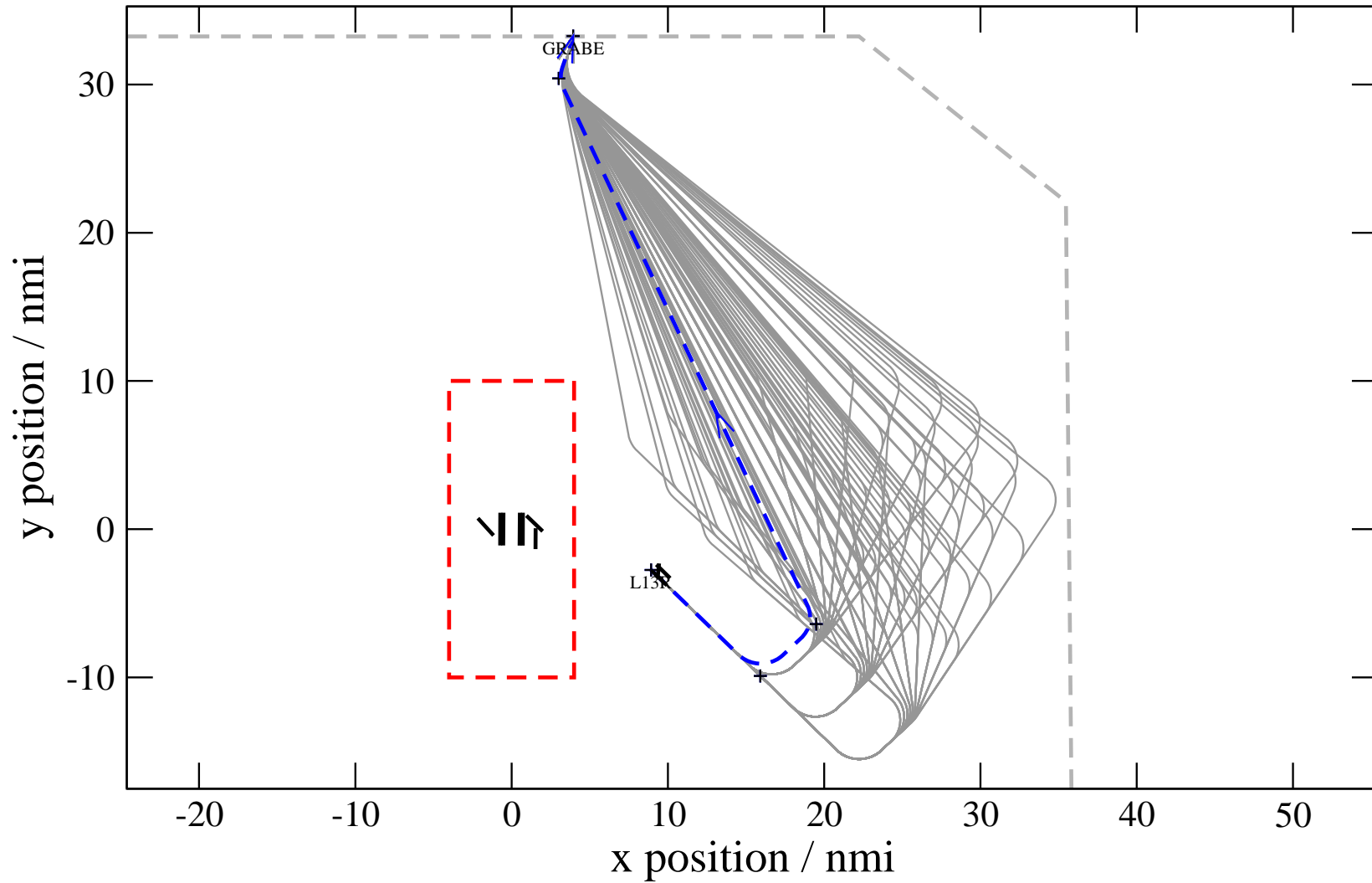
Departure Reroute Candidates

2190 (B733 D DAL/13R Dep) 142 candidates



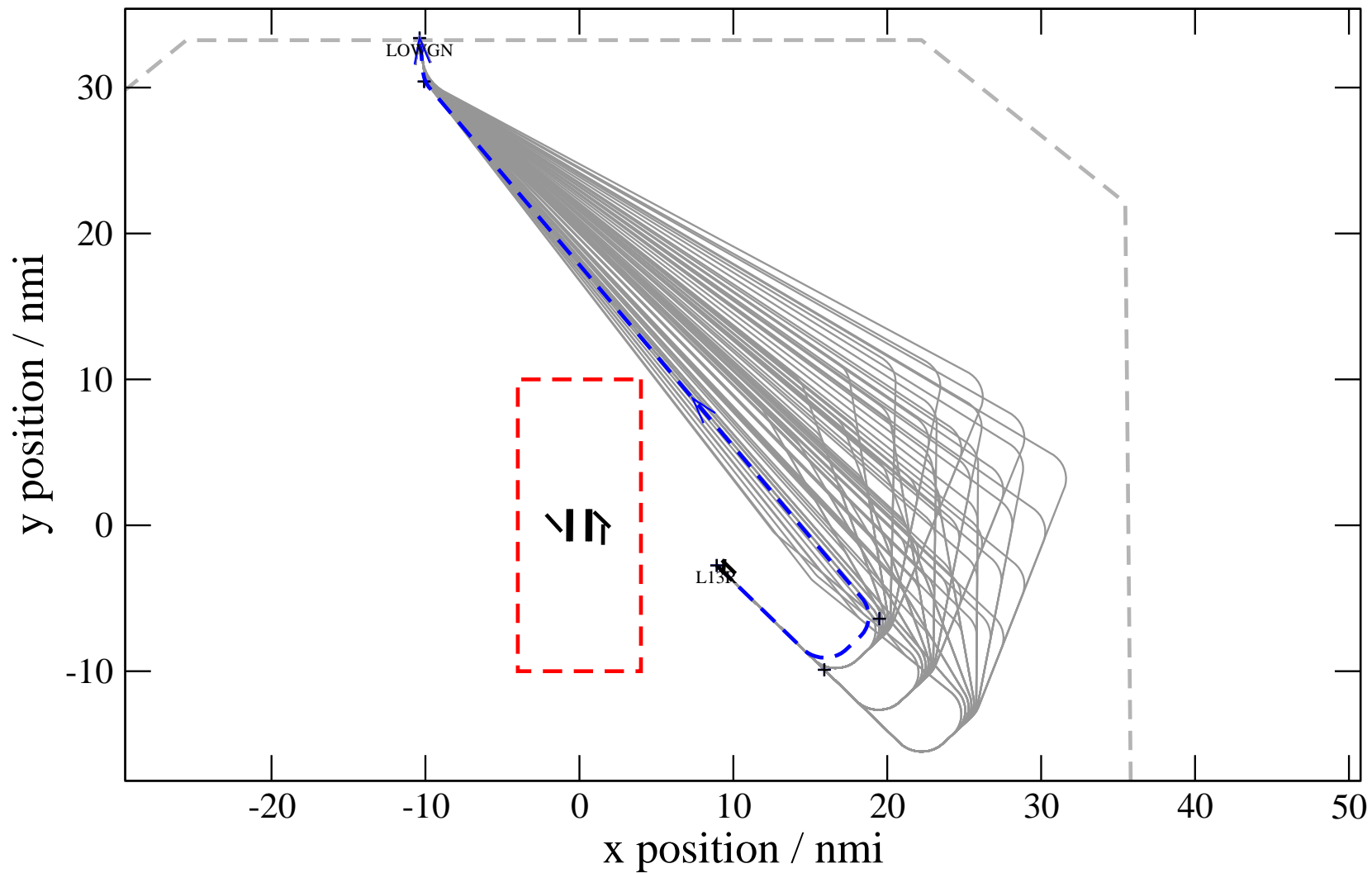
Departure Reroute Candidates

2205 (B737 D DAL/13R Dep) 108 candidates



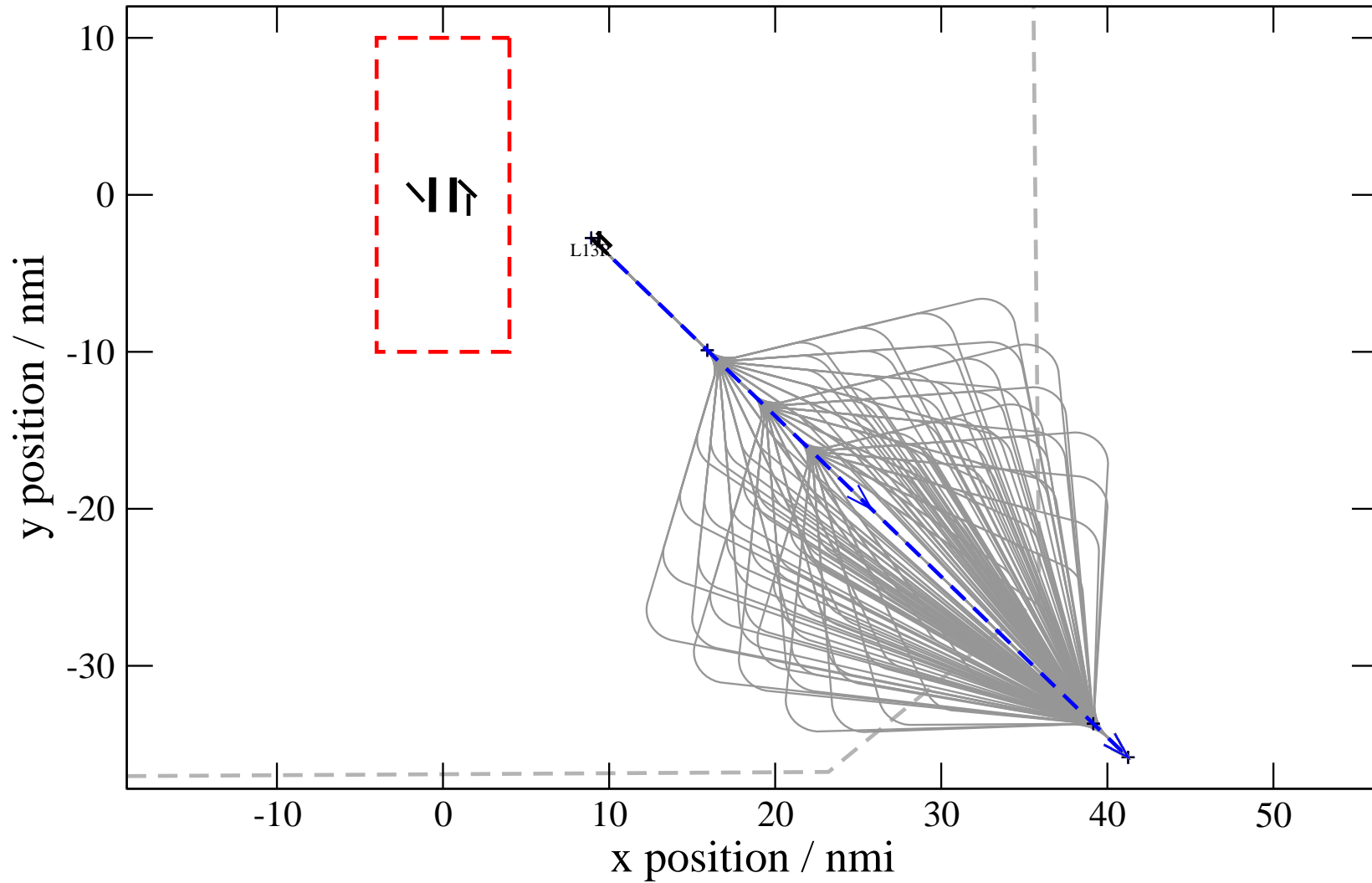
Departure Reroute Candidates

2233 (CL60 E DAL/13R Dep) 91 candidates



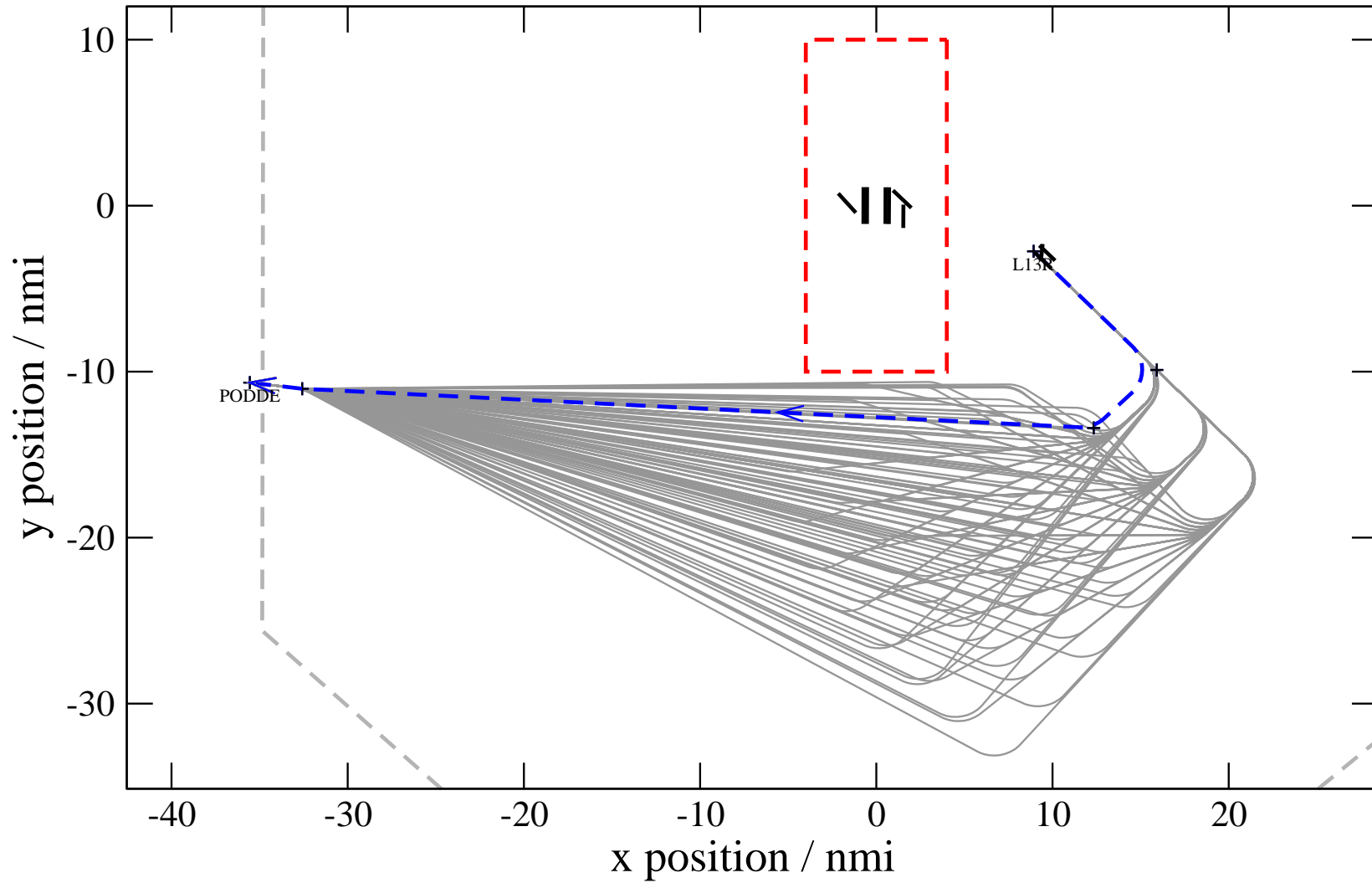
Departure Reroute Candidates

2234 (CRJ2 E DAL/13R Dep) 154 candidates



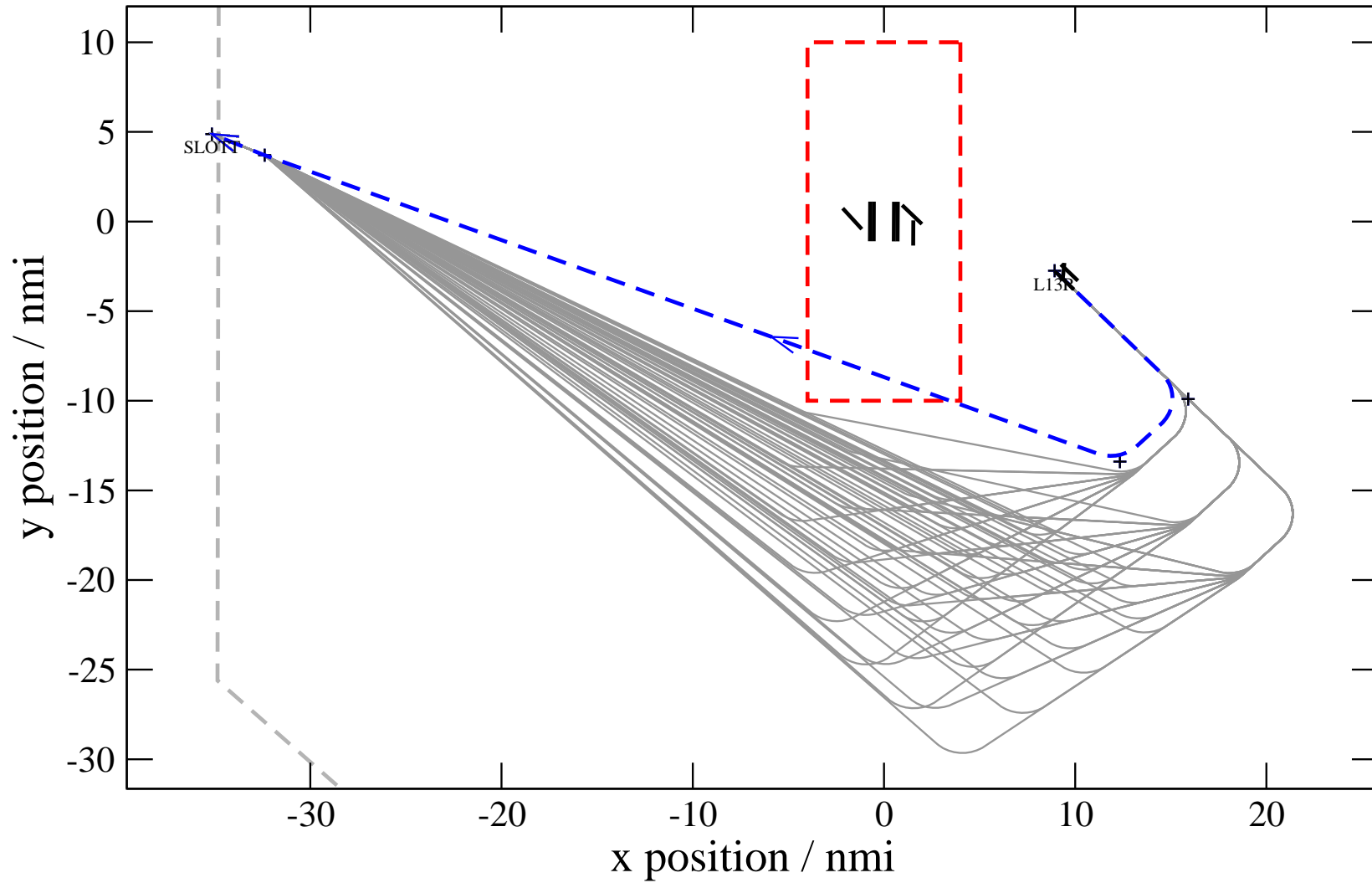
Departure Reroute Candidates

2257 (FA50 F DAL/13R Dep) 112 candidates



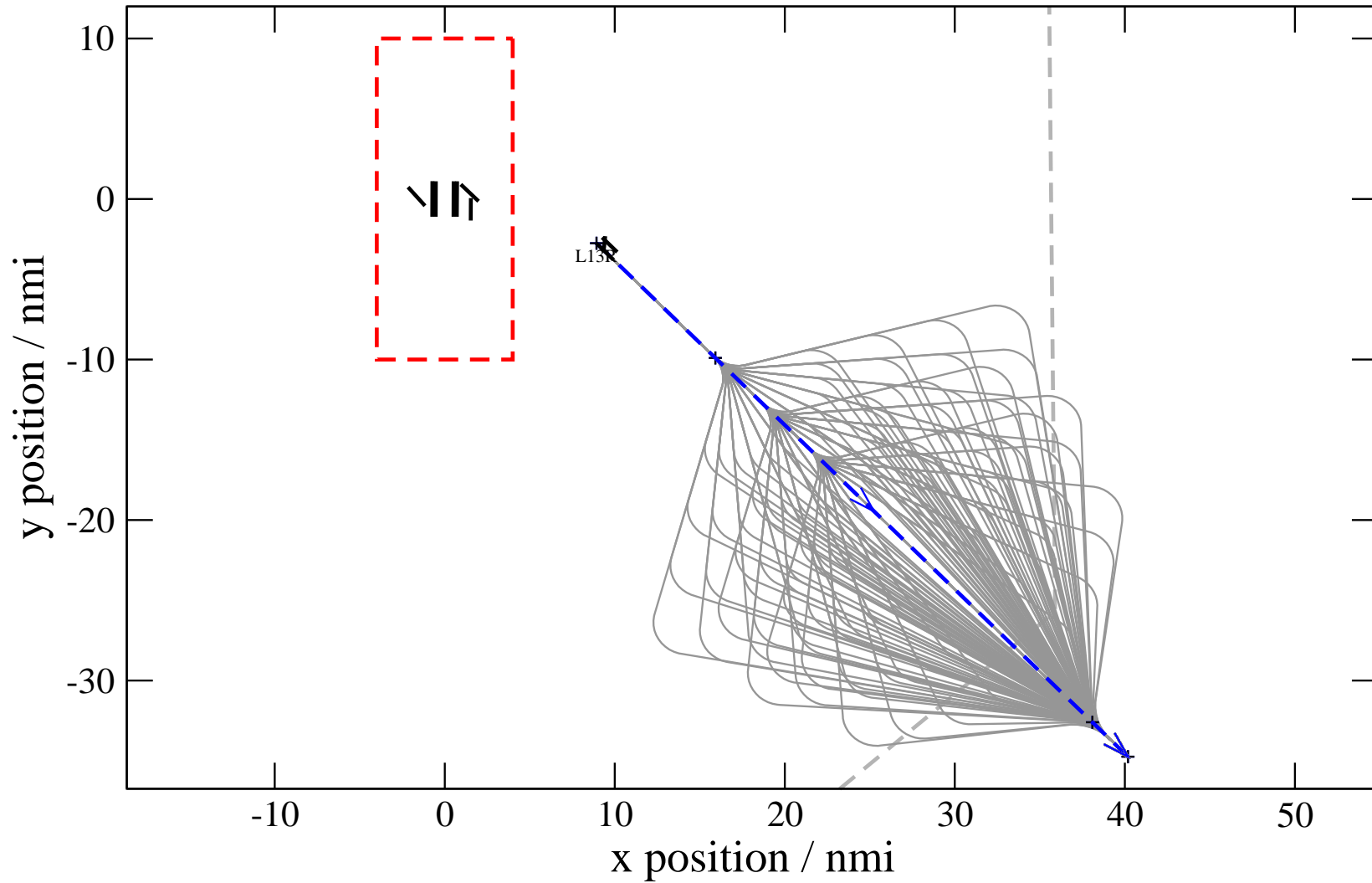
Departure Reroute Candidates

2288 (B737 D DAL/13R Dep) 59 candidates



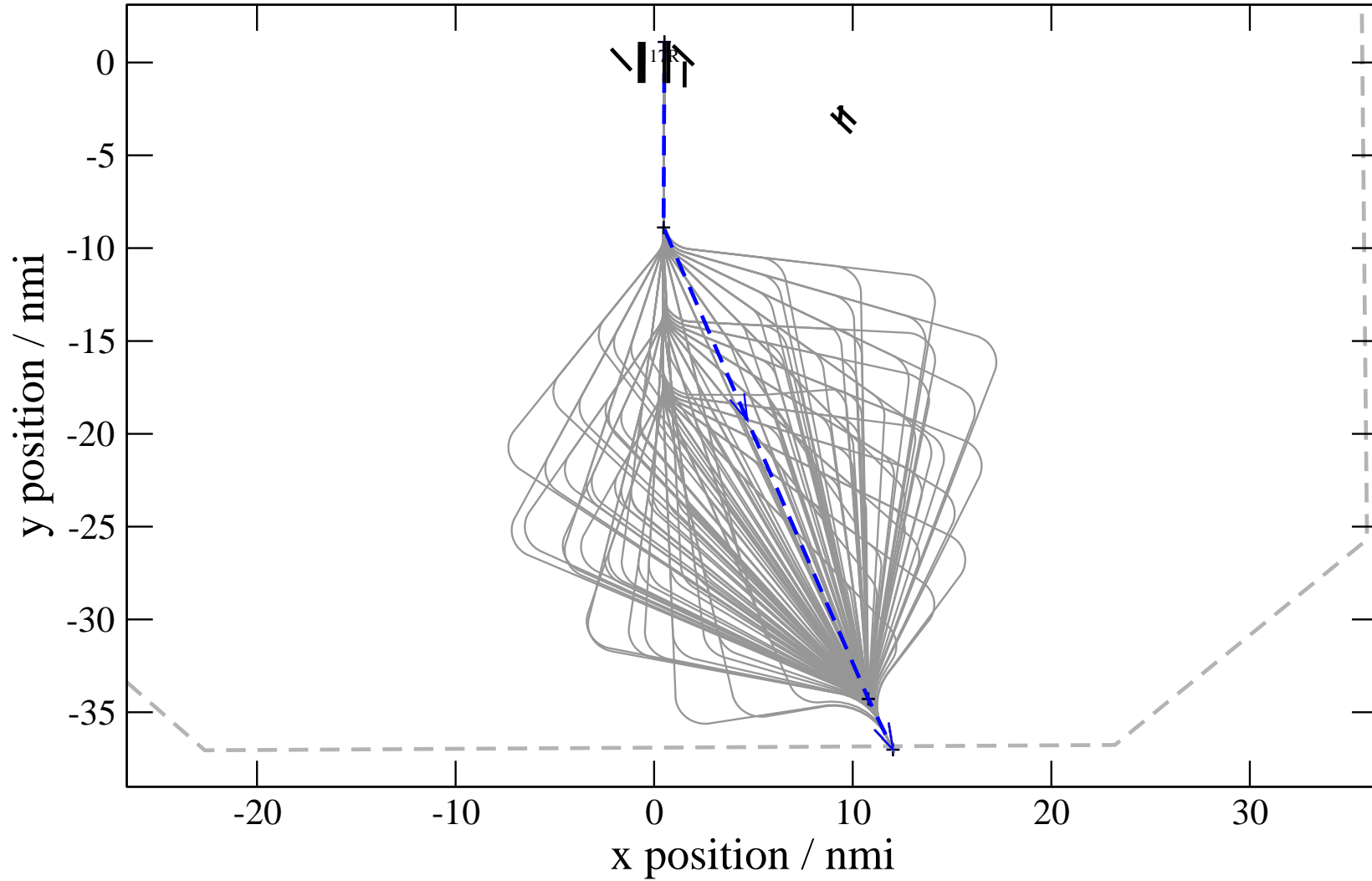
Departure Reroute Candidates

2291 (B733 D DAL/13R Dep) 150 candidates



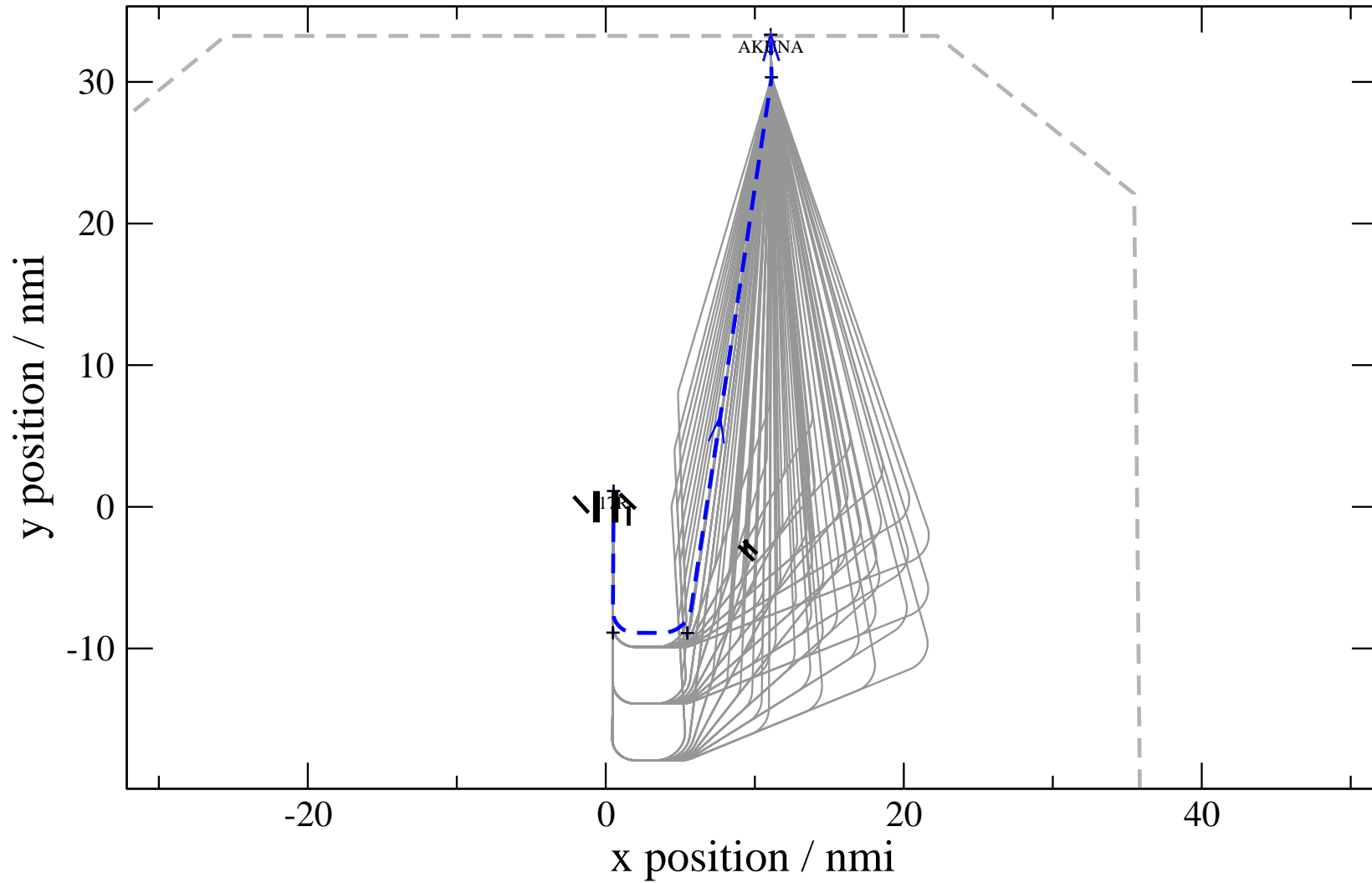
Departure Reroute Candidates

484 (CRJ2 E DFW/17R Dep) 142 candidates



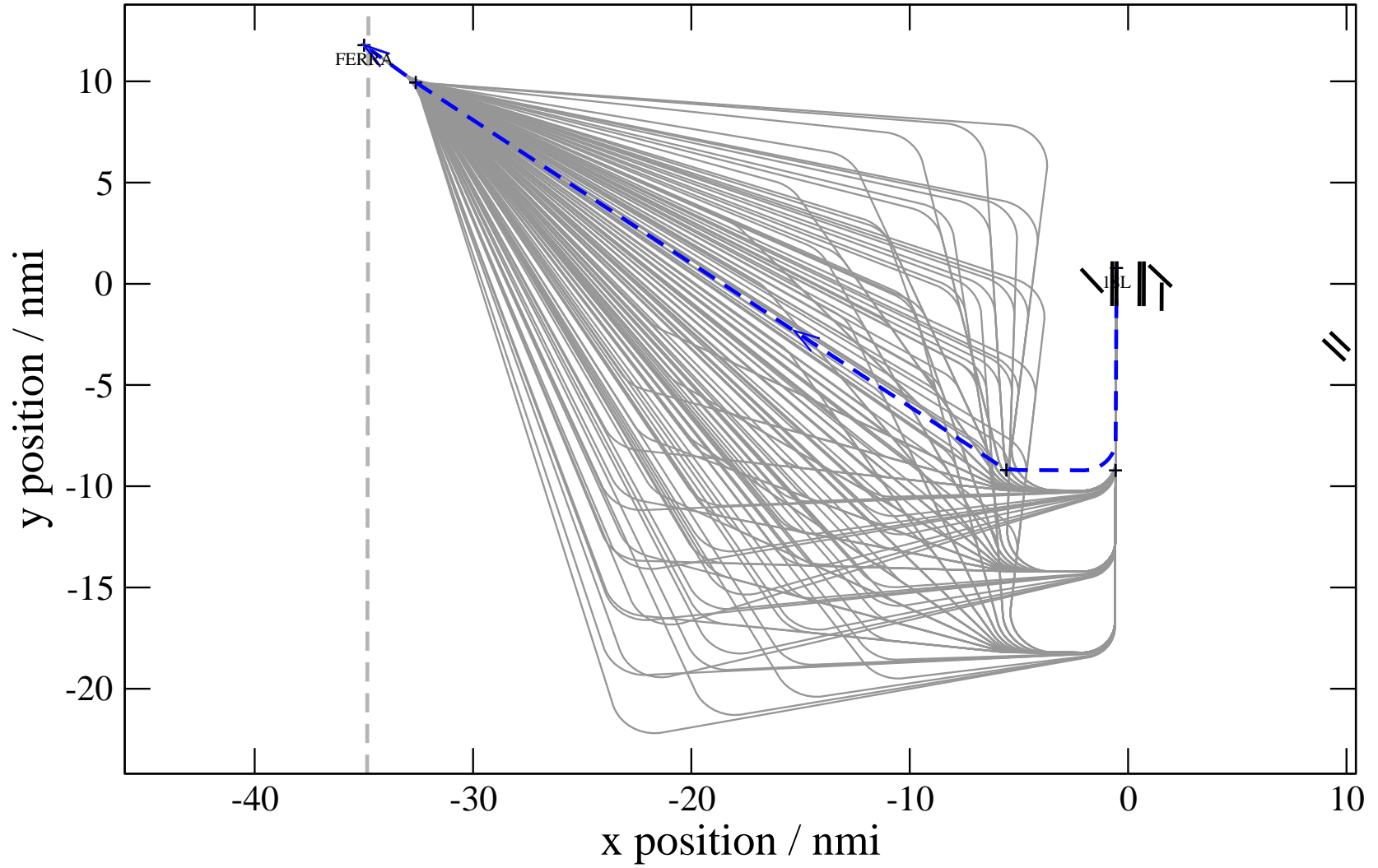
Departure Reroute Candidates

486 (MD83 D DFW/17R Dep) 96 candidates



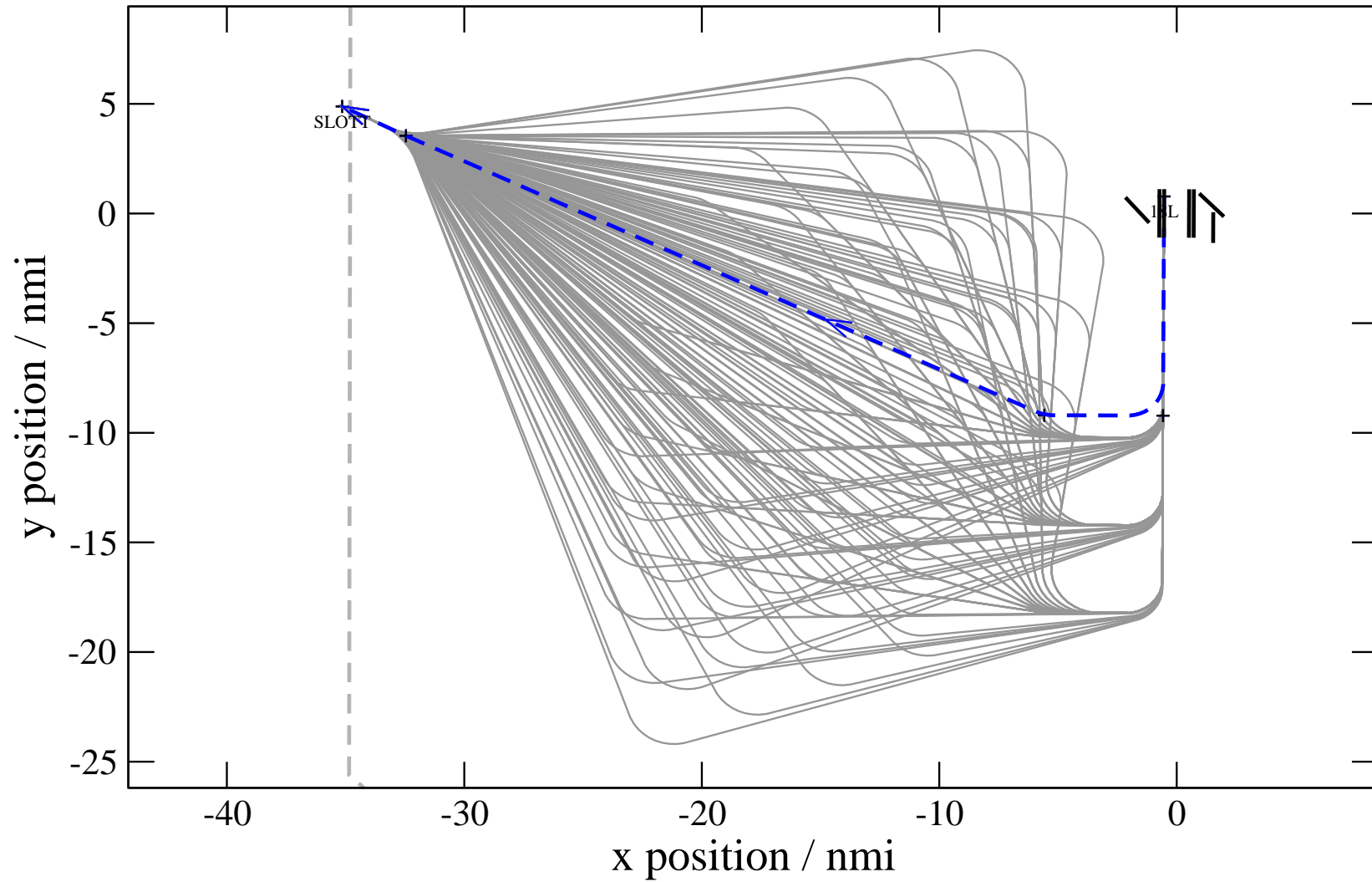
Departure Reroute Candidates

491 (BE99 F DFW/18L Dep) 148 candidates



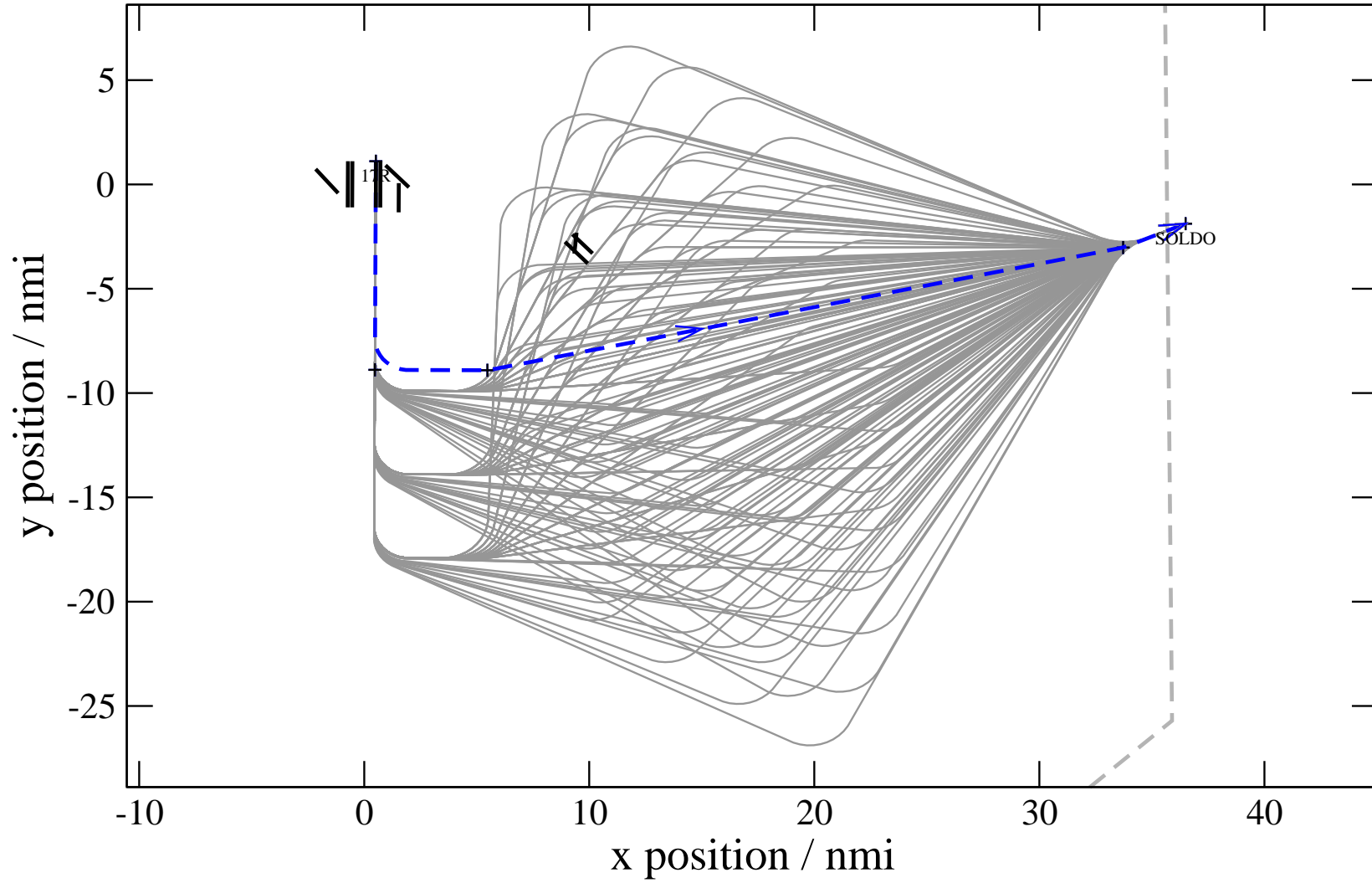
Departure Reroute Candidates

492 (BE99 F DFW/18L Dep) 156 candidates



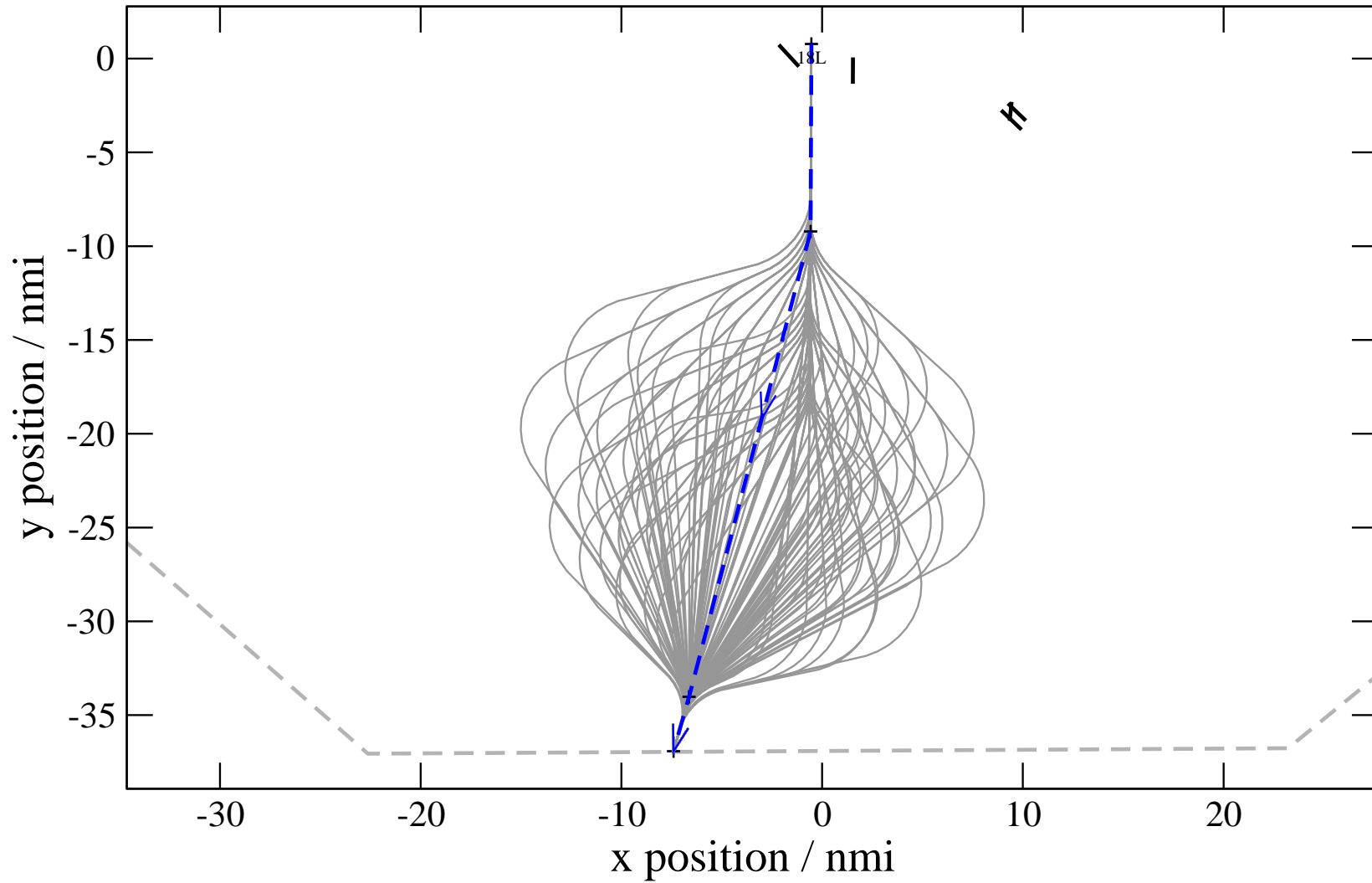
Departure Reroute Candidates

497 (MD88 D DFW/17R Dep) 156 candidates



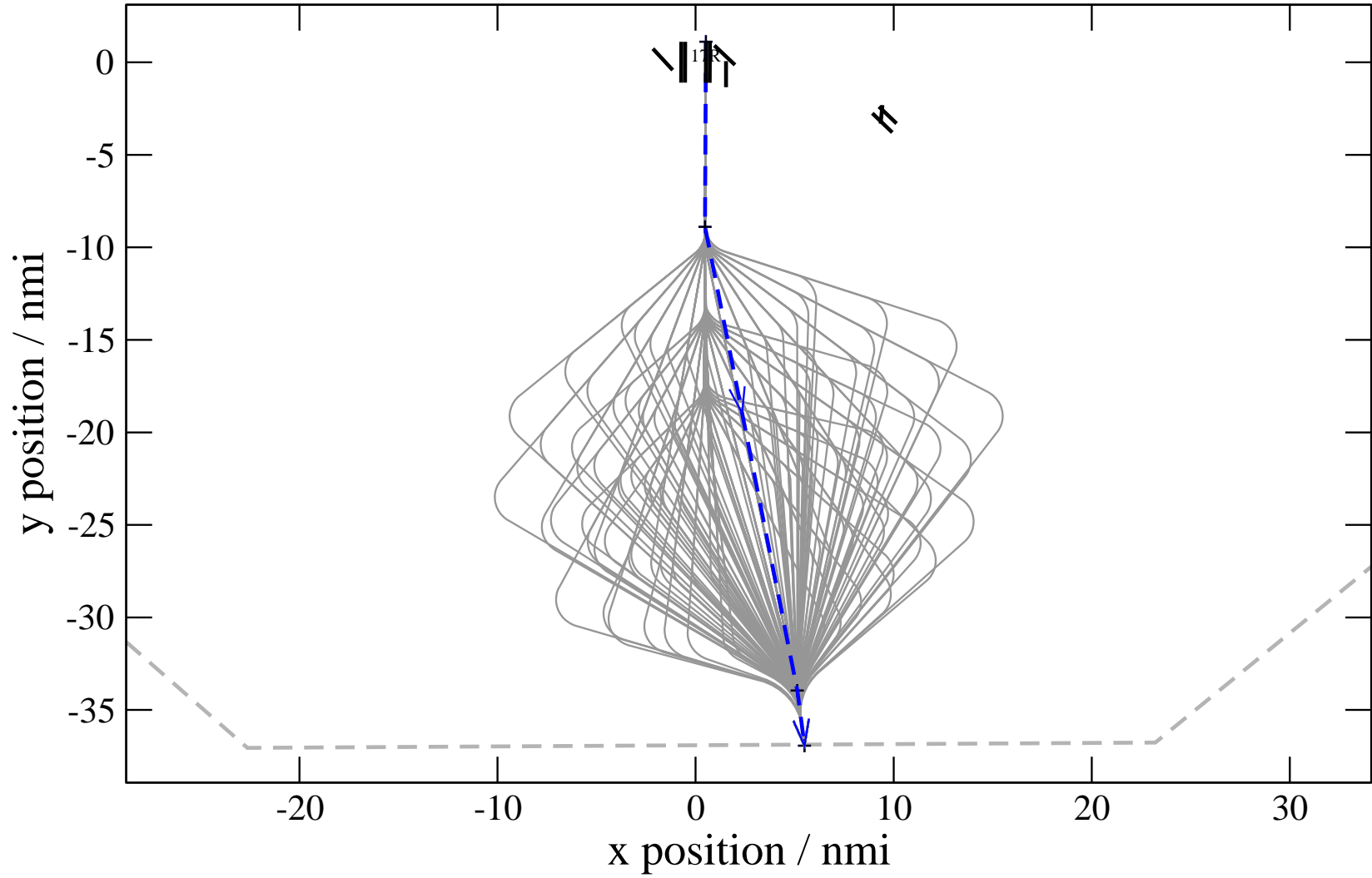
Departure Reroute Candidates

498 (E135 E DFW/18L Dep) 128 candidates



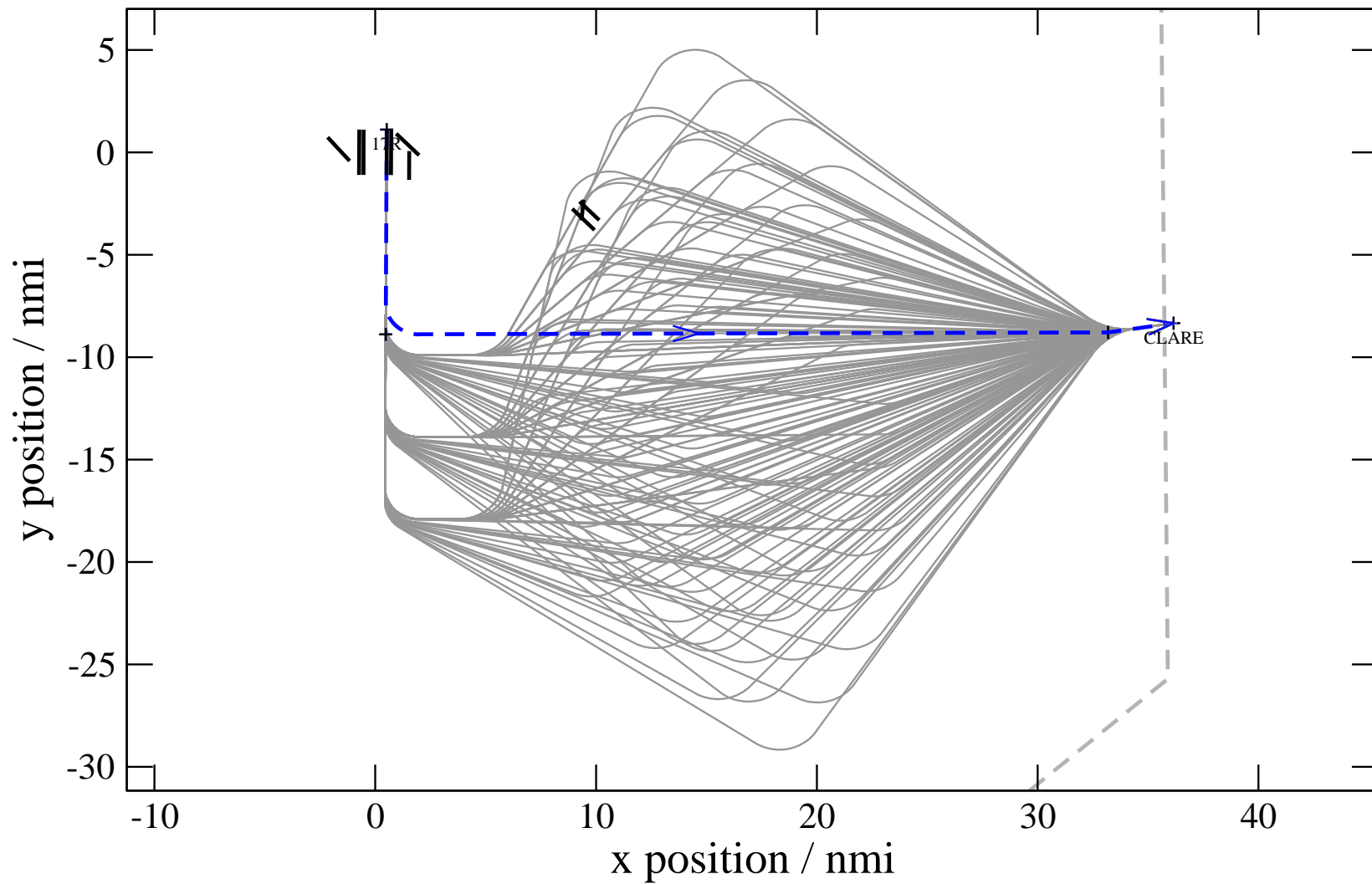
Departure Reroute Candidates

499 (E145 E DFW/17R Dep) 131 candidates



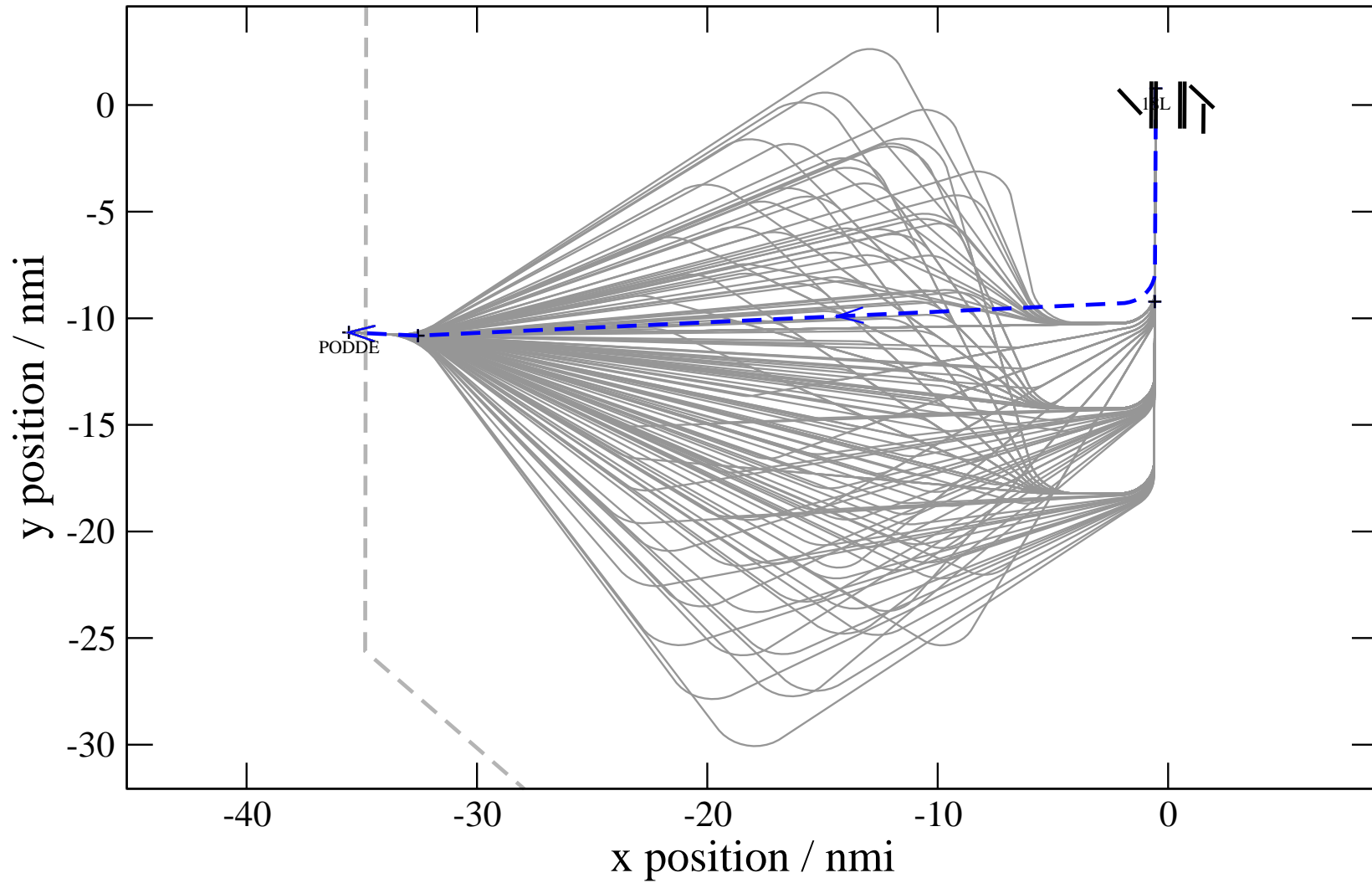
Departure Reroute Candidates

512 (B752 D DFW/17R Dep) 156 candidates



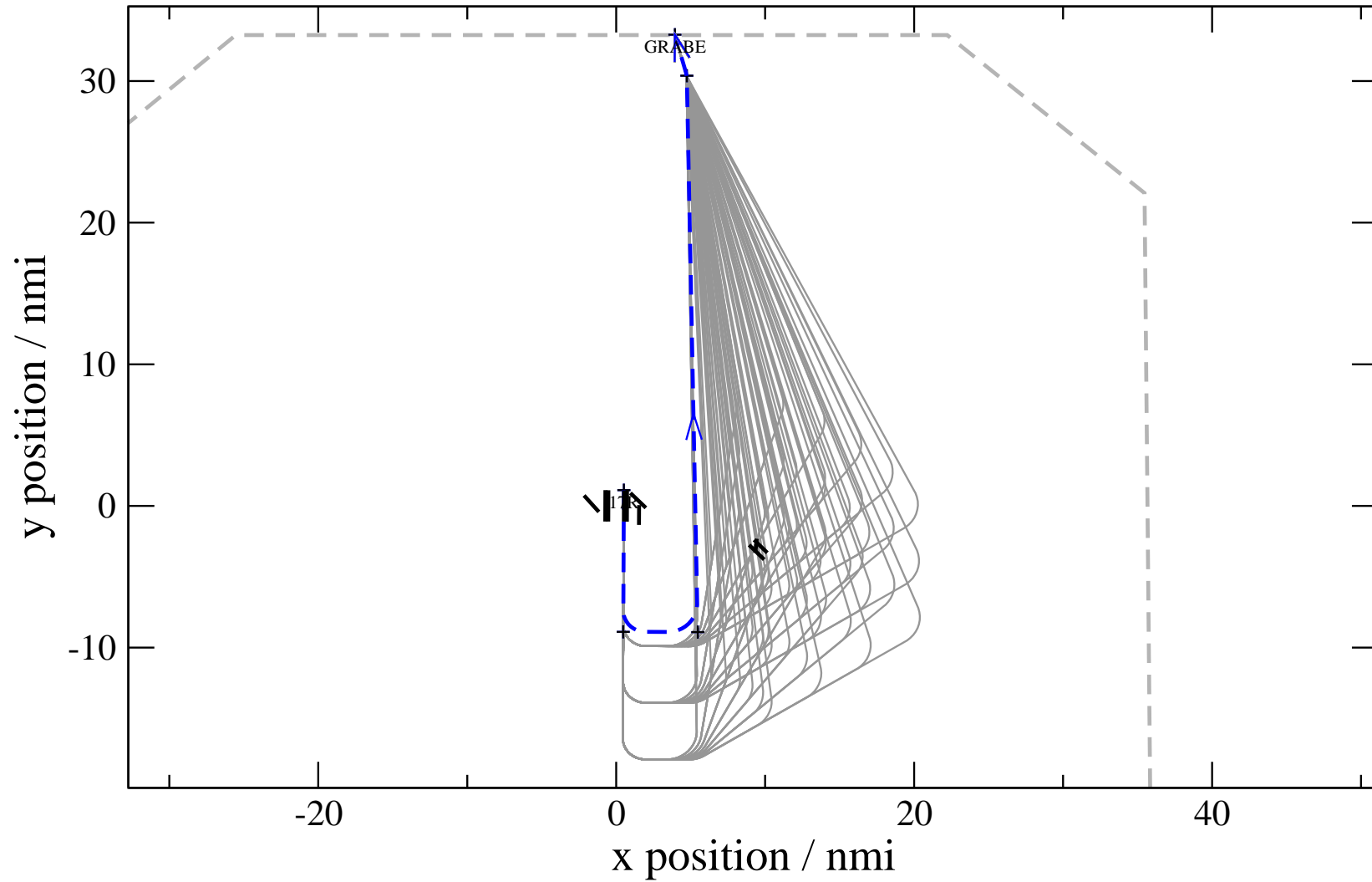
Departure Reroute Candidates

513 (A320 D DFW/18L Dep) 152 candidates



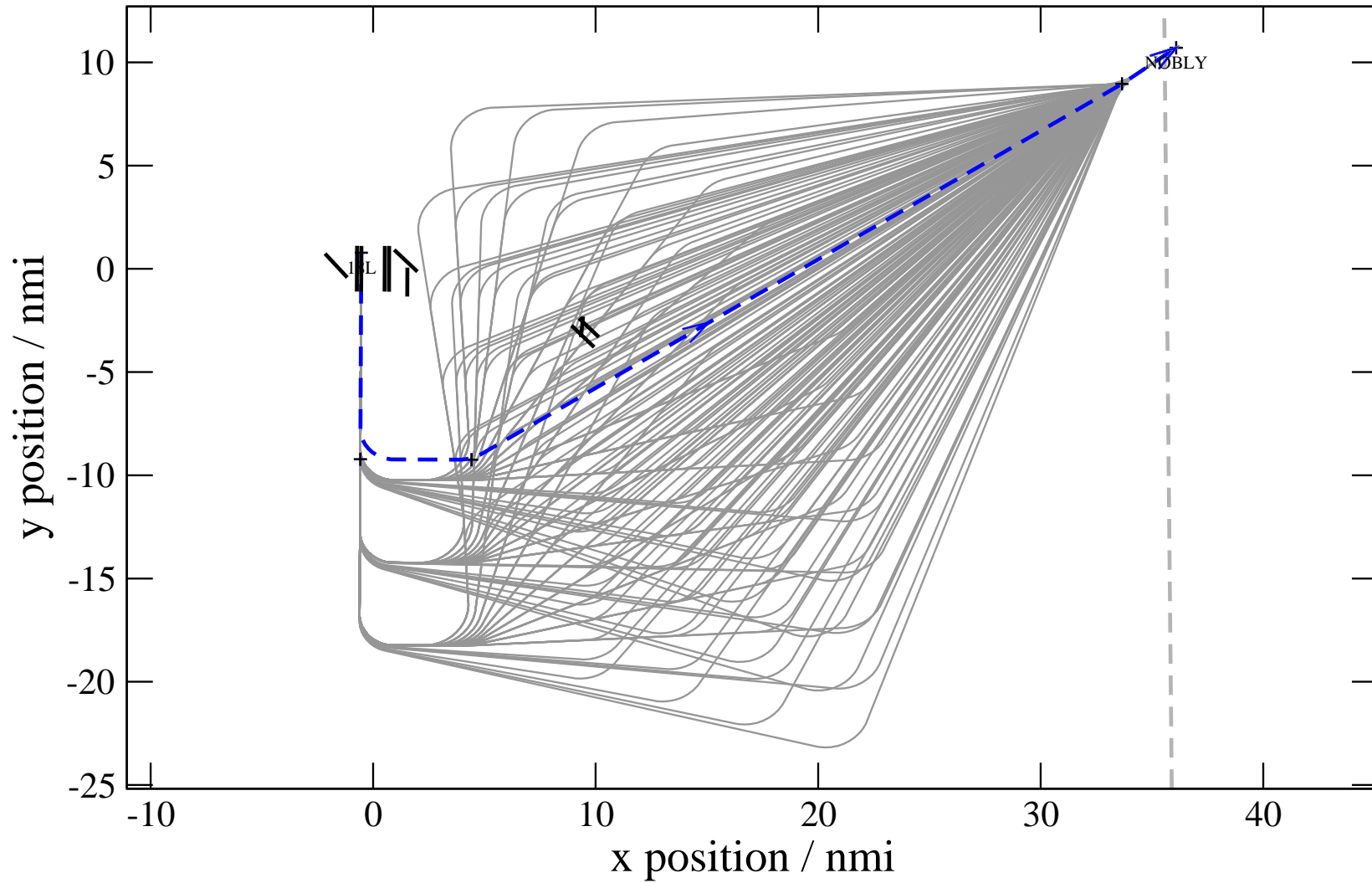
Departure Reroute Candidates

514 (E170 E DFW/17R Dep) 84 candidates



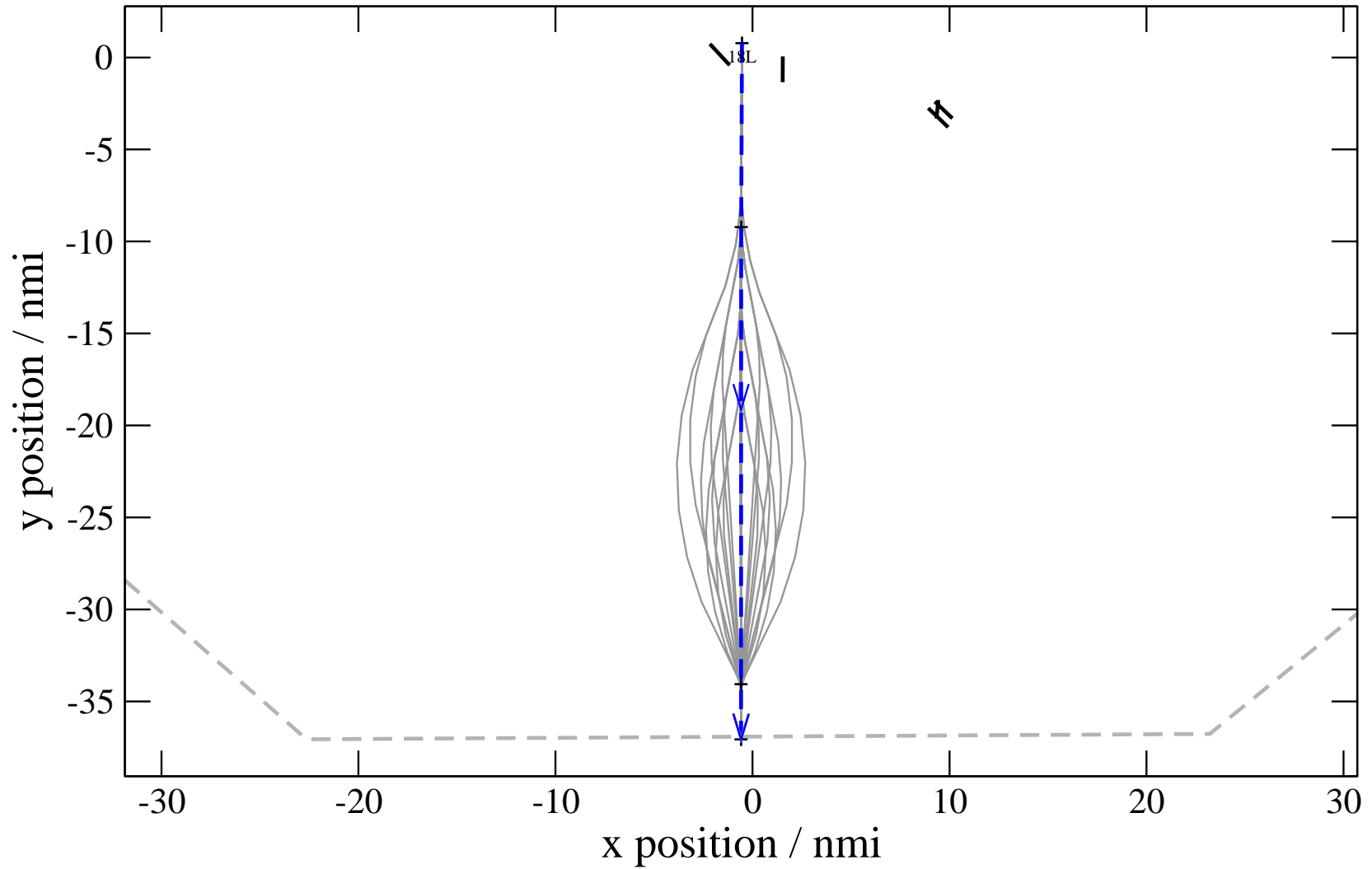
Departure Reroute Candidates

516 (E145 E DFW/18L Dep) 152 candidates



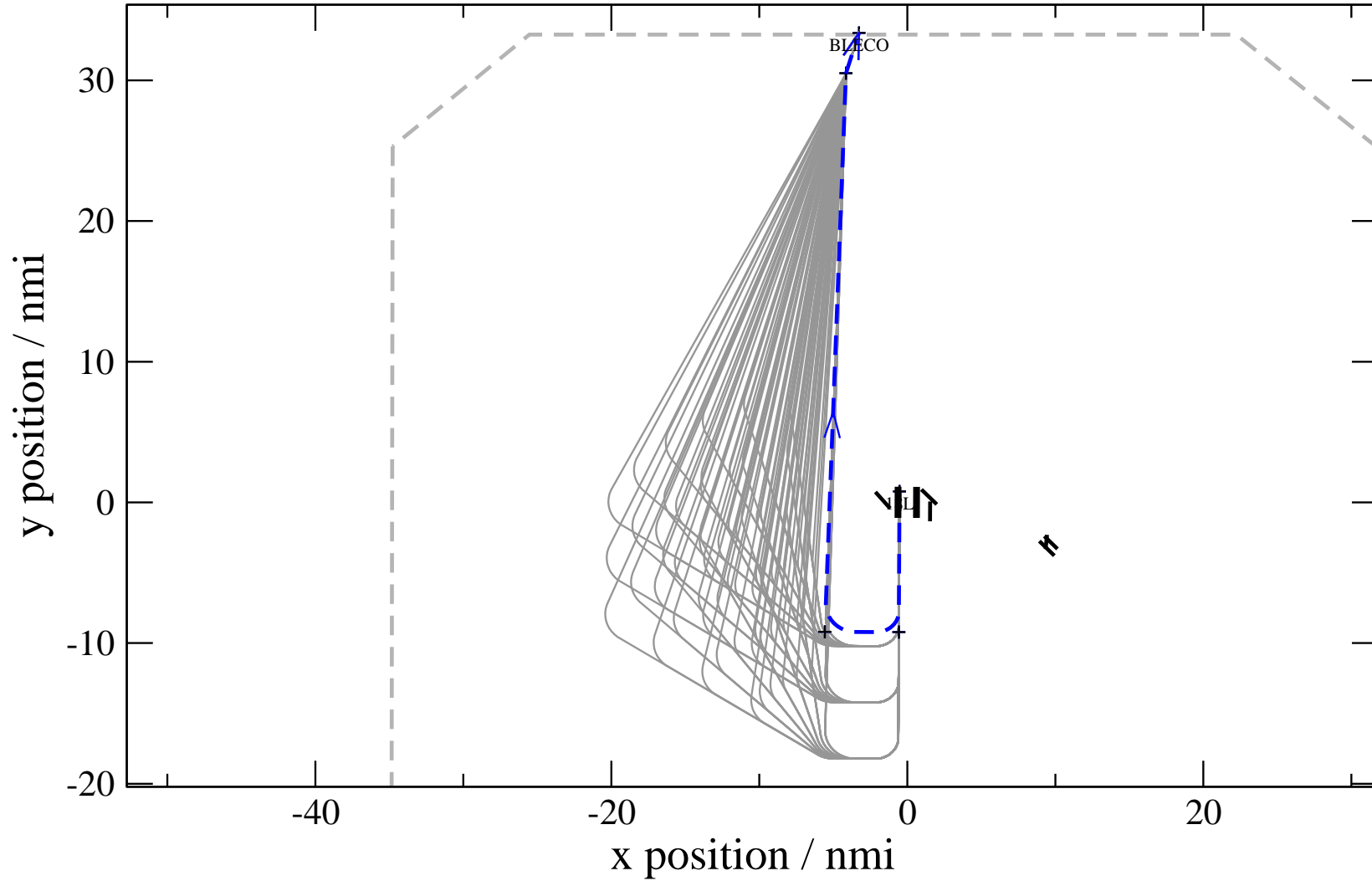
Departure Reroute Candidates

539 (MD82 D DFW/18L Dep) 31 candidates



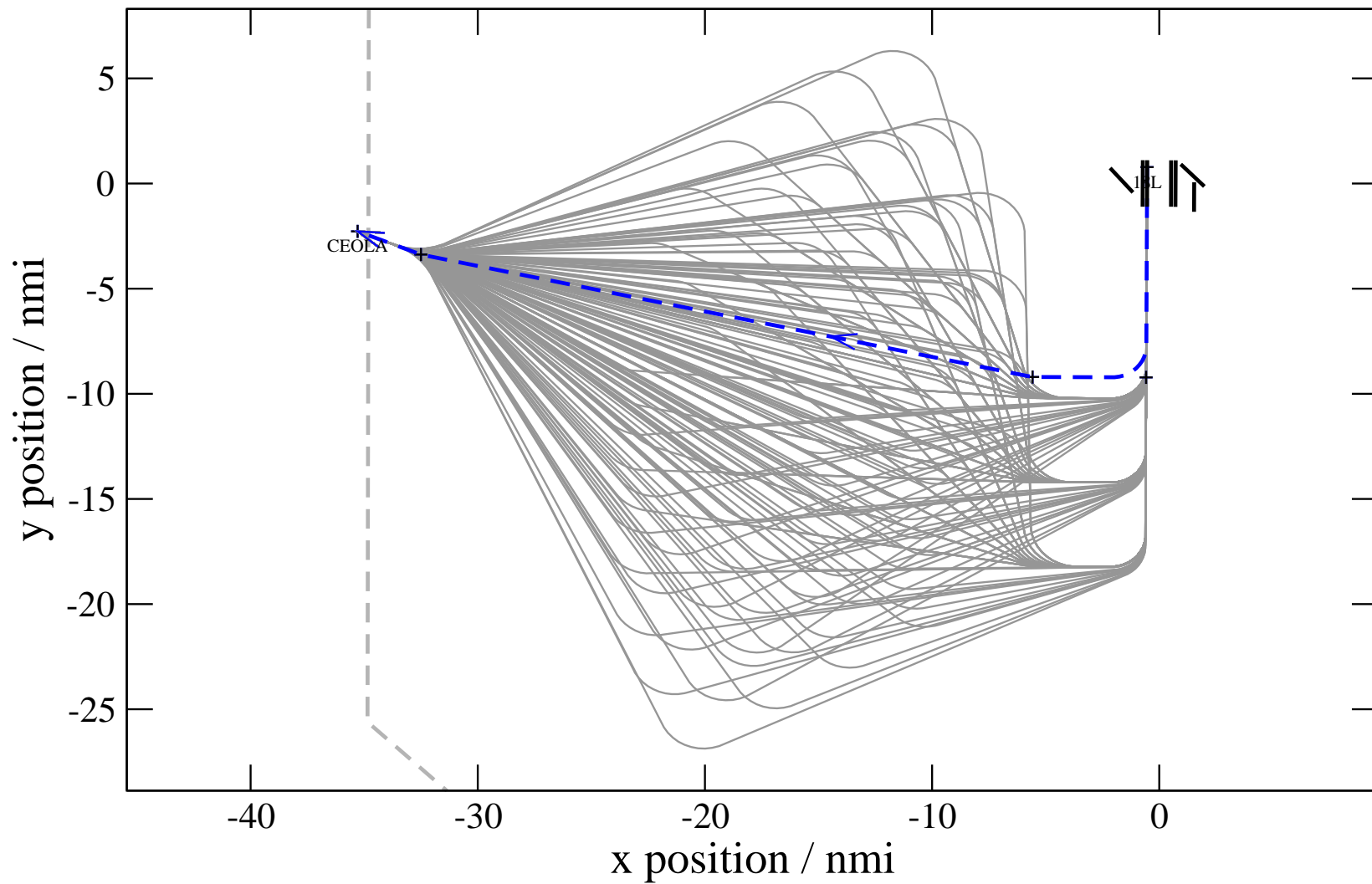
Departure Reroute Candidates

552 (E145 E DFW/18L Dep) 84 candidates



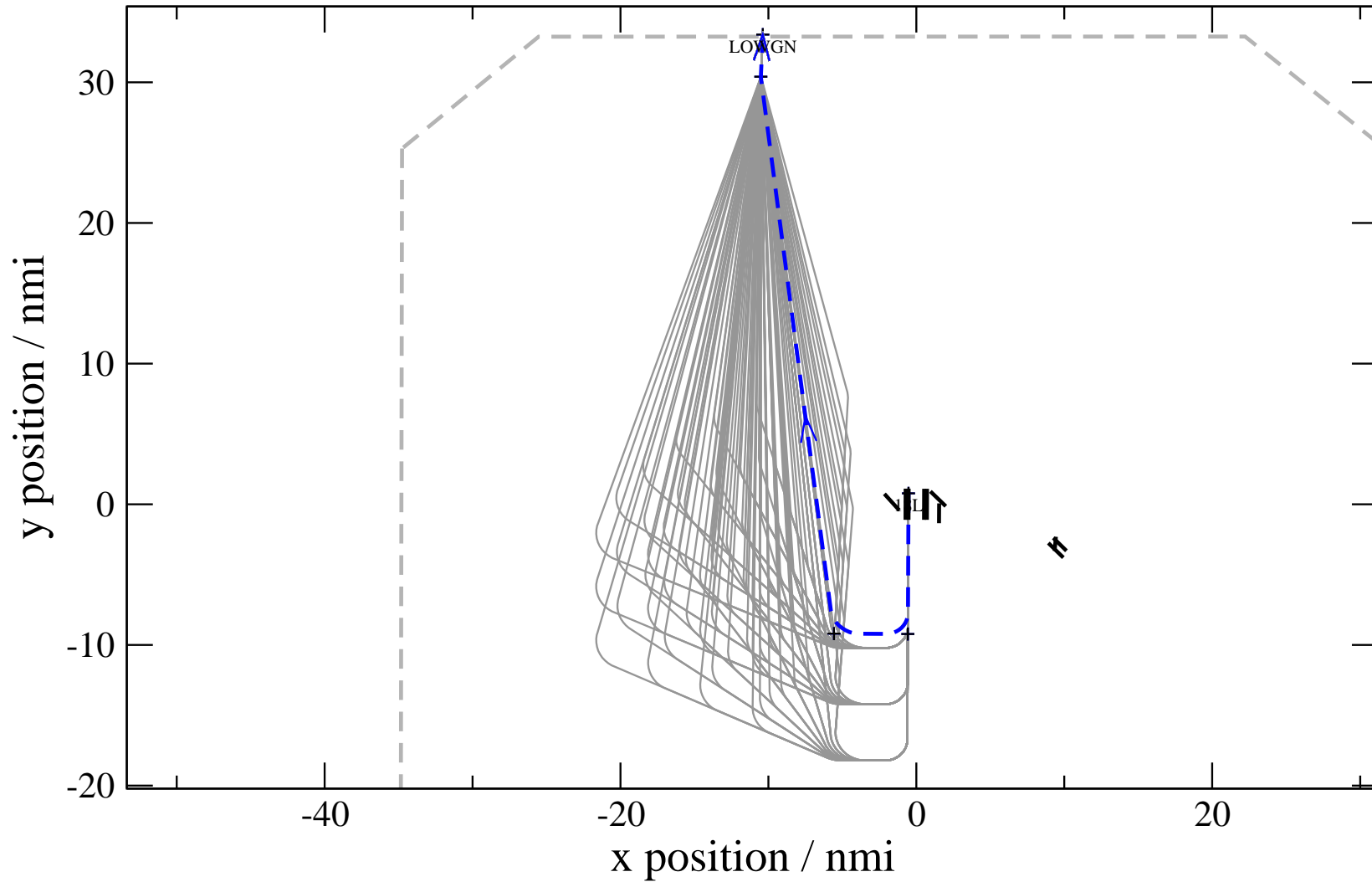
Departure Reroute Candidates

566 (CRJ7 E DFW/18L Dep) 156 candidates



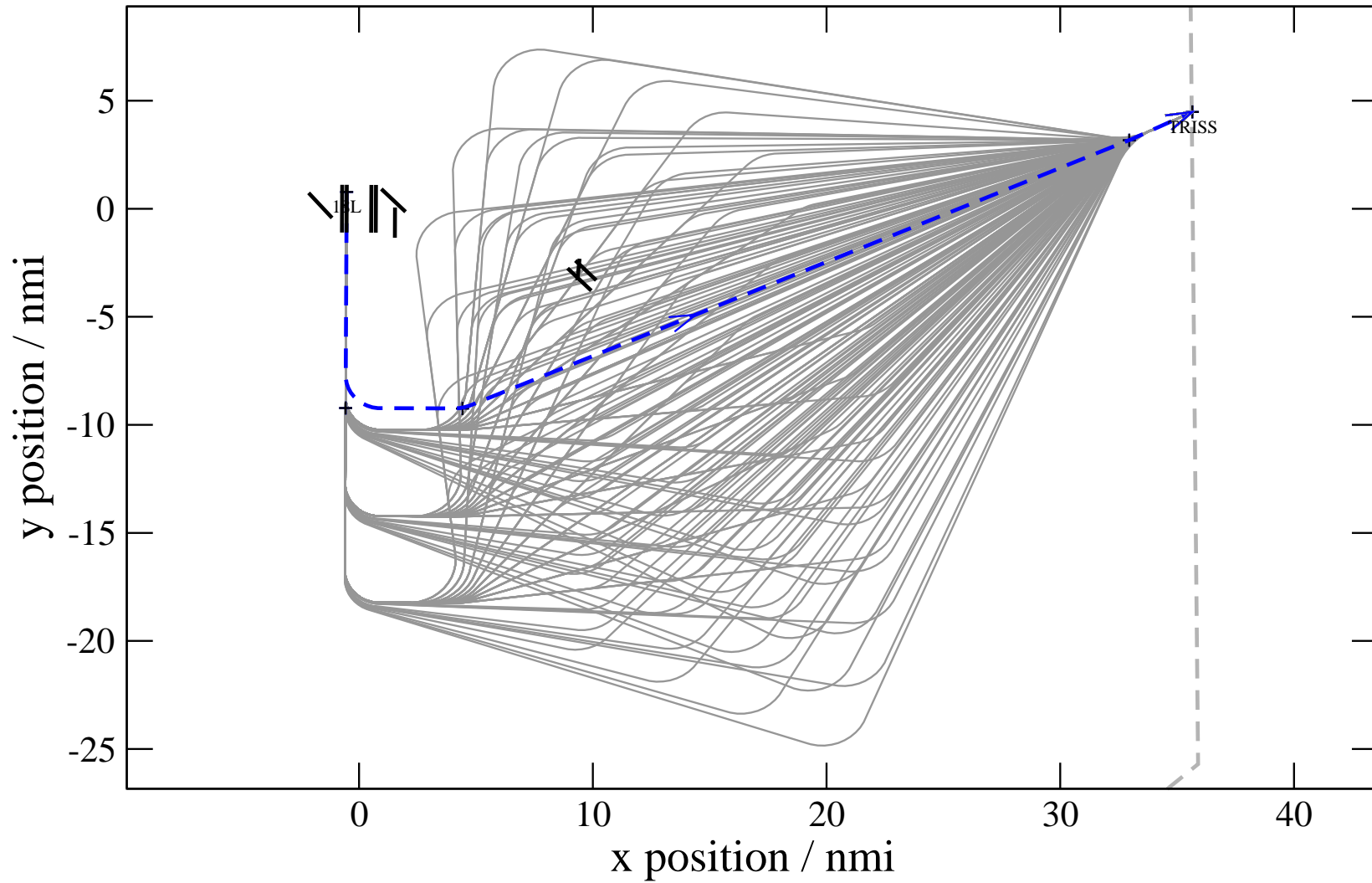
Departure Reroute Candidates

617 (B744 B DFW/18L Dep) 96 candidates



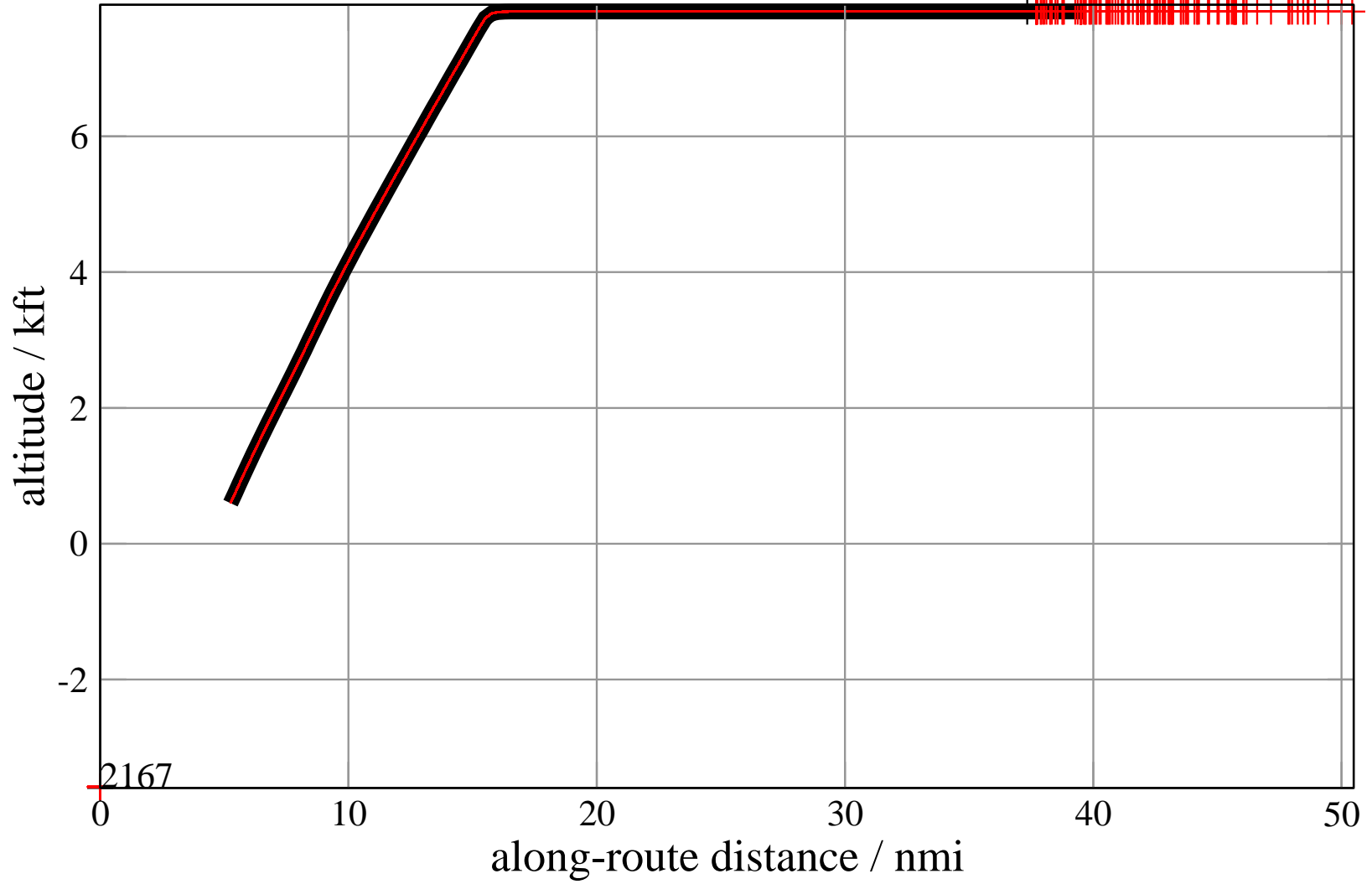
Departure Reroute Candidates

892 (E135 E DFW/18L Dep) 156 candidates



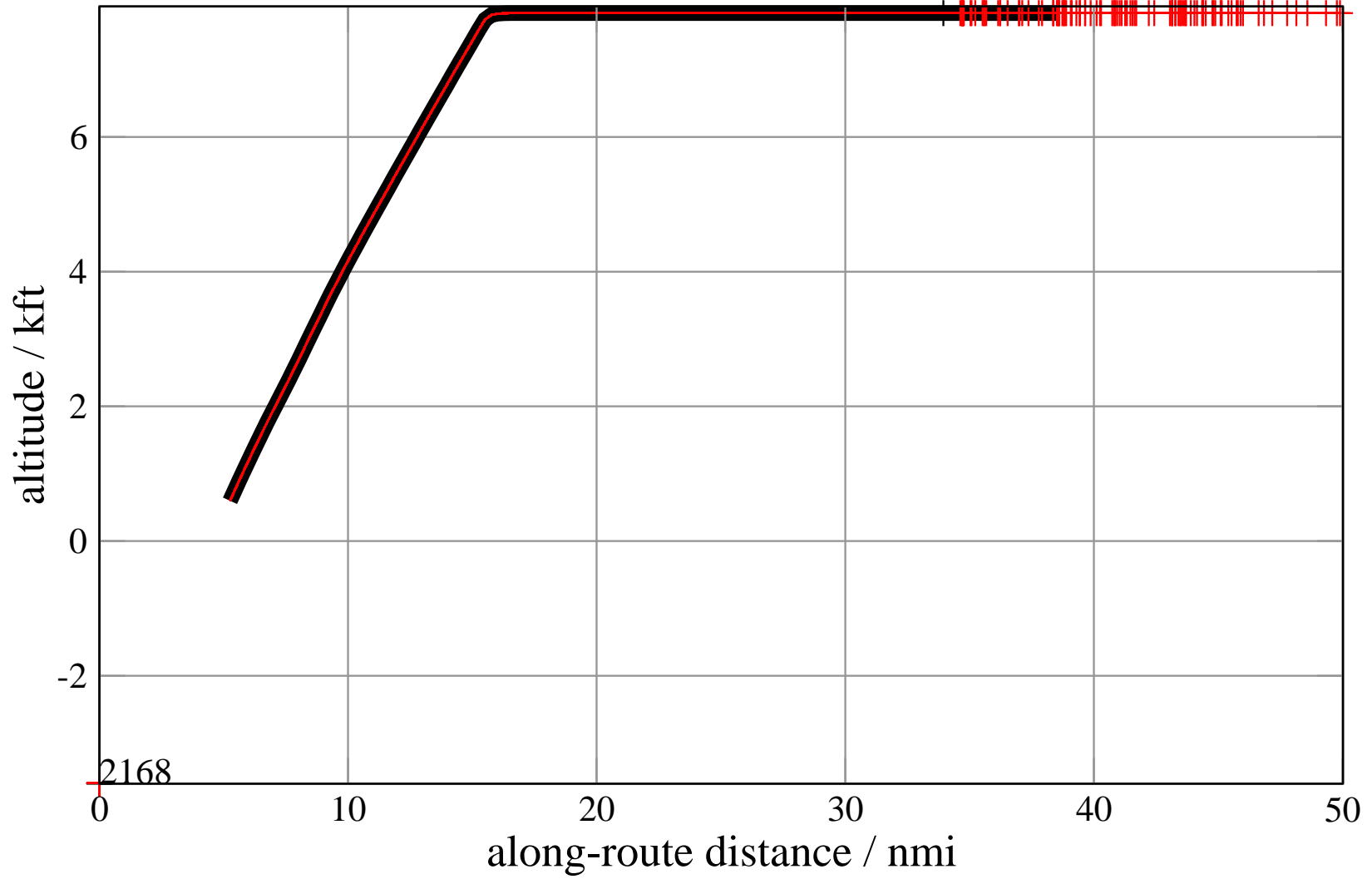
Altitude vs Distance

2167 (CRJ7 E DAL/13R Dep)



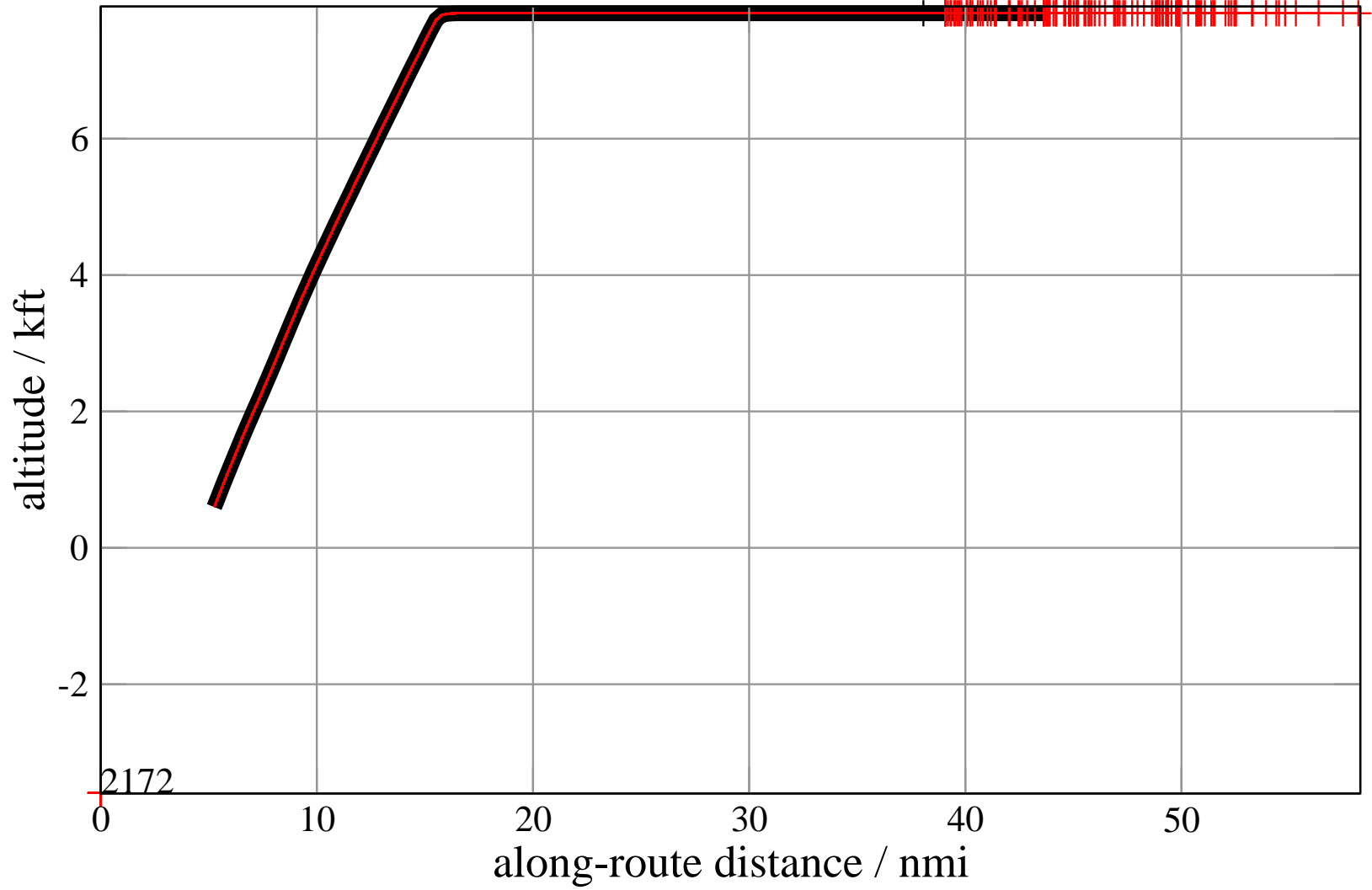
Altitude vs Distance

2168 (CRJ2 E DAL/13R Dep)



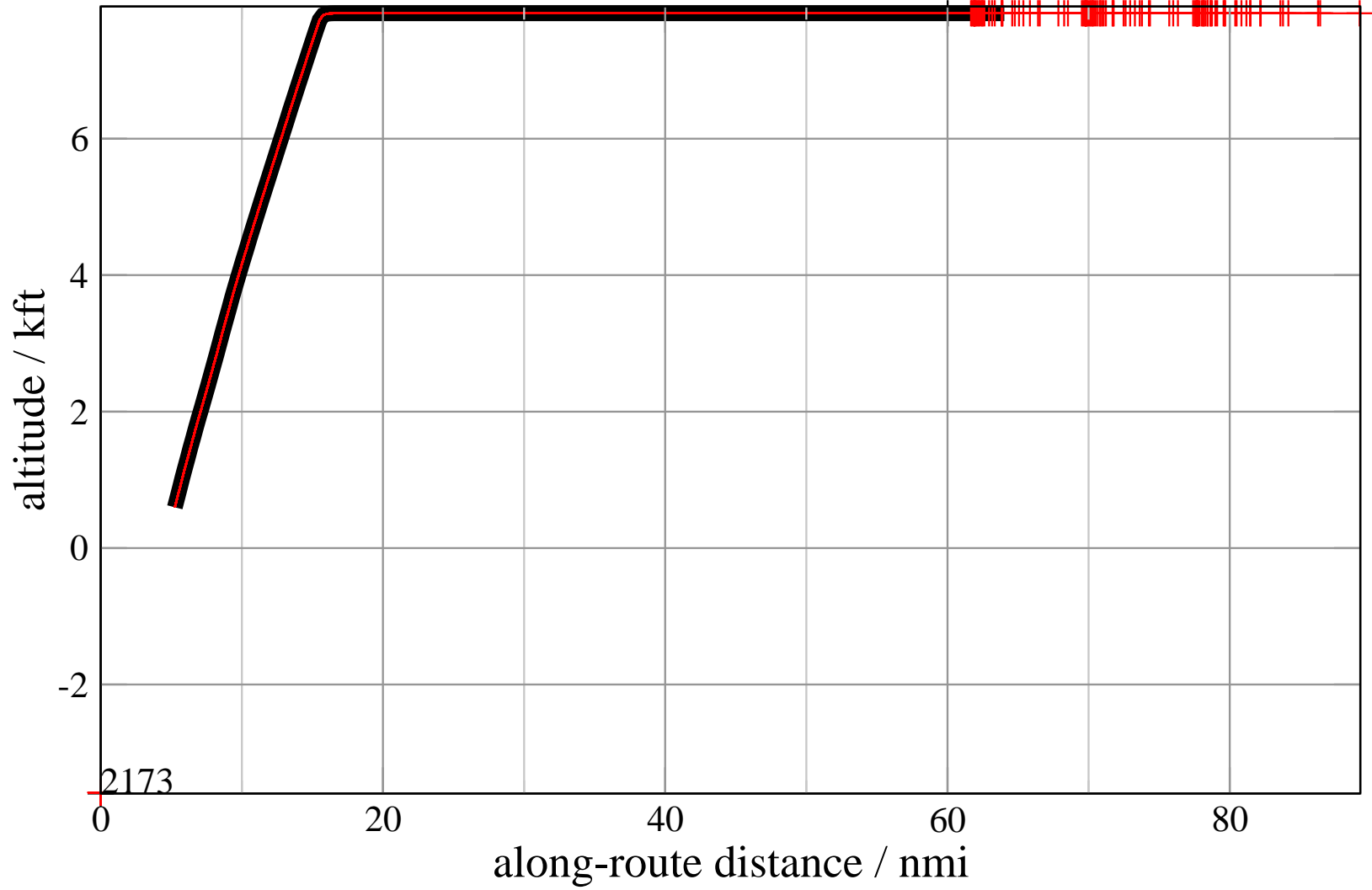
Altitude vs Distance

2172 (B737 D DAL/13R Dep)



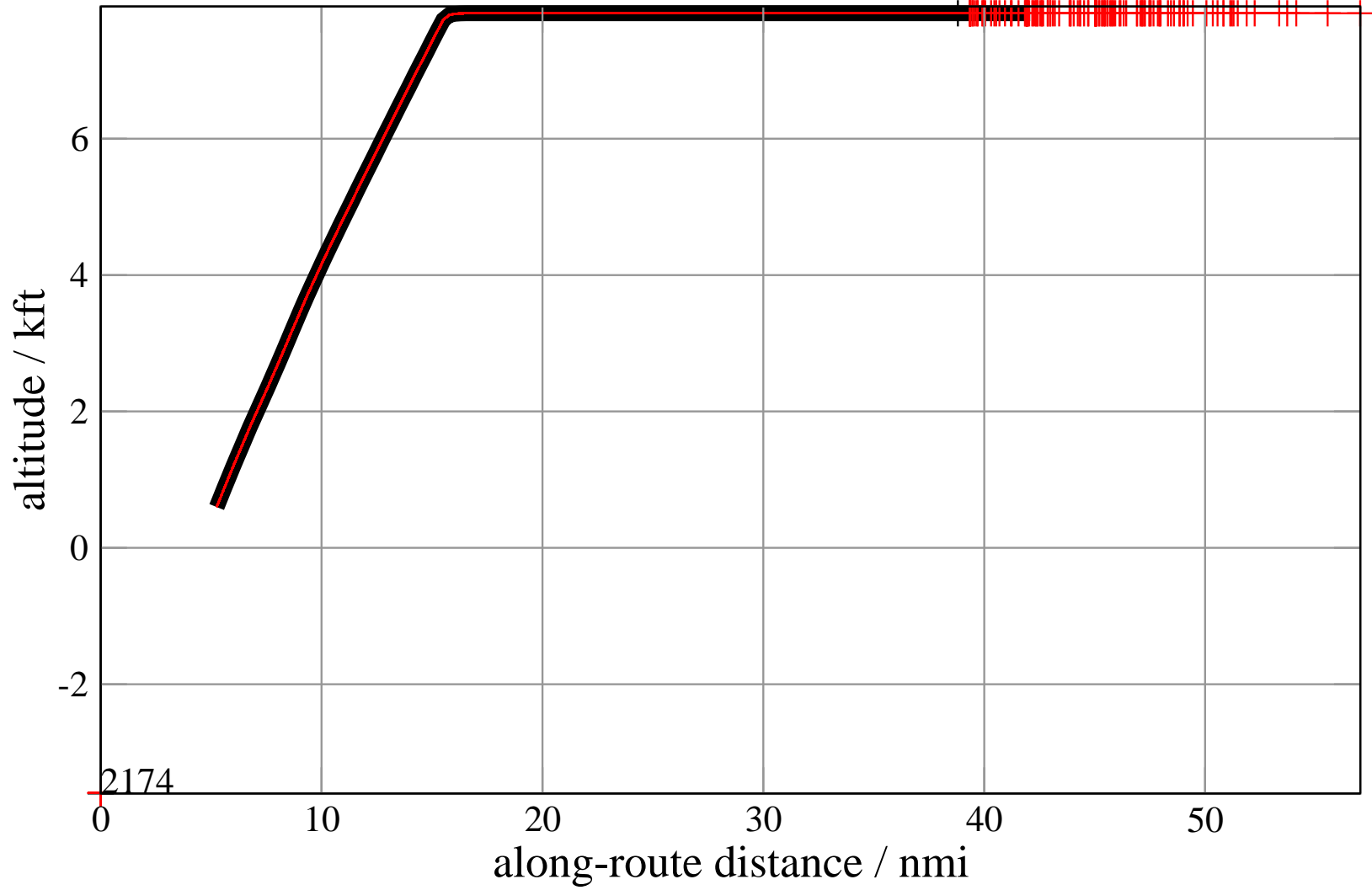
Altitude vs Distance

2173 (B733 D DAL/13R Dep)



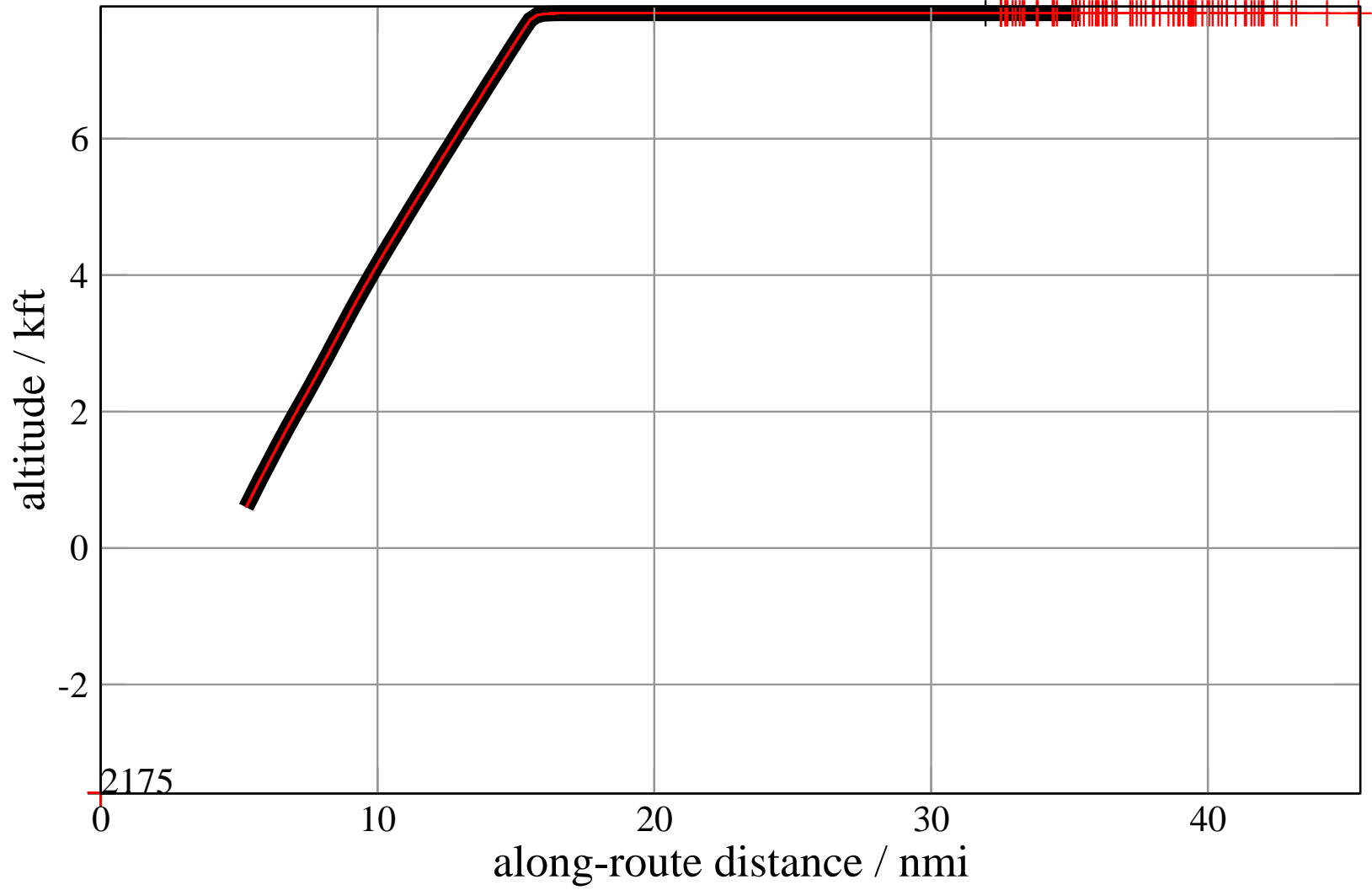
Altitude vs Distance

2174 (B737 D DAL/13R Dep)



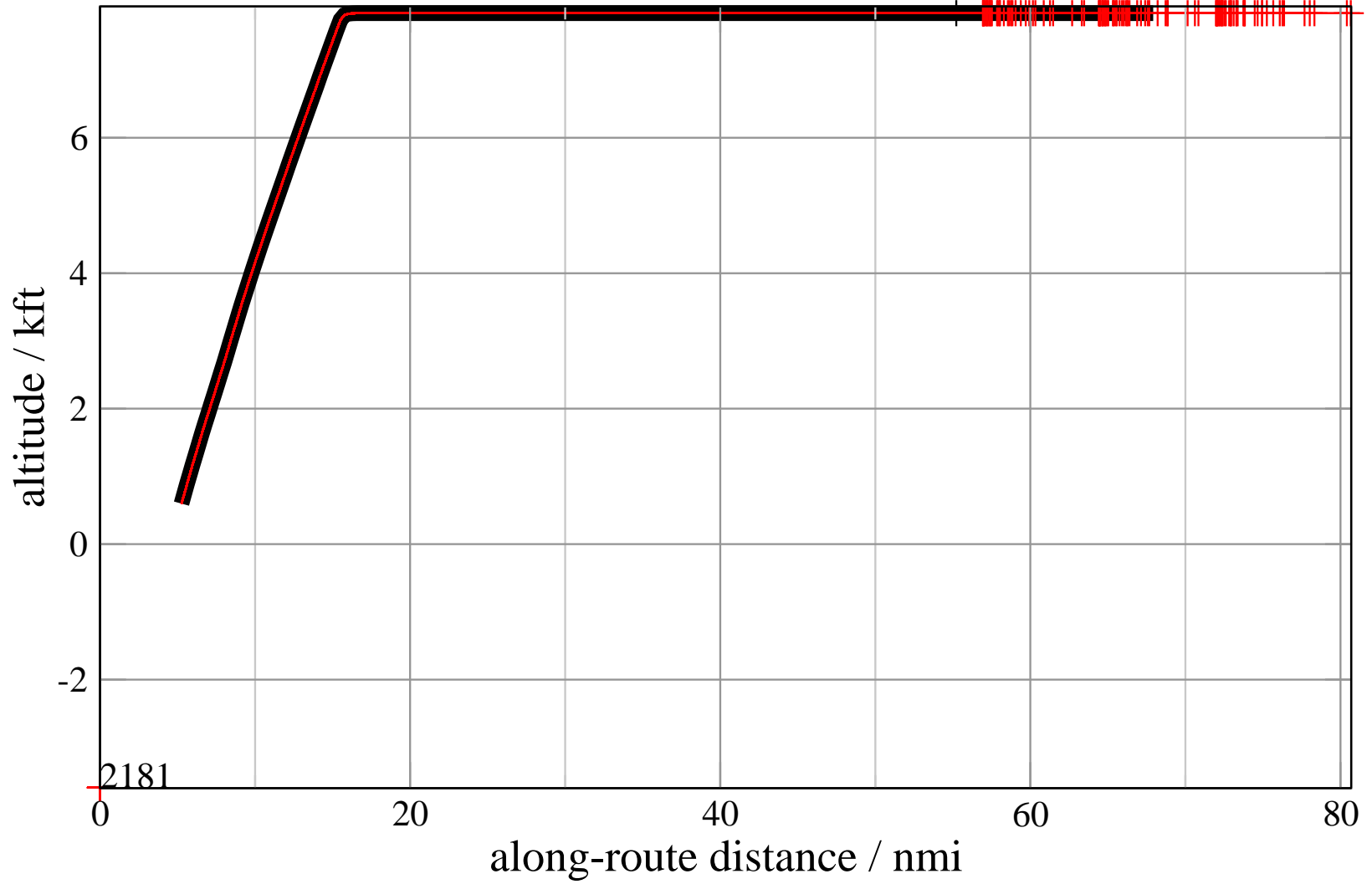
Altitude vs Distance

2175 (B733 D DAL/13R Dep)



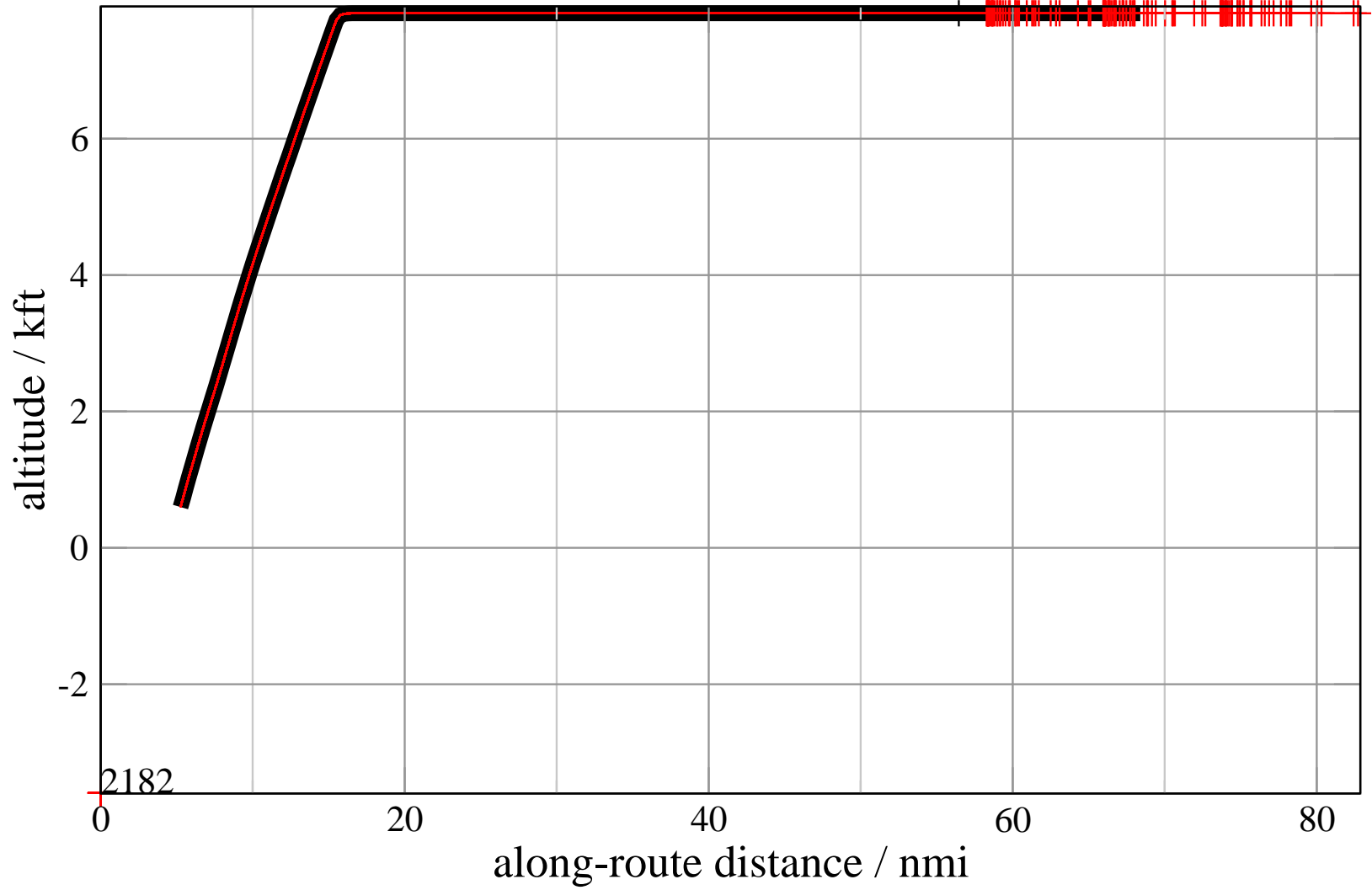
Altitude vs Distance

2181 (B733 D DAL/13R Dep)



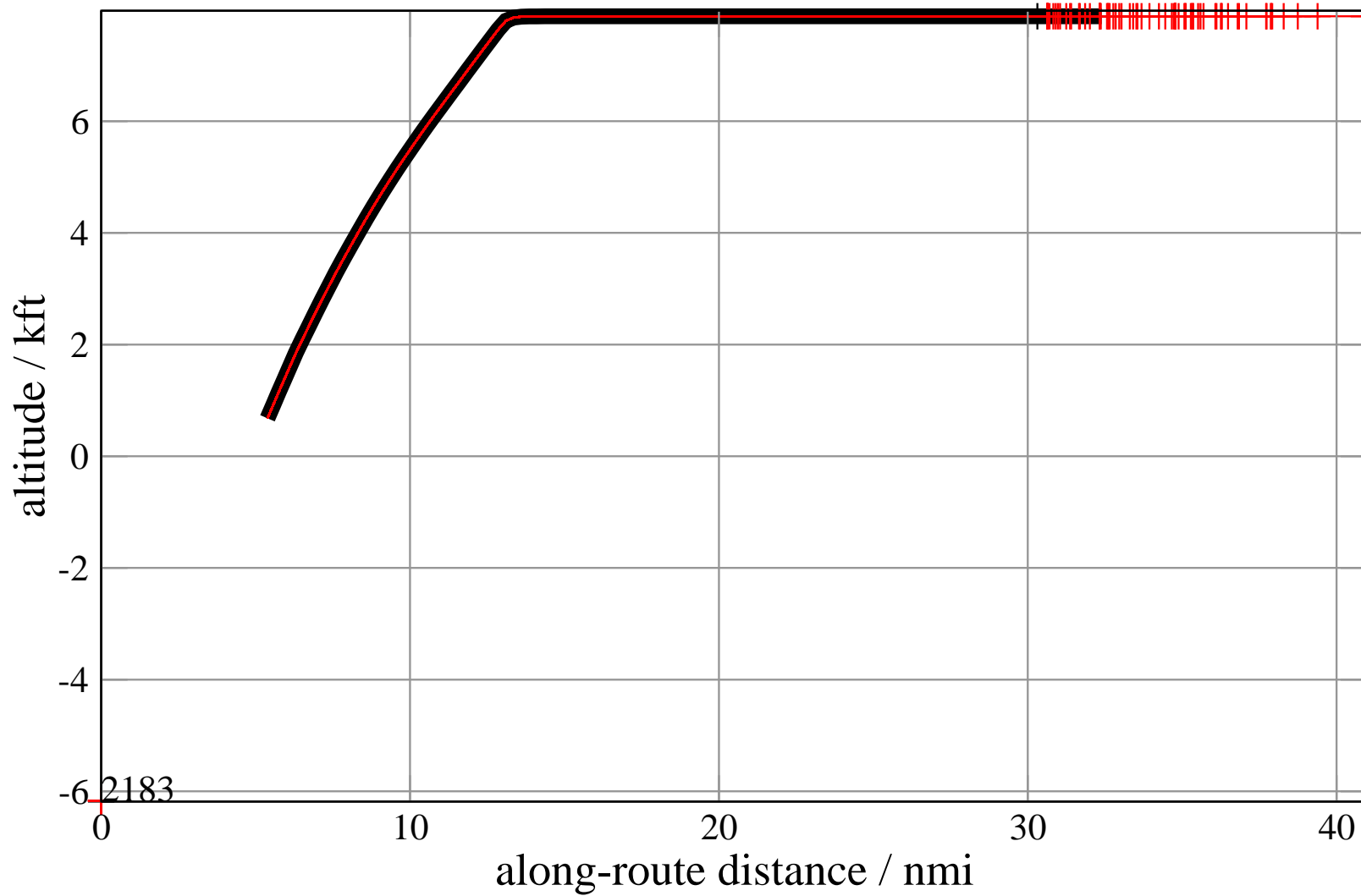
Altitude vs Distance

2182 (B737 D DAL/13R Dep)



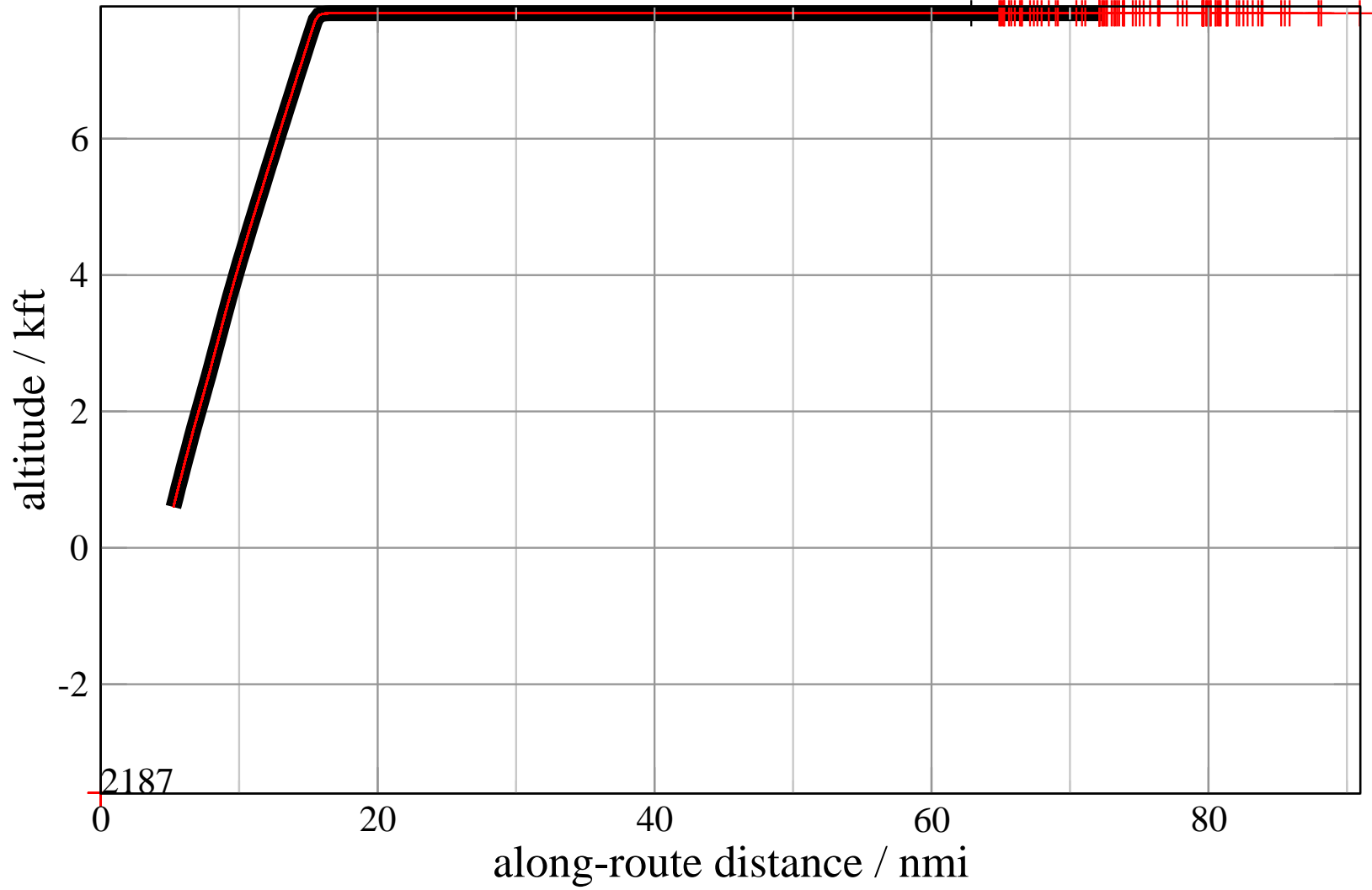
Altitude vs Distance

2183 (WW24 F DAL/13R Dep)



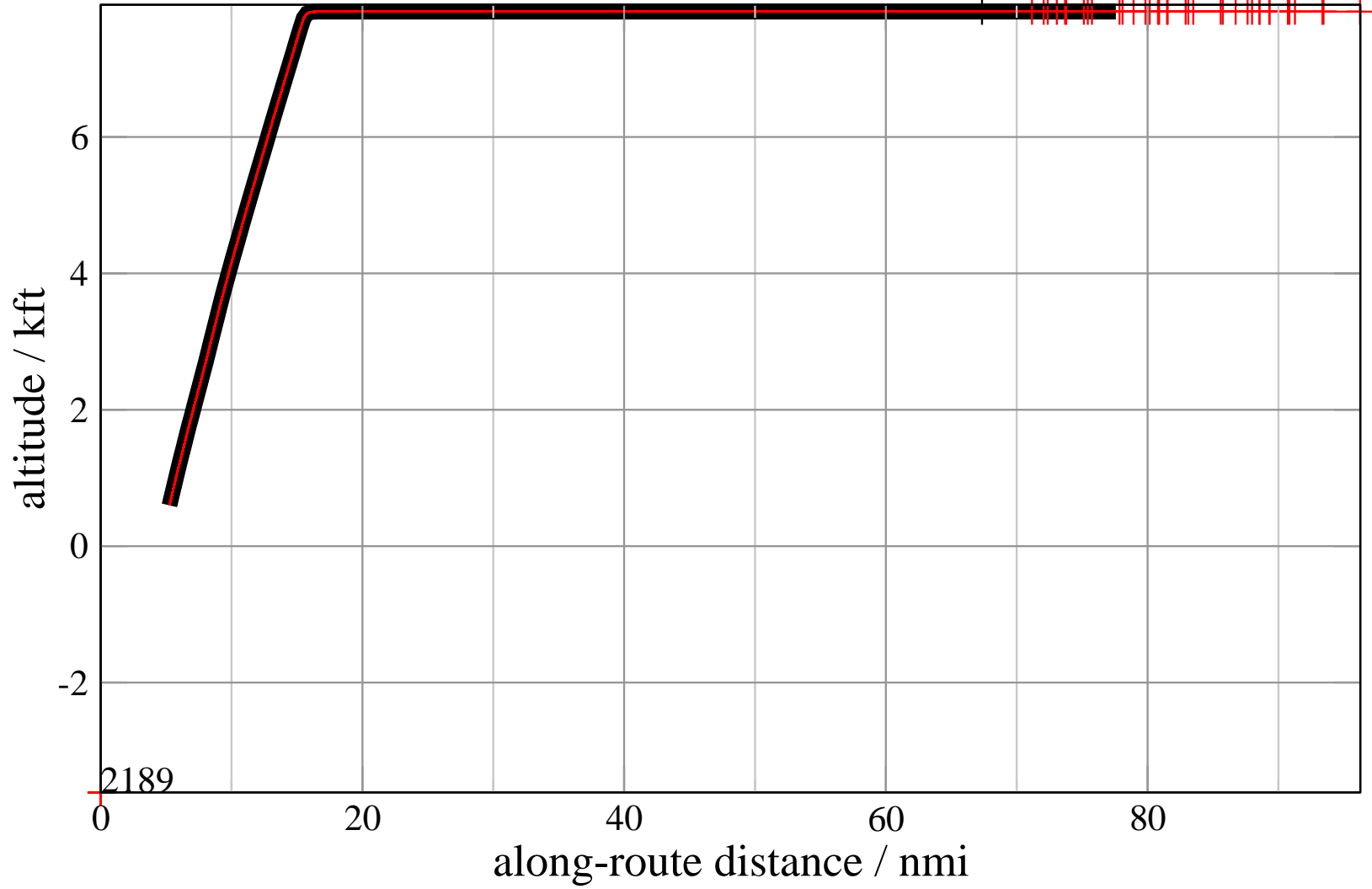
Altitude vs Distance

2187 (C560 F DAL/13R Dep)



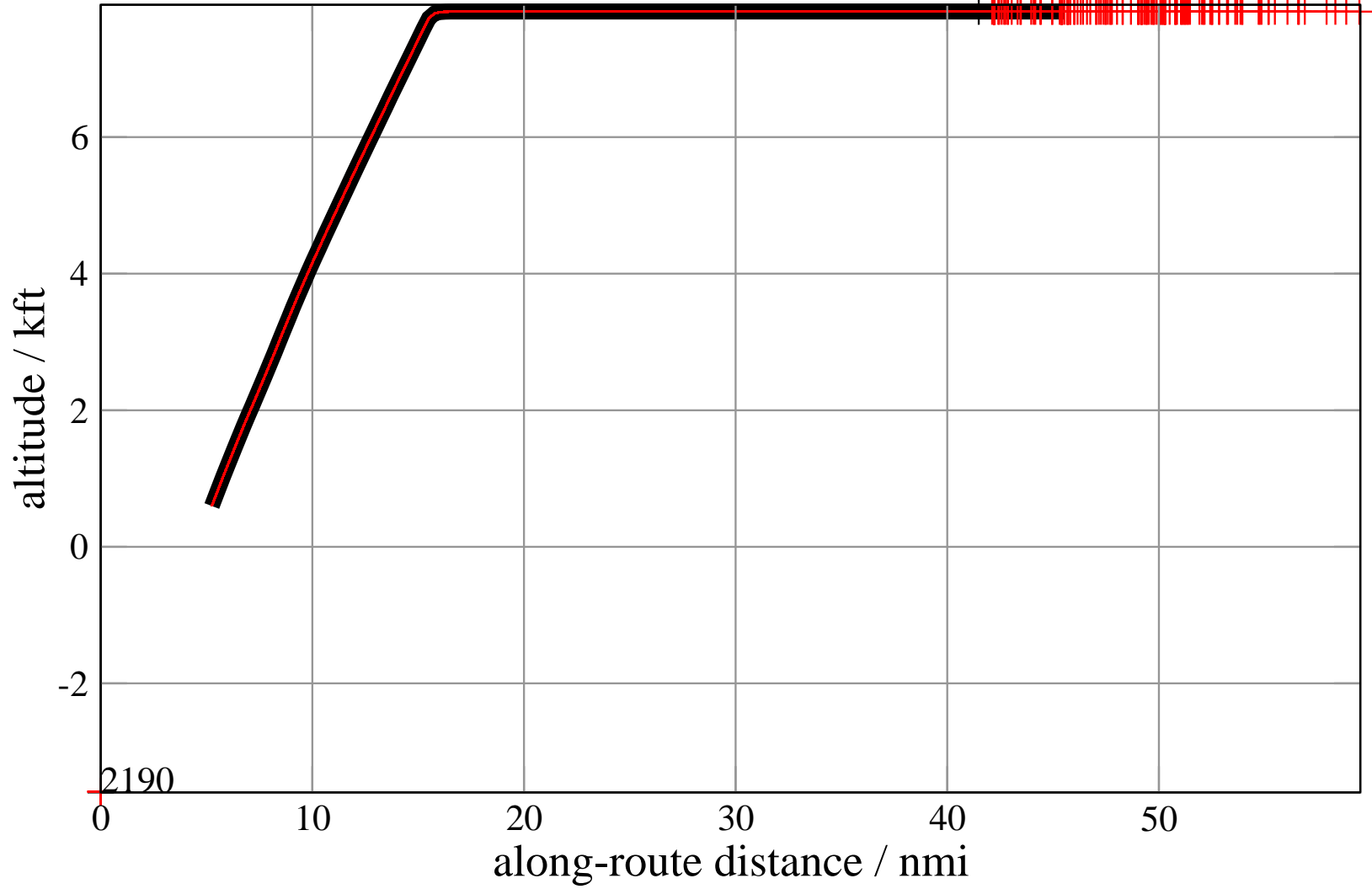
Altitude vs Distance

2189 (B737 D DAL/13R Dep)



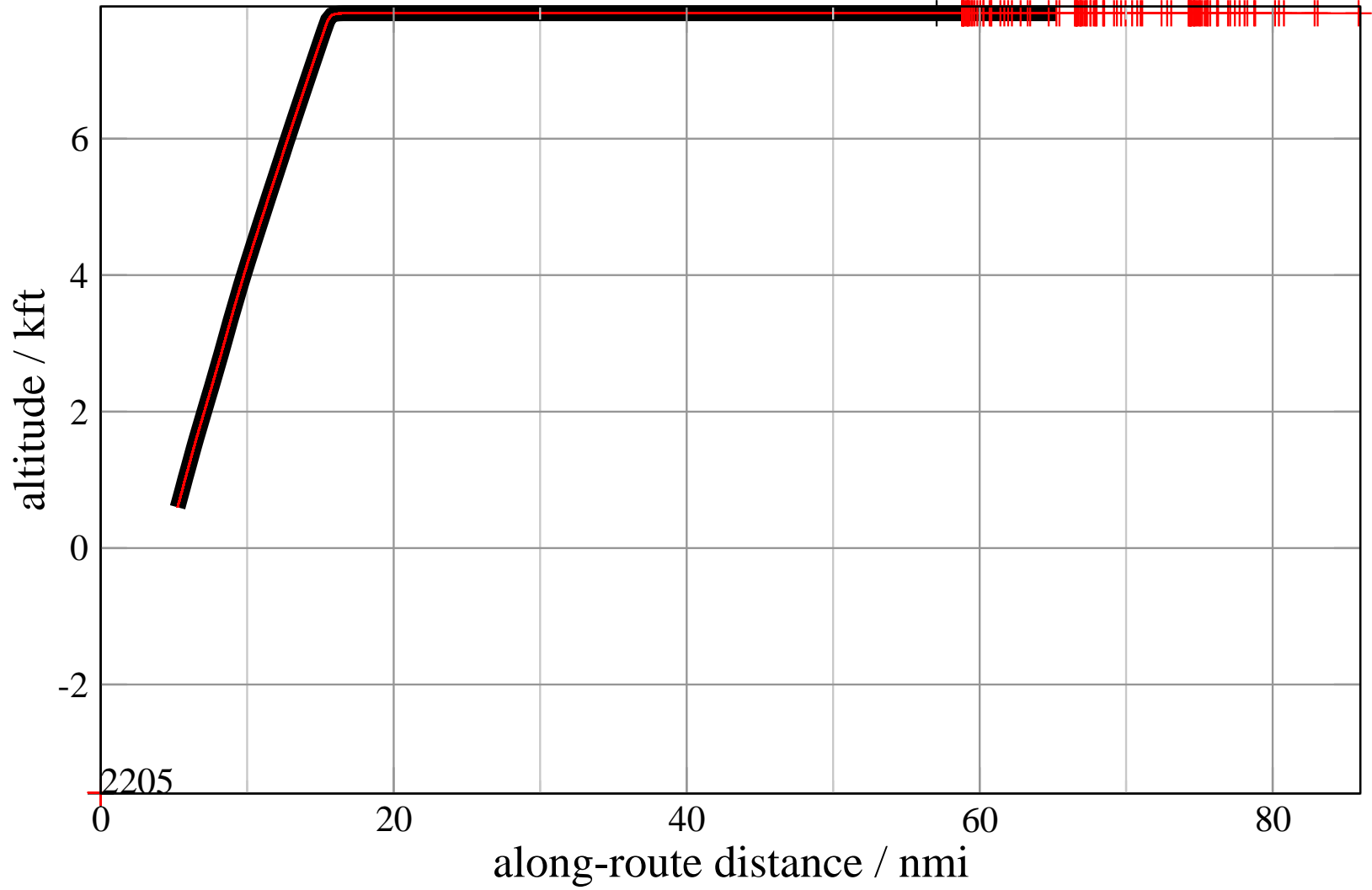
Altitude vs Distance

2190 (B733 D DAL/13R Dep)



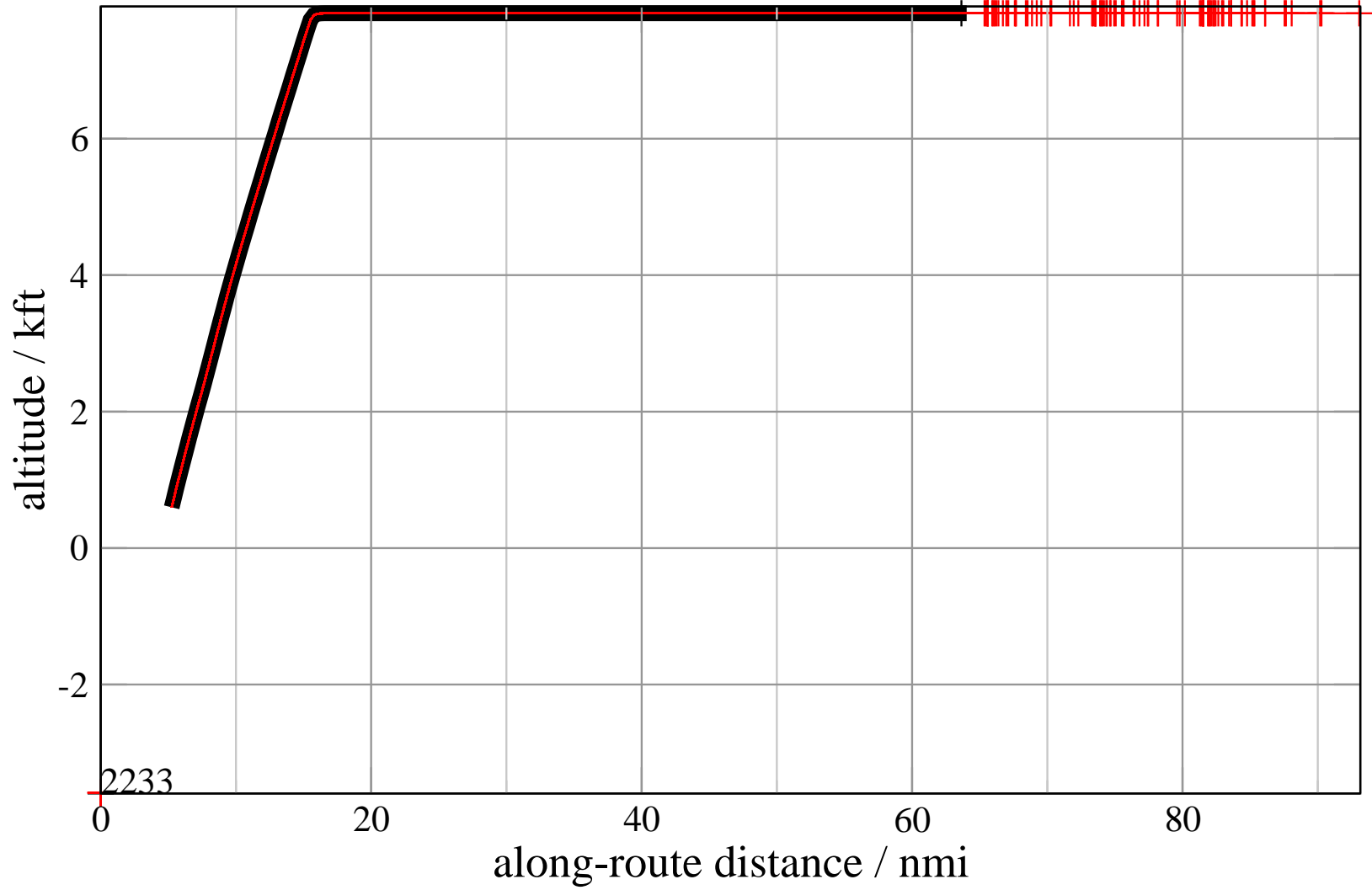
Altitude vs Distance

2205 (B737 D DAL/13R Dep)



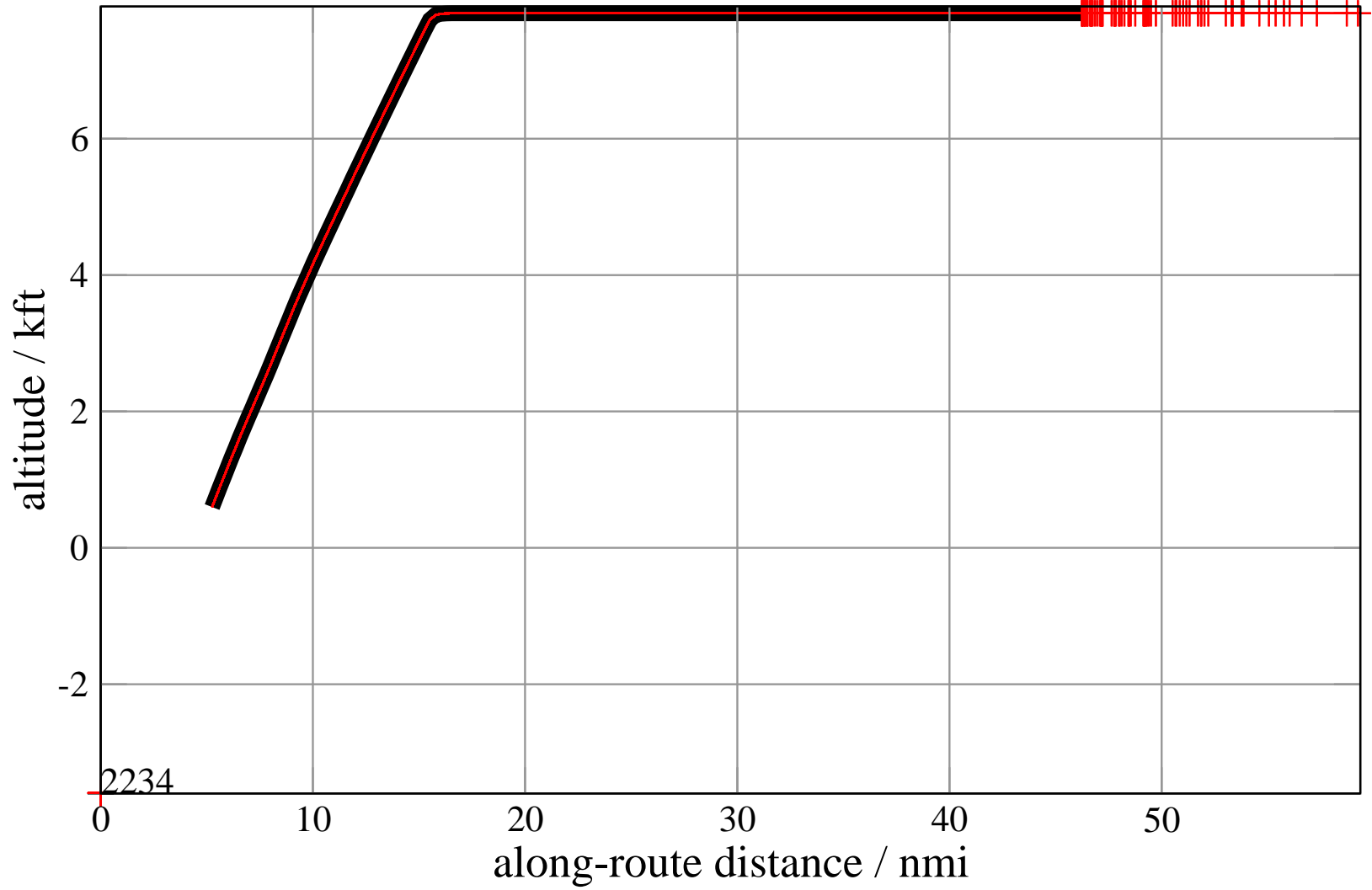
Altitude vs Distance

2233 (CL60 E DAL/13R Dep)



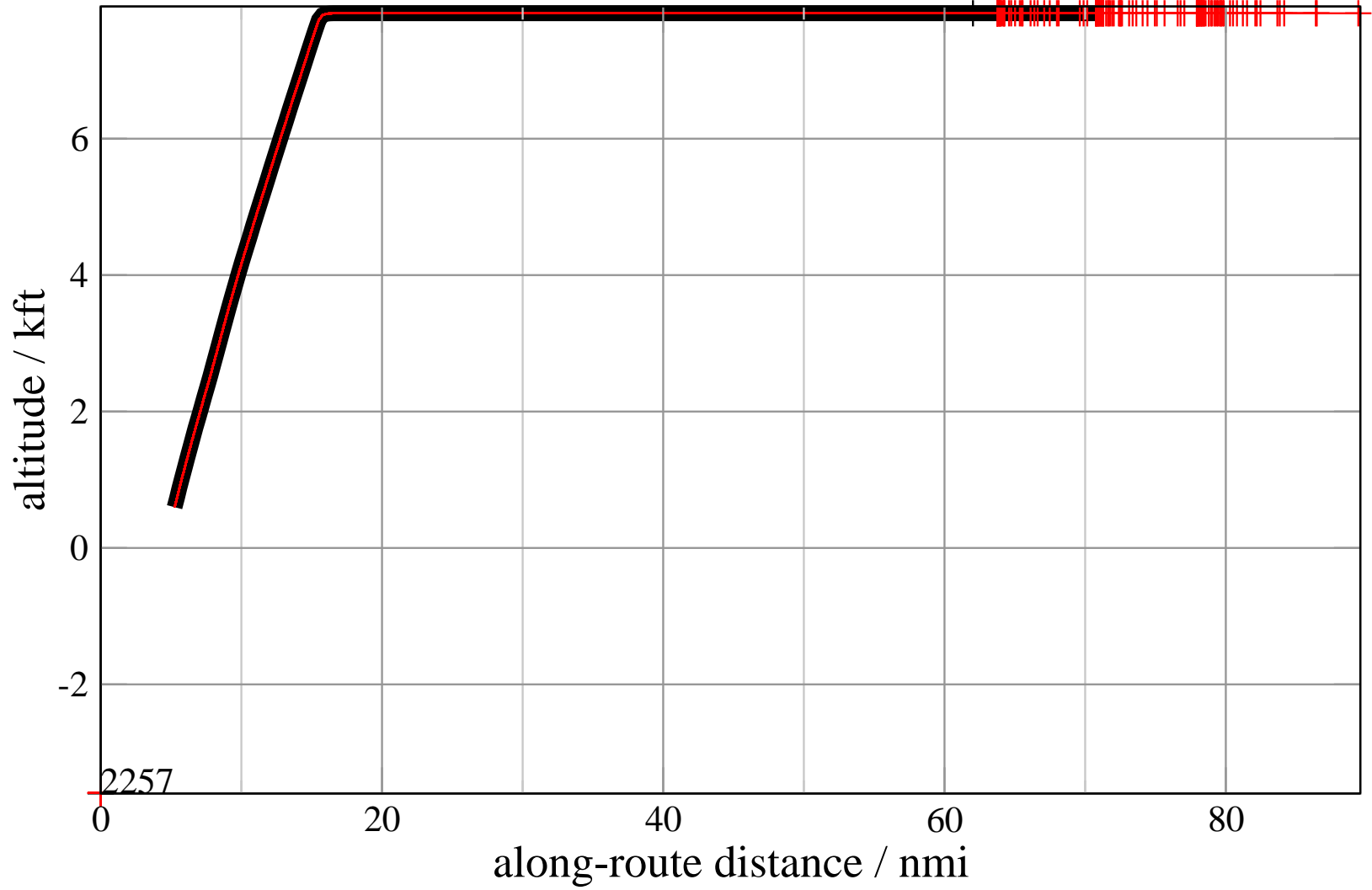
Altitude vs Distance

2234 (CRJ2 E DAL/13R Dep)



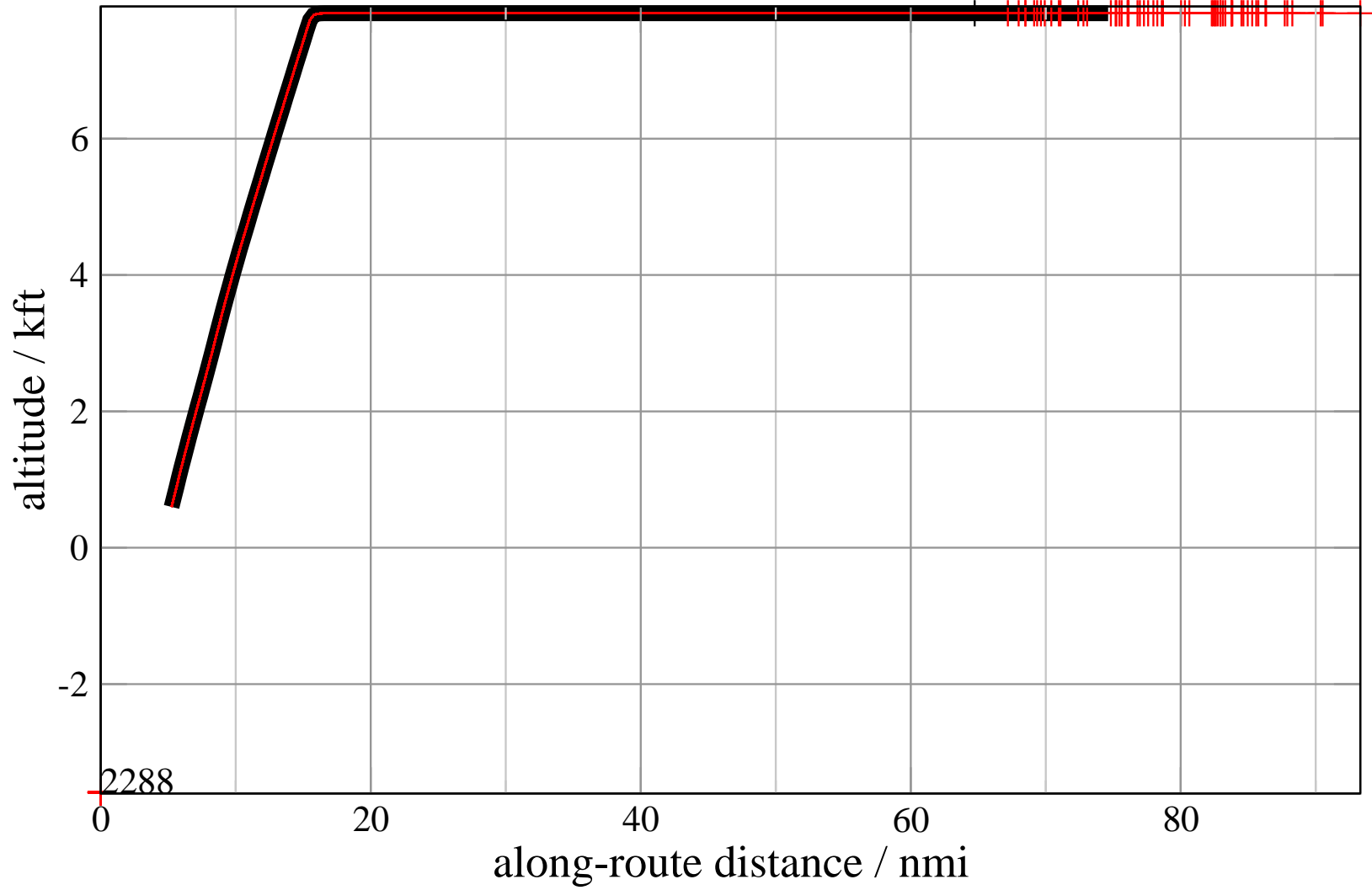
Altitude vs Distance

2257 (FA50 F DAL/13R Dep)



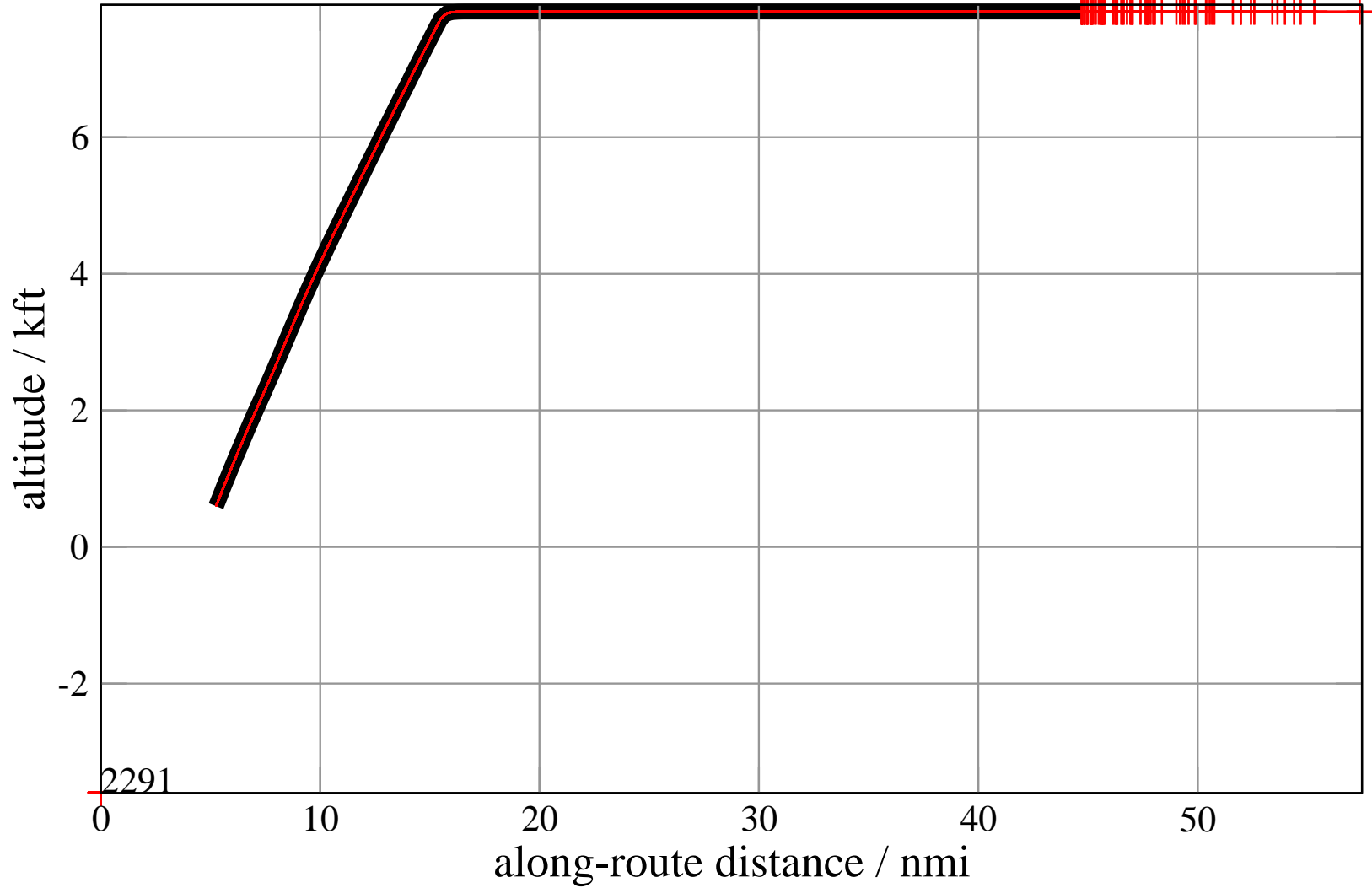
Altitude vs Distance

2288 (B737 D DAL/13R Dep)



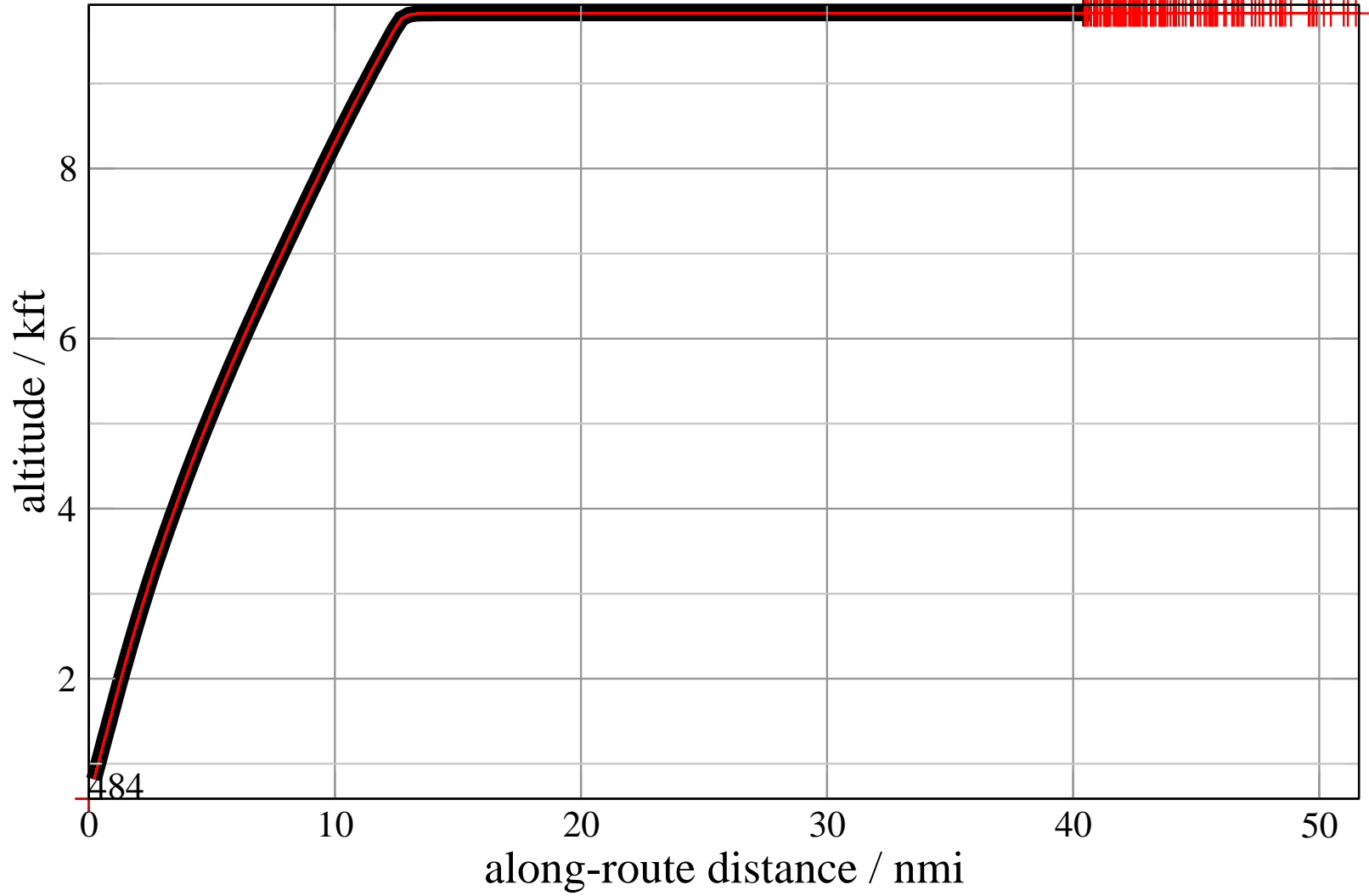
Altitude vs Distance

2291 (B733 D DAL/13R Dep)



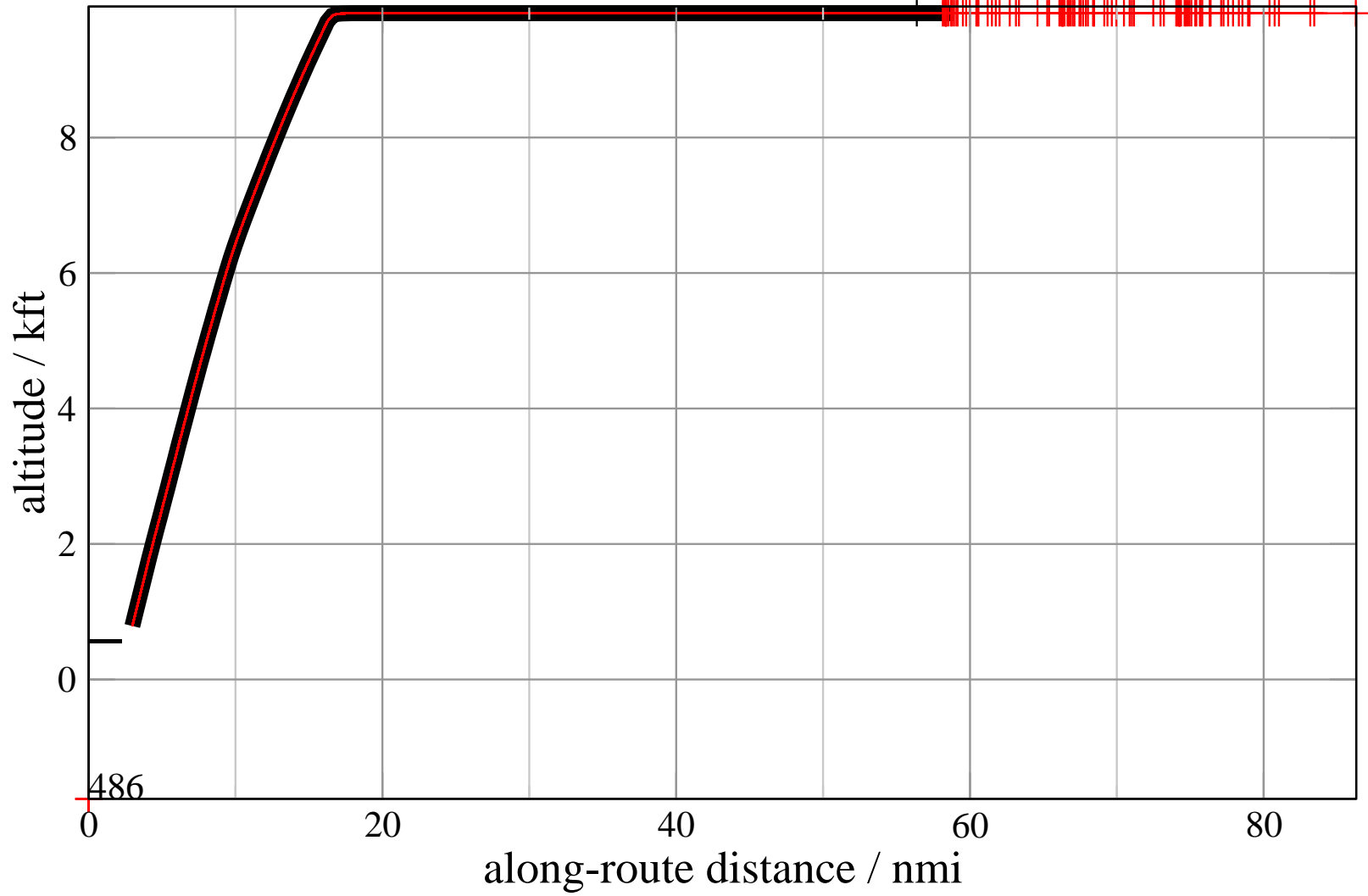
Altitude vs Distance

484 (CRJ2 E DFW/17R Dep)



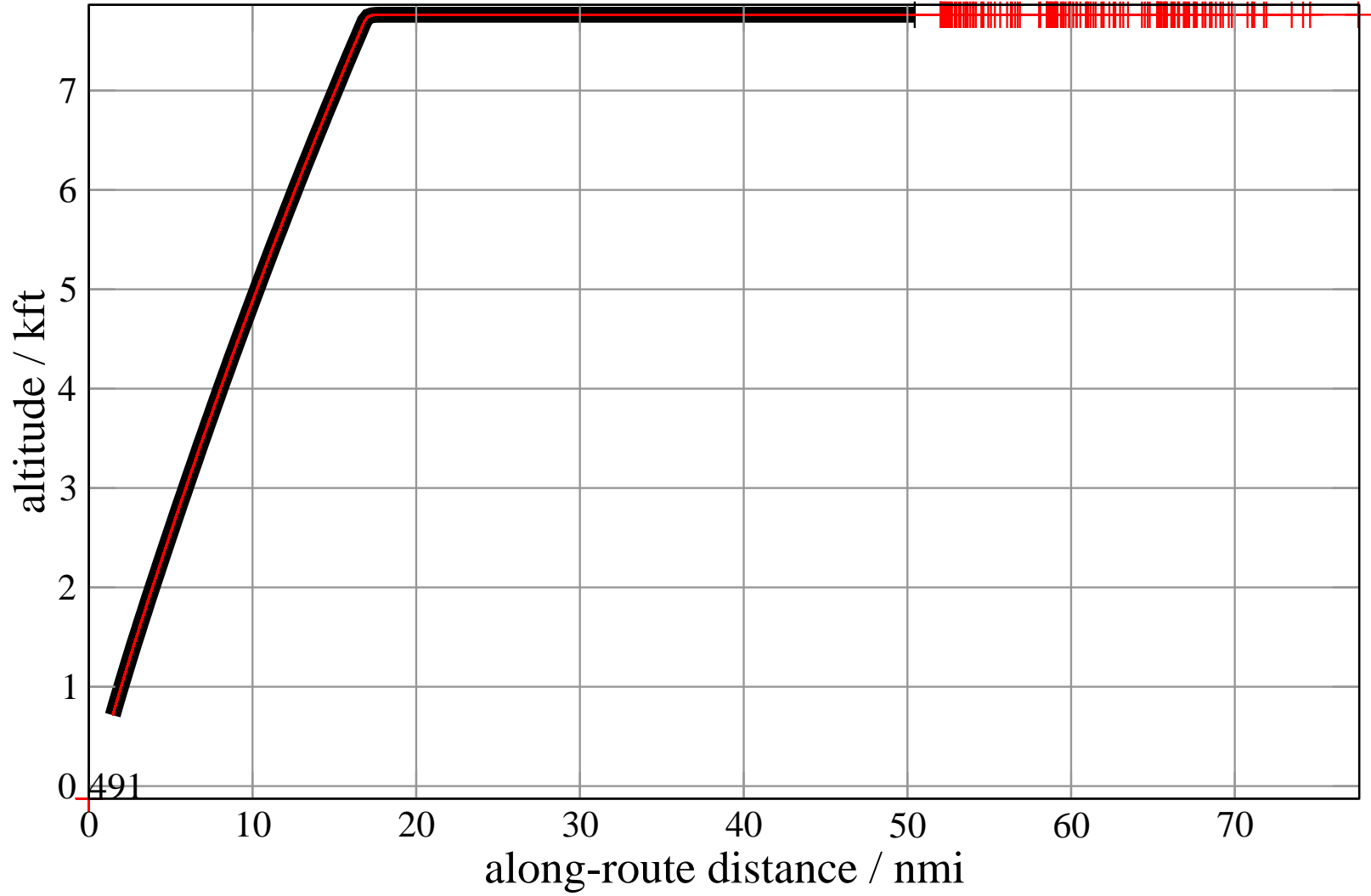
Altitude vs Distance

486 (MD83 D DFW/17R Dep)



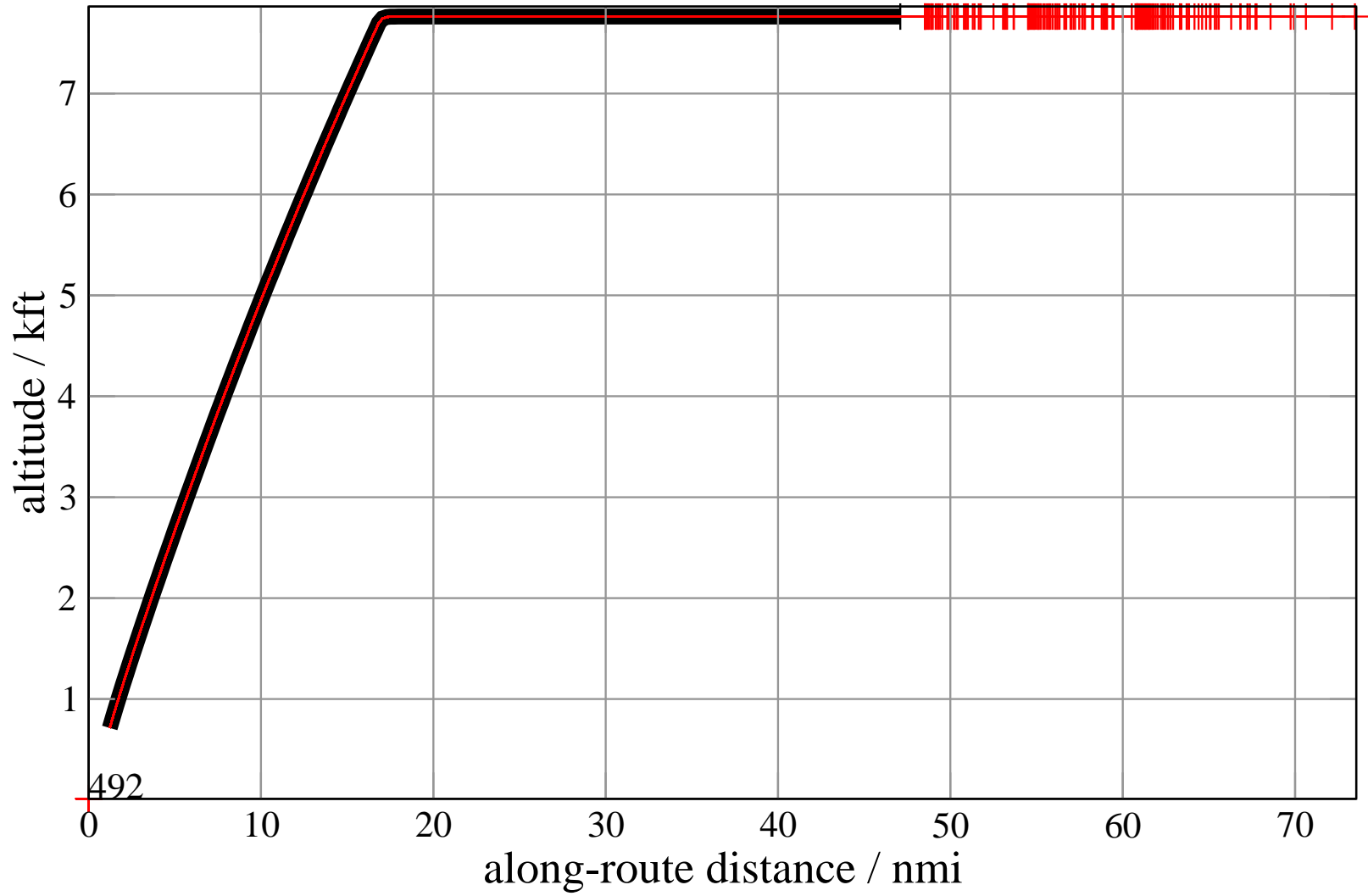
Altitude vs Distance

491 (BE99 F DFW/18L Dep)



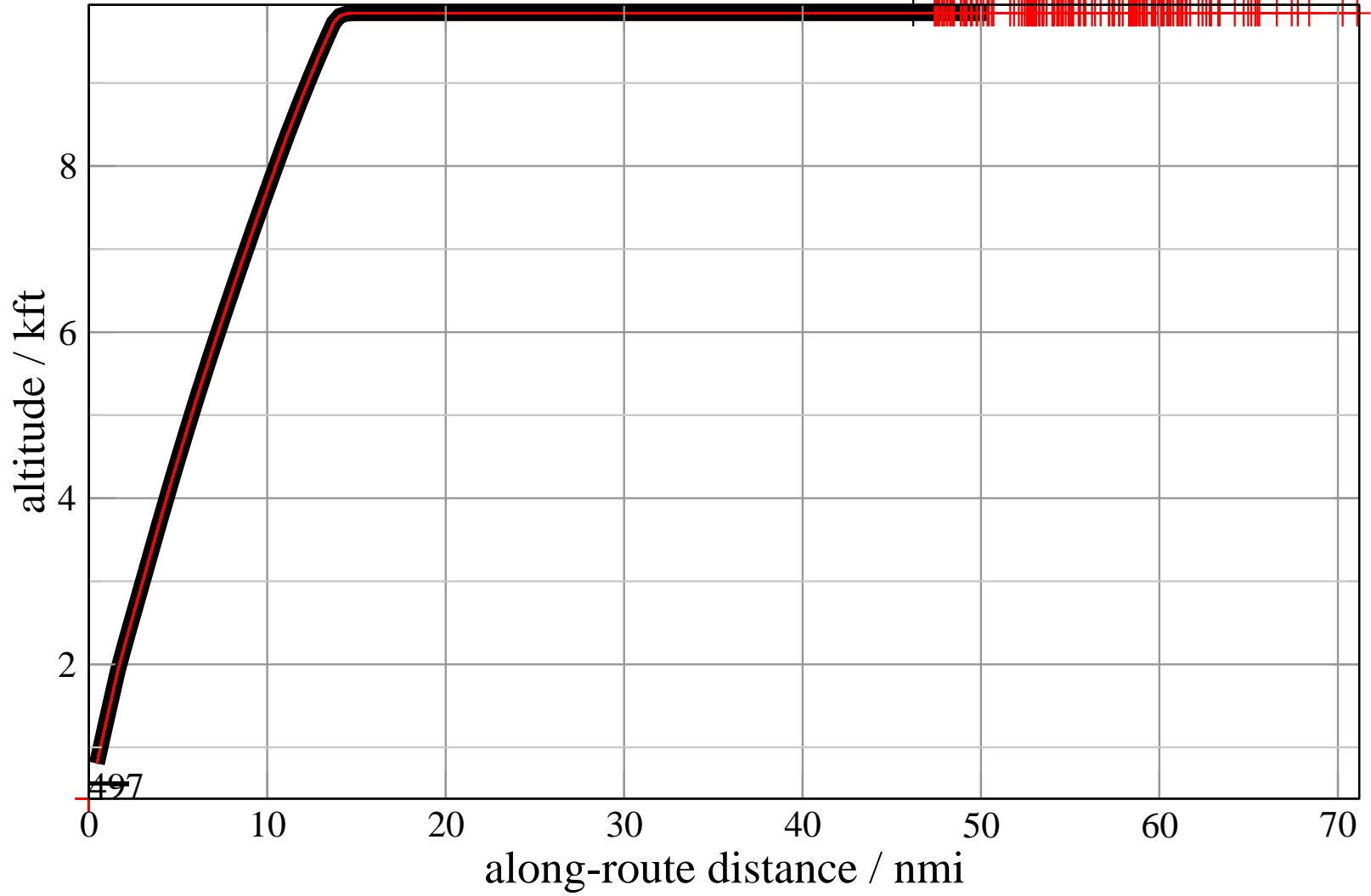
Altitude vs Distance

492 (BE99 F DFW/18L Dep)



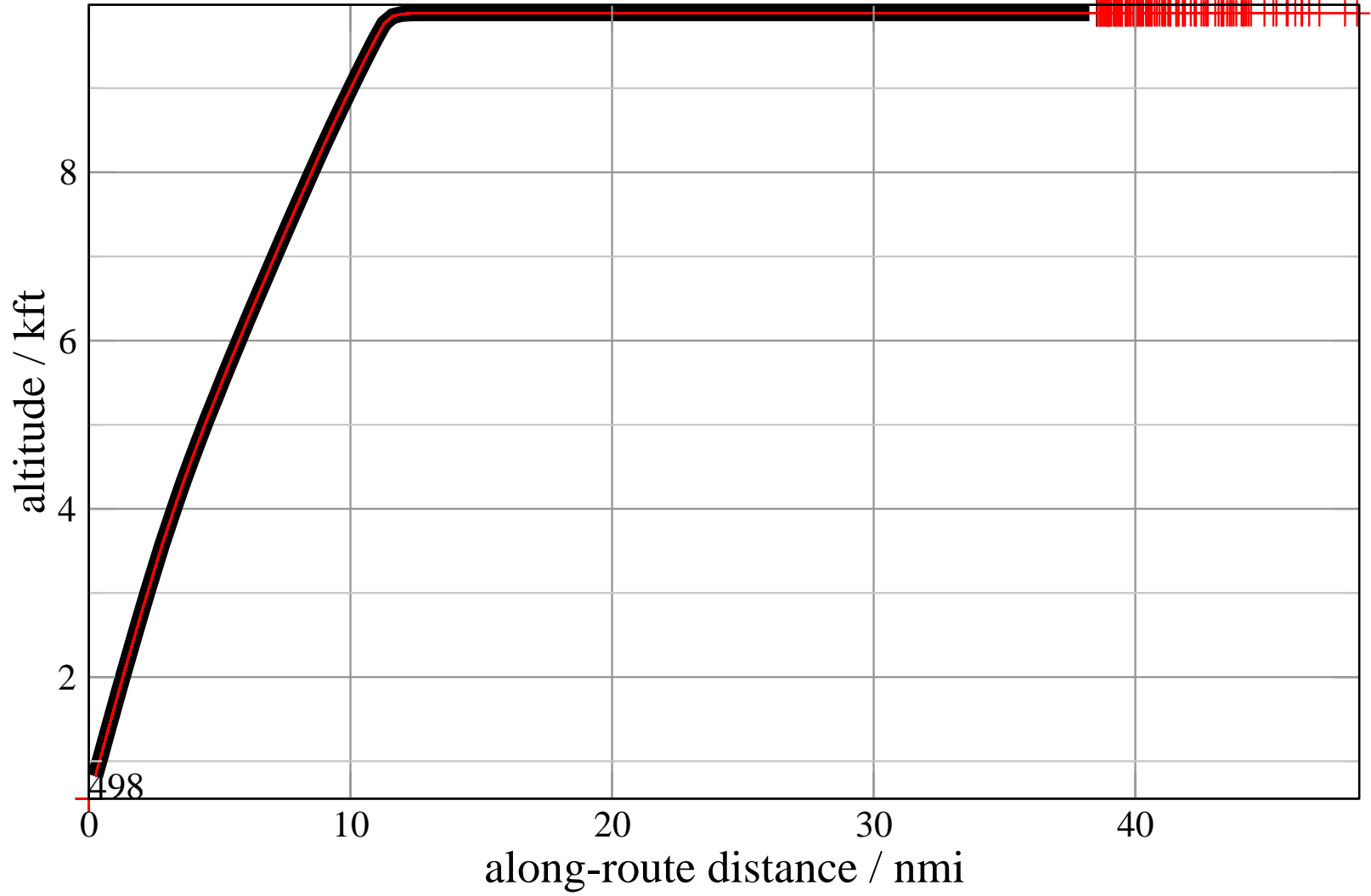
Altitude vs Distance

497 (MD88 D DFW/17R Dep)



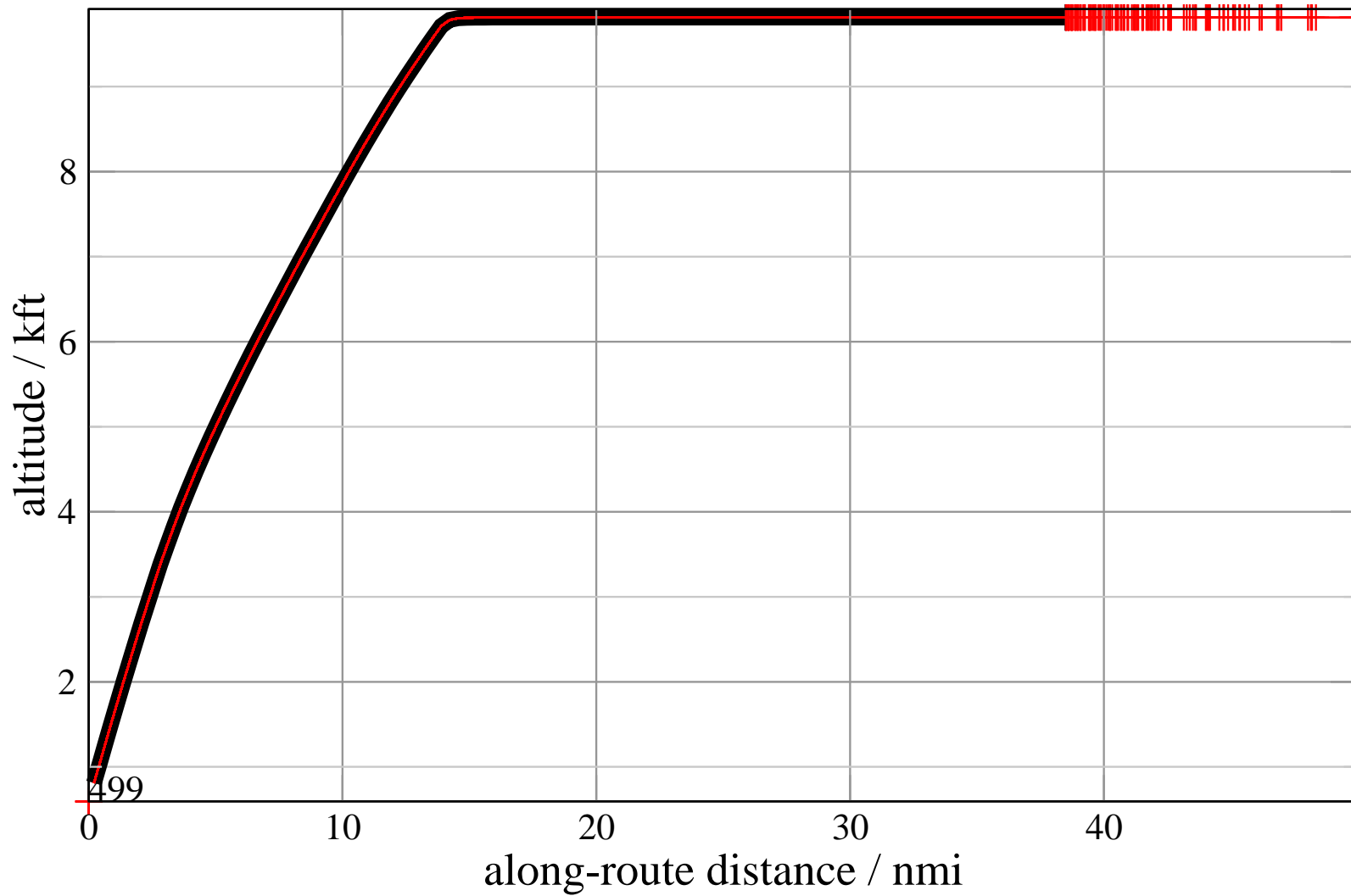
Altitude vs Distance

498 (E135 E DFW/18L Dep)



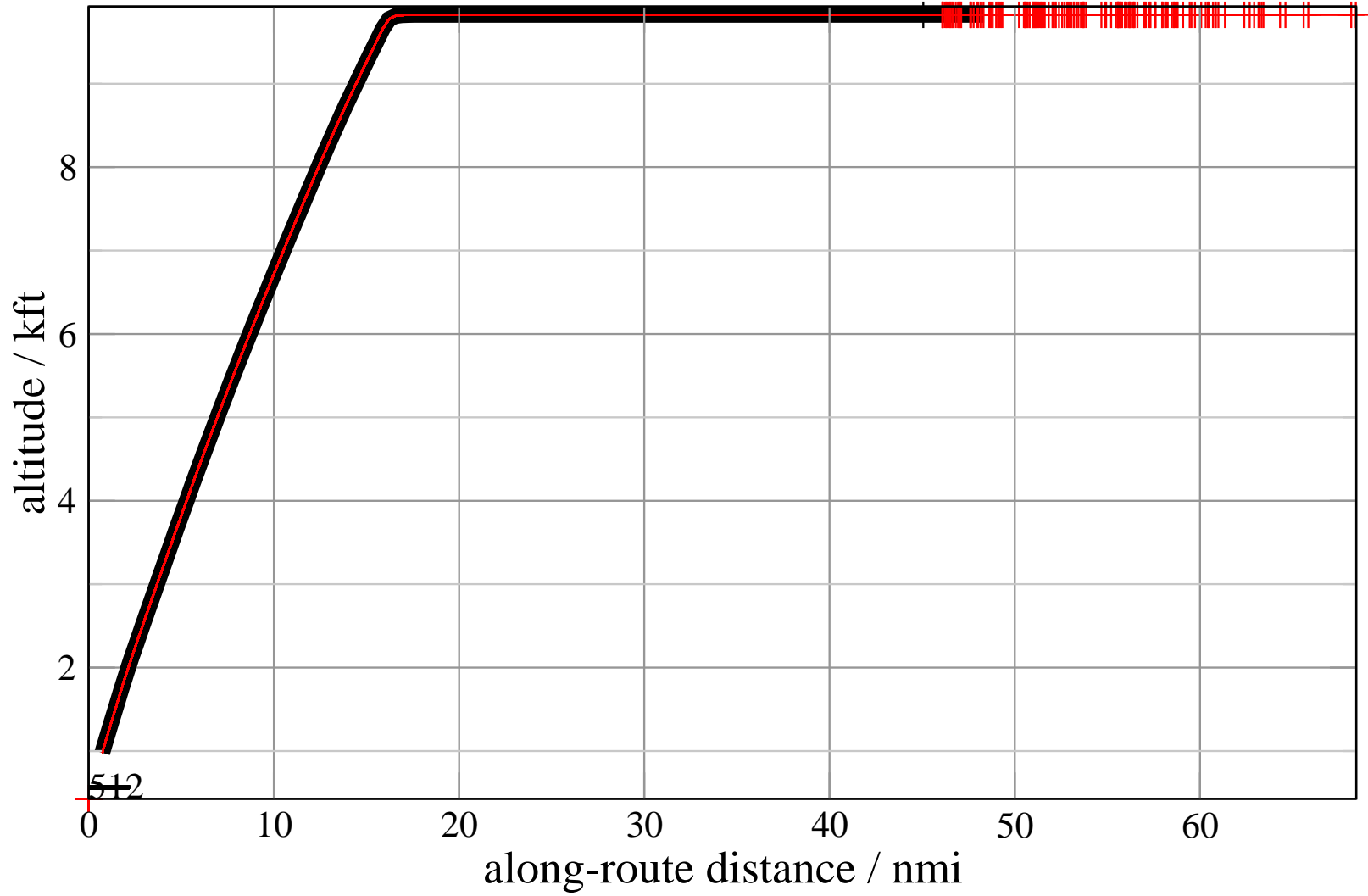
Altitude vs Distance

499 (E145 E DFW/17R Dep)



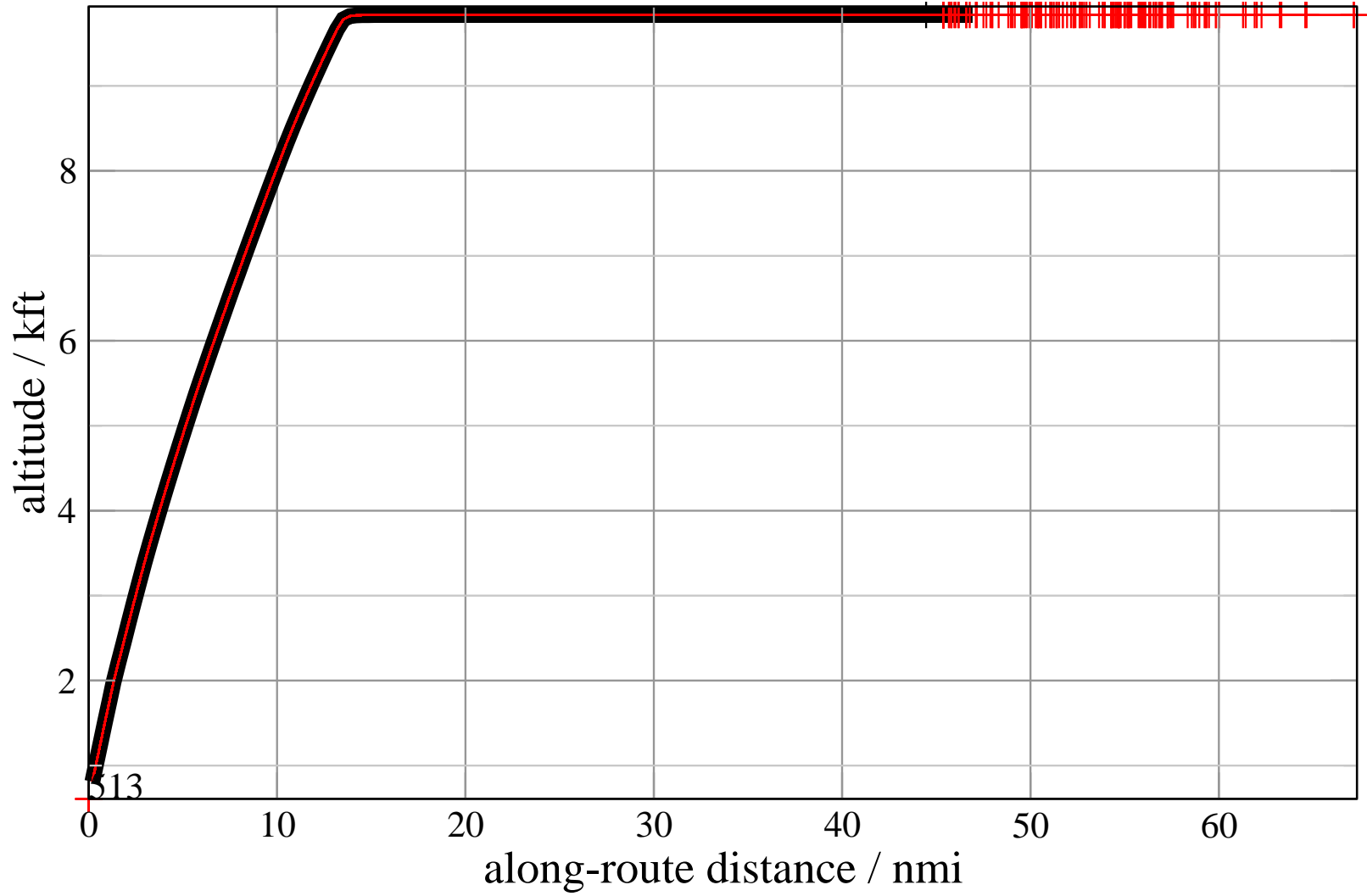
Altitude vs Distance

512 (B752 D DFW/17R Dep)



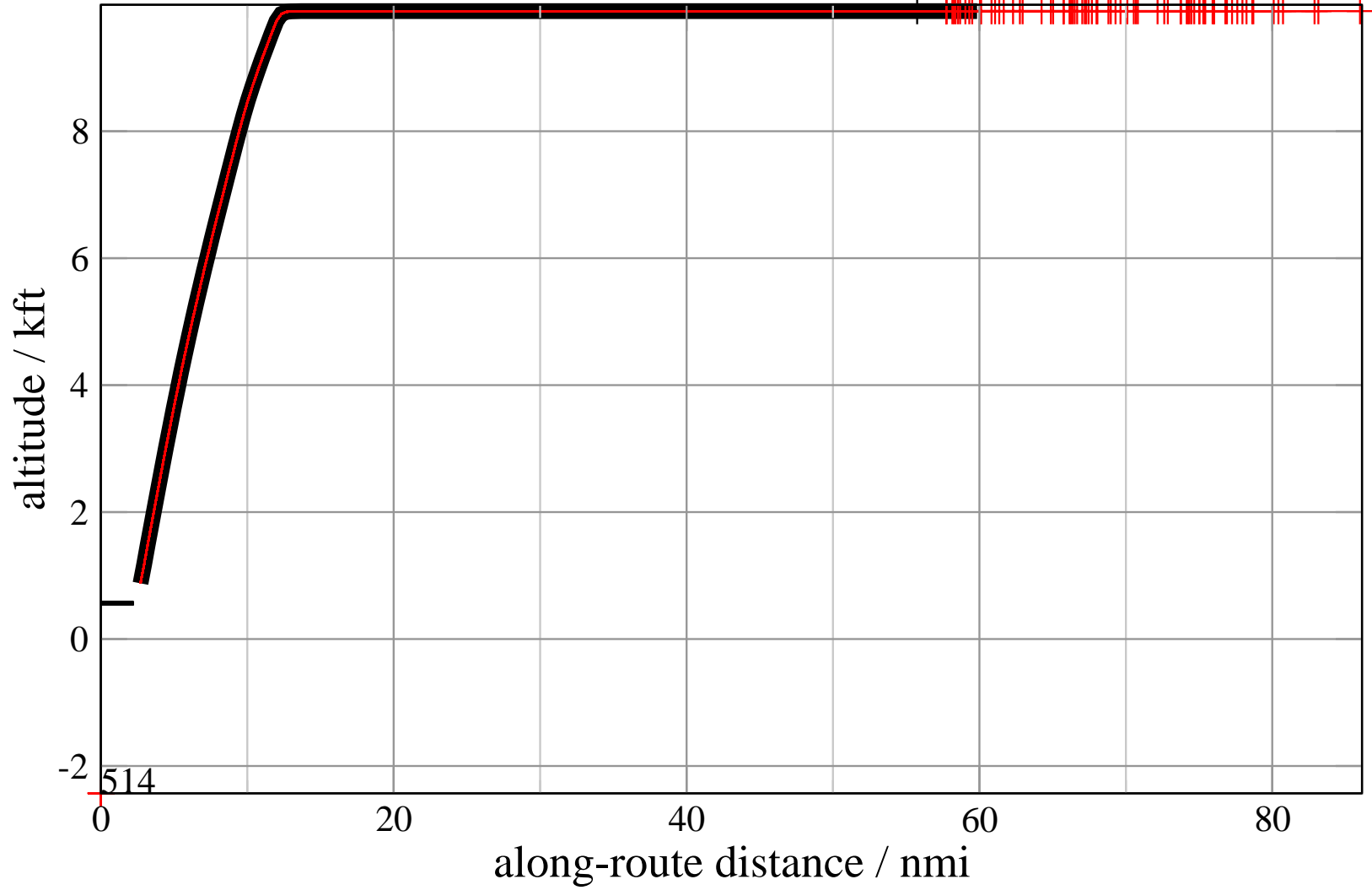
Altitude vs Distance

513 (A320 D DFW/18L Dep)



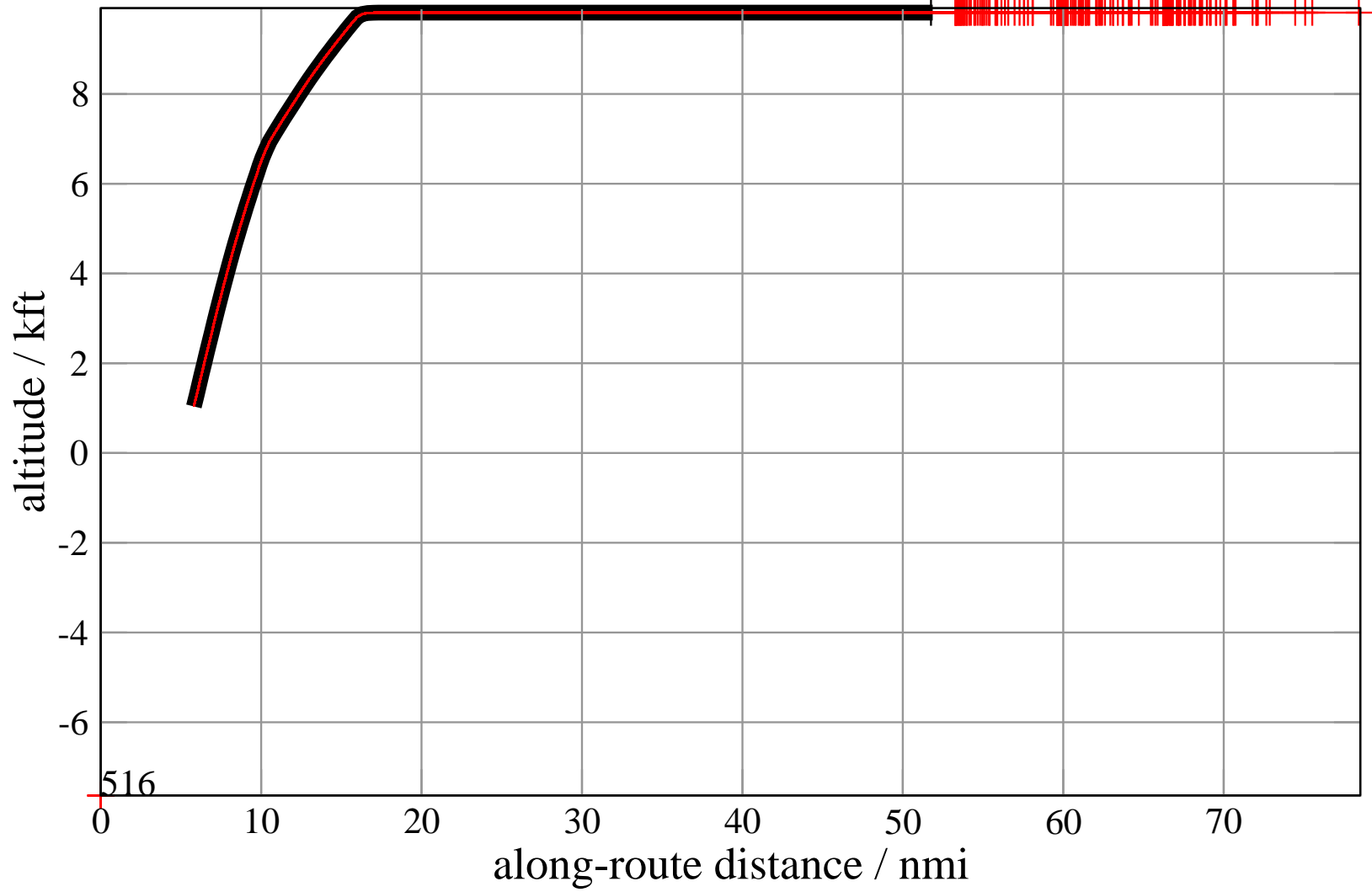
Altitude vs Distance

514 (E170 E DFW/17R Dep)



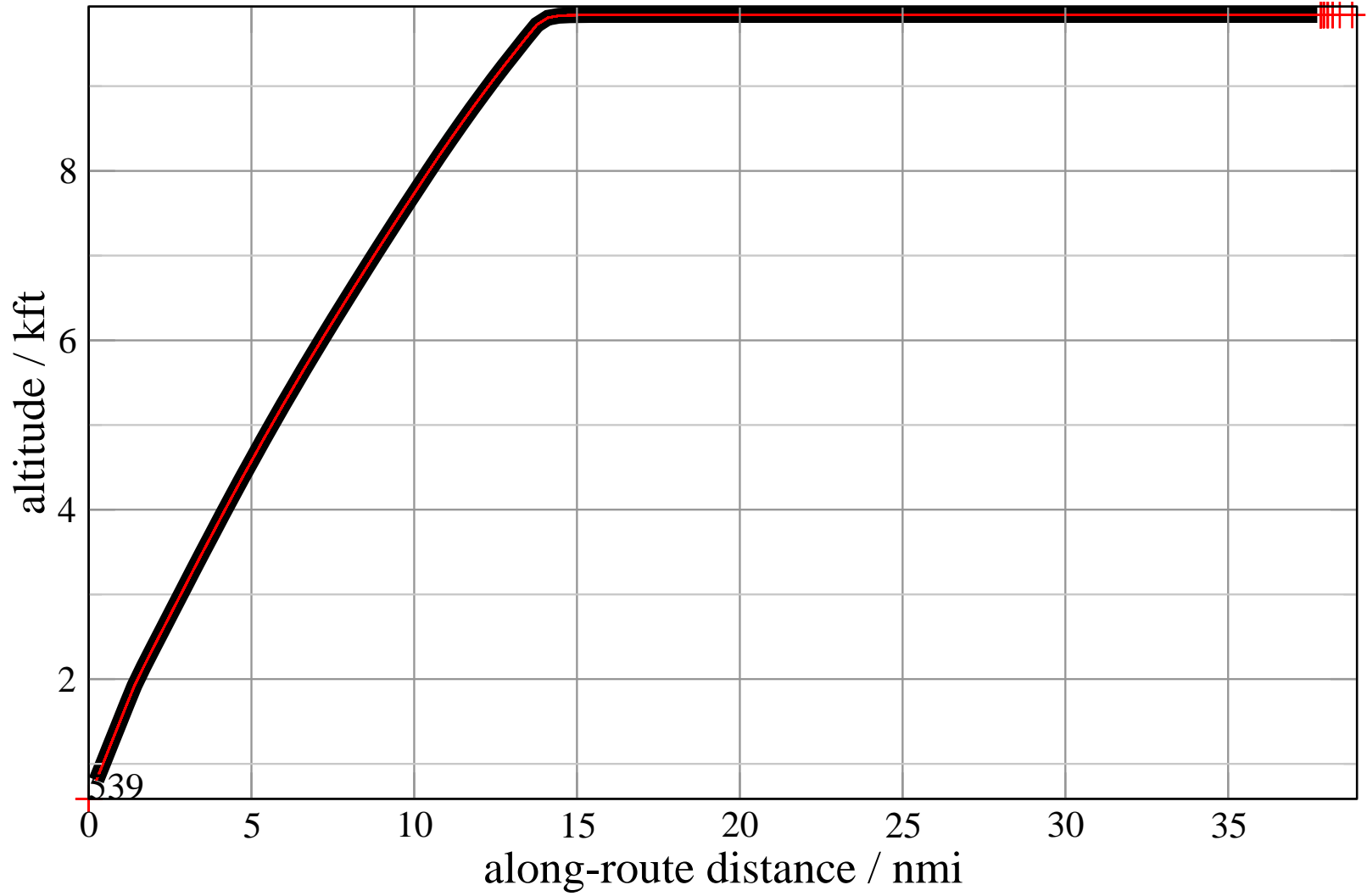
Altitude vs Distance

516 (E145 E DFW/18L Dep)



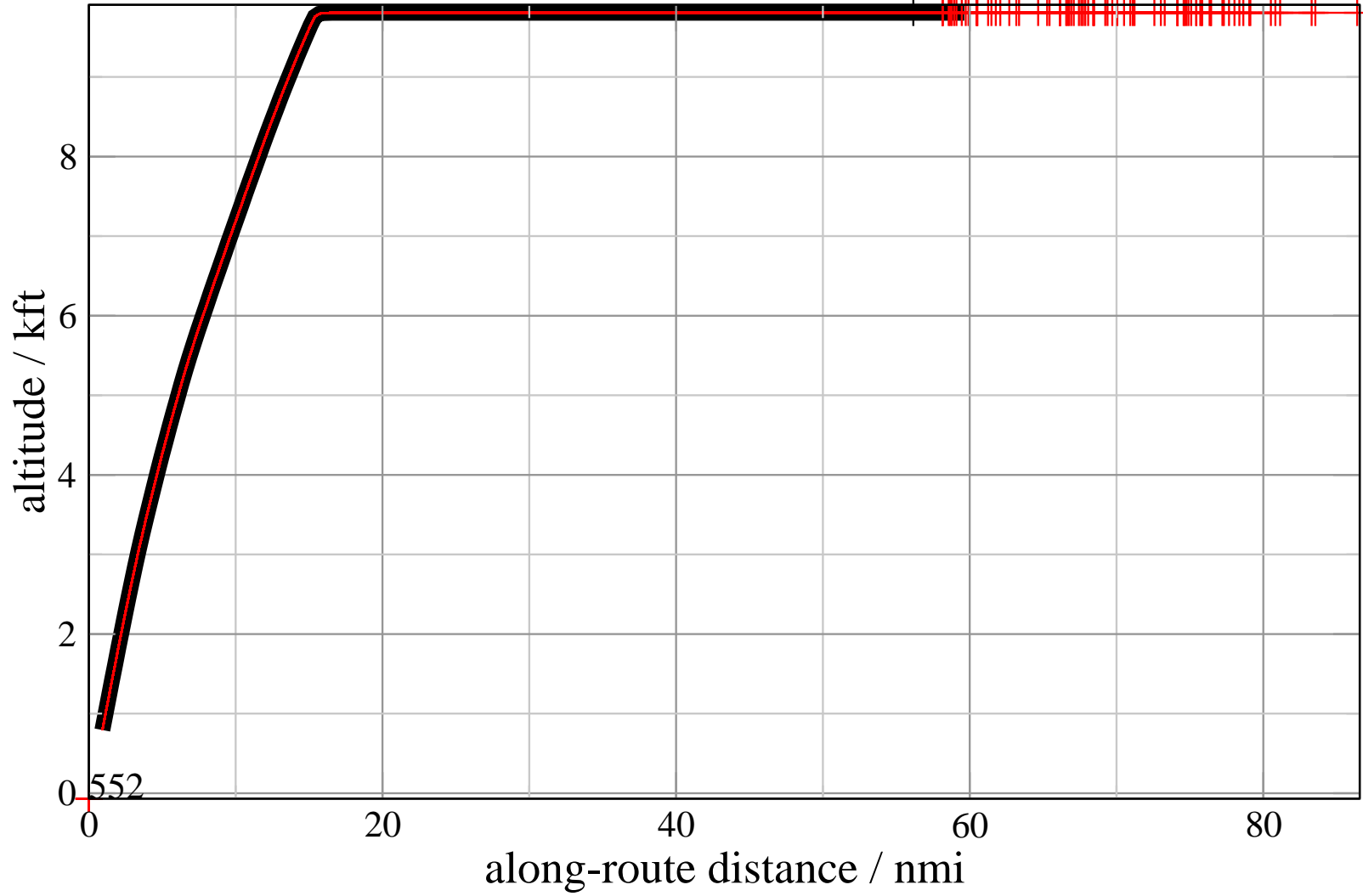
Altitude vs Distance

539 (MD82 D DFW/18L Dep)



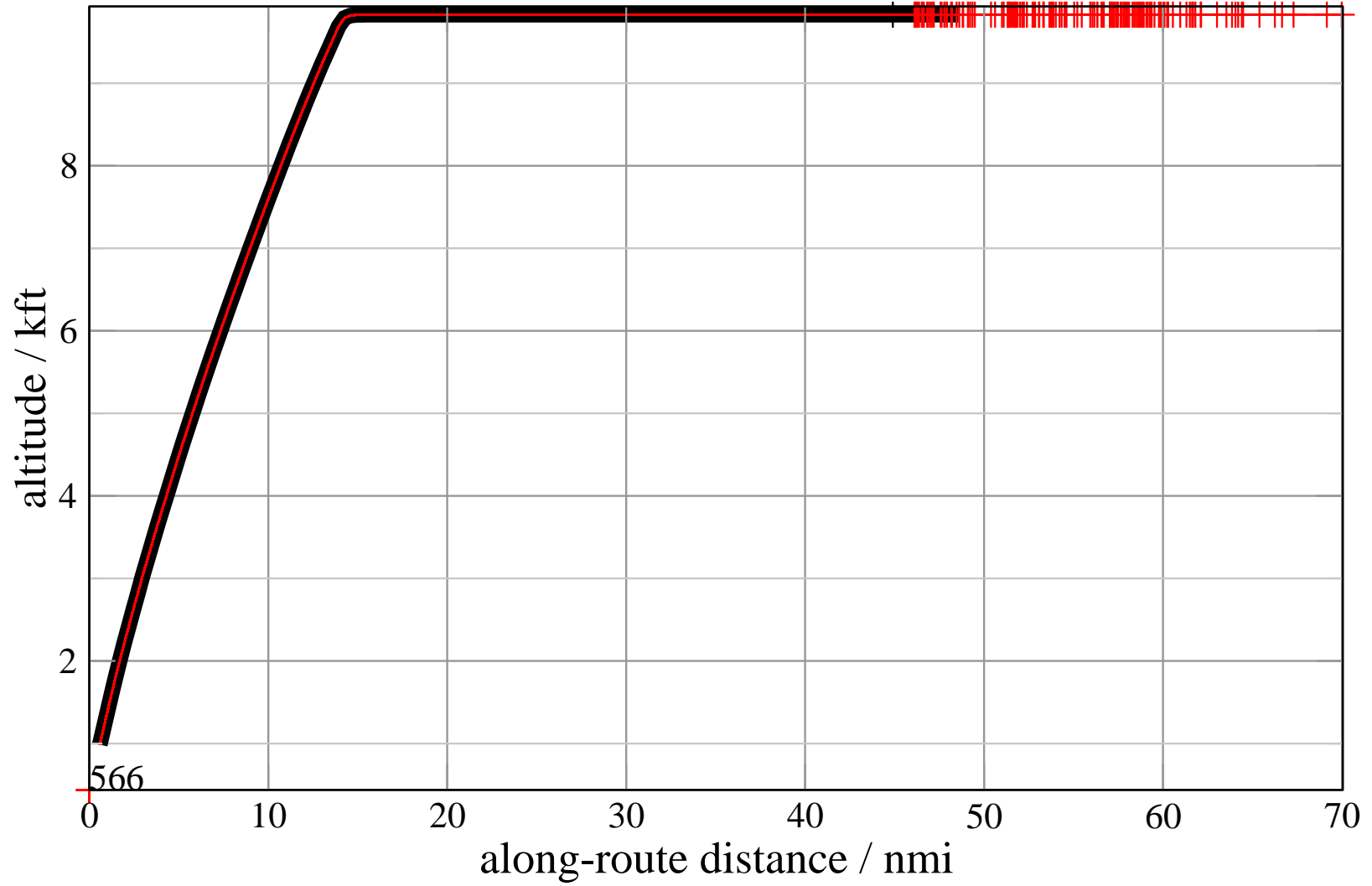
Altitude vs Distance

552 (E145 E DFW/18L Dep)



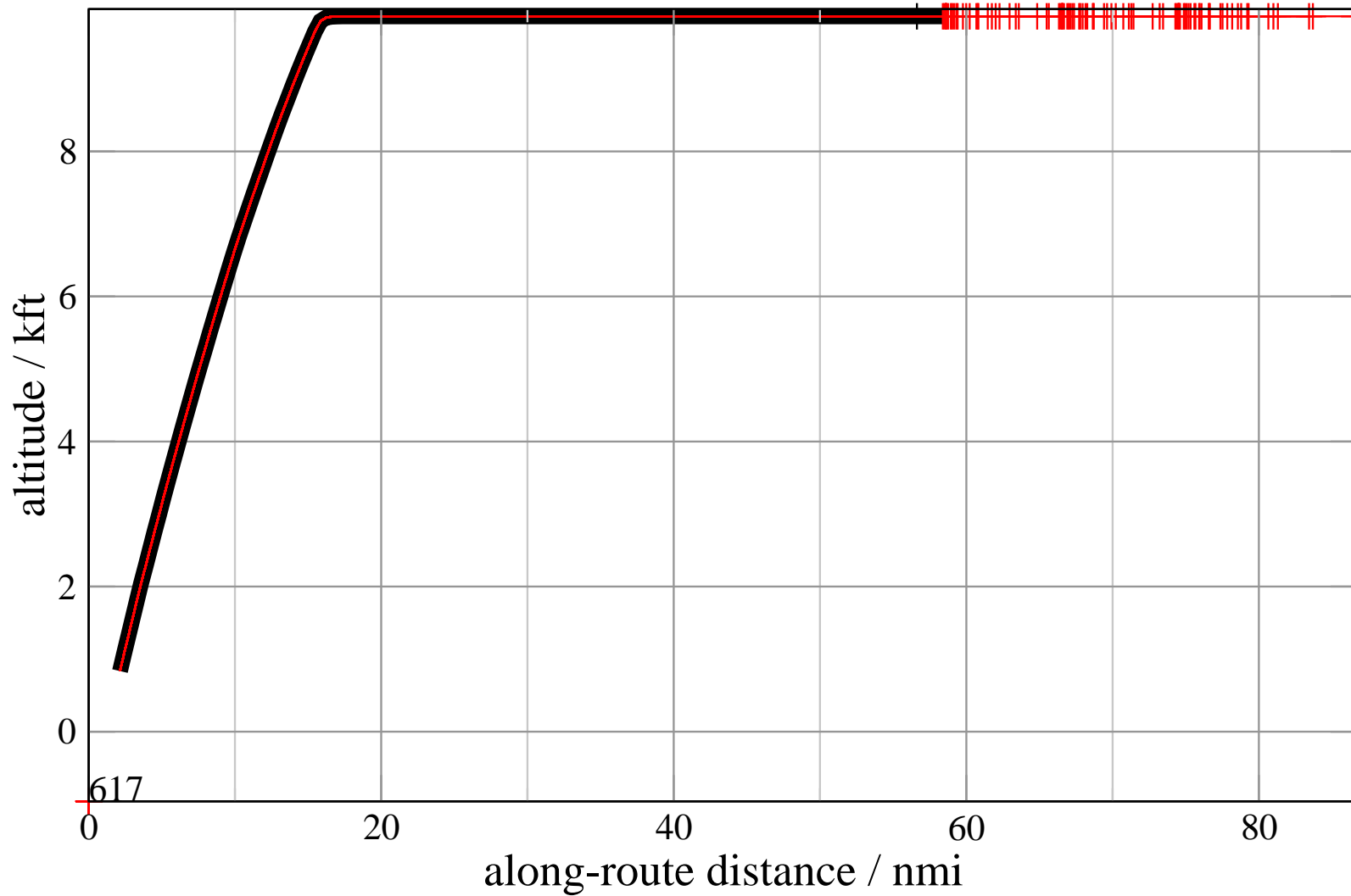
Altitude vs Distance

566 (CRJ7 E DFW/18L Dep)



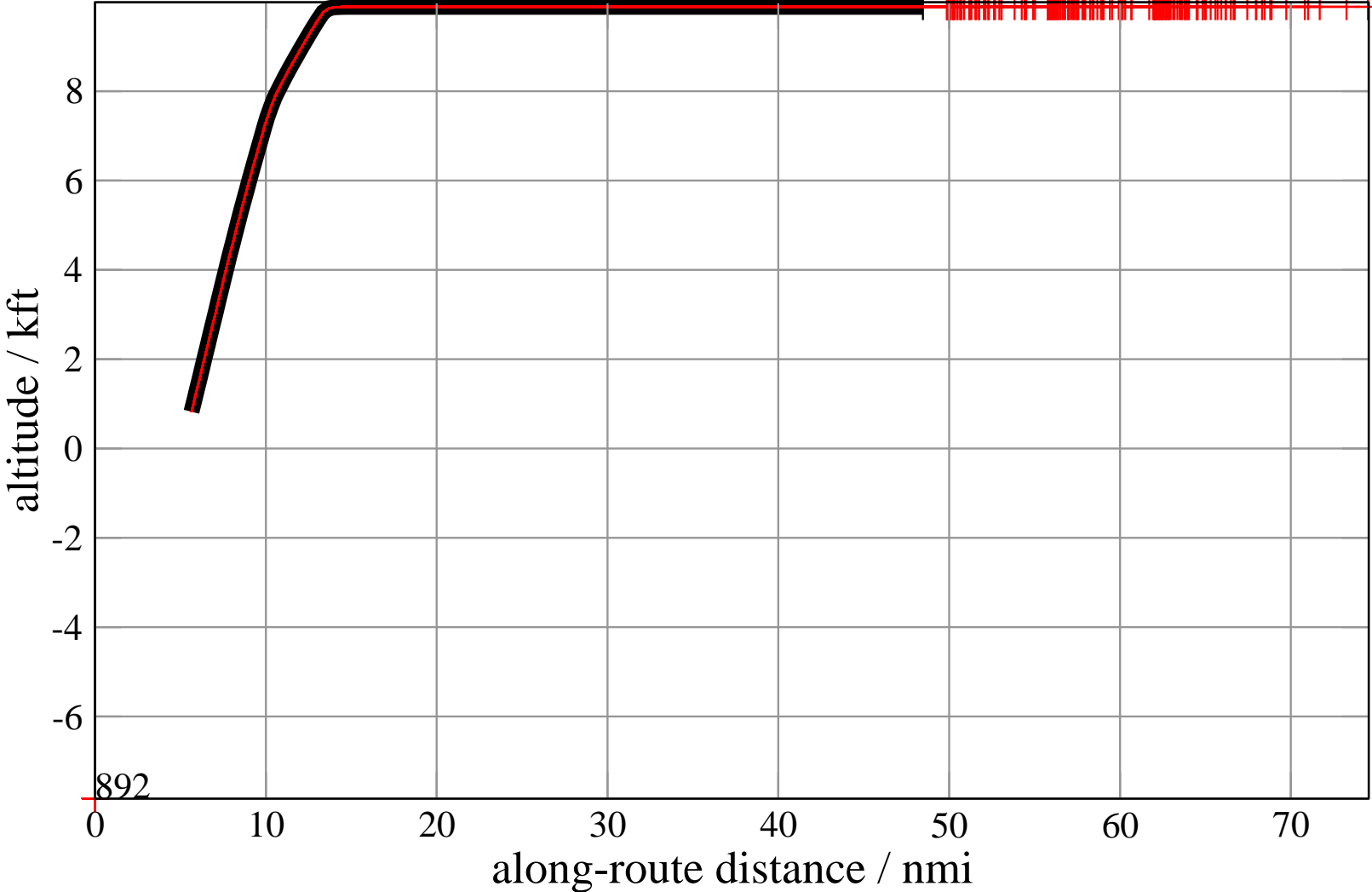
Altitude vs Distance

617 (B744 B DFW/18L Dep)



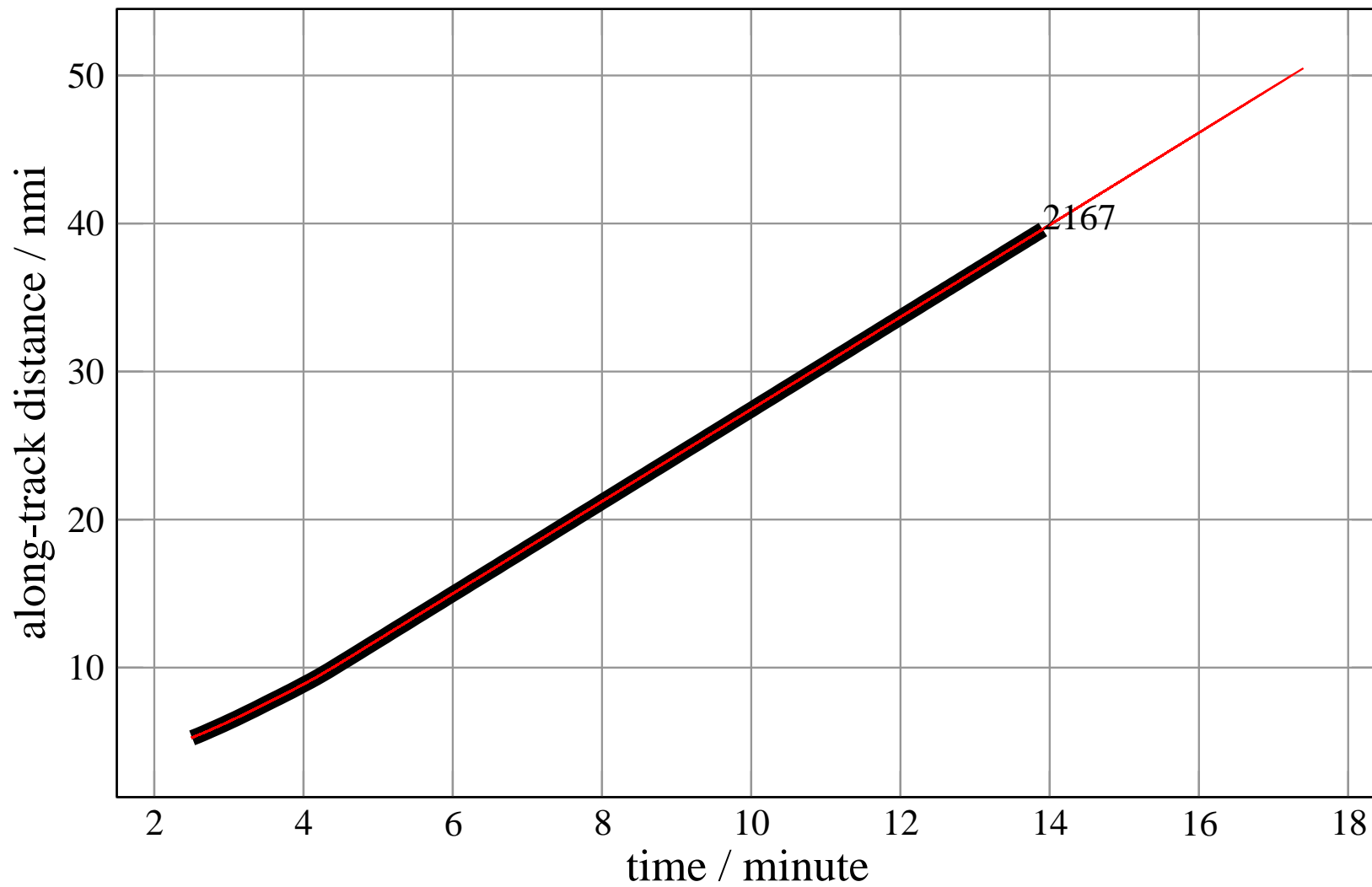
Altitude vs Distance

892 (E135 E DFW/18L Dep)



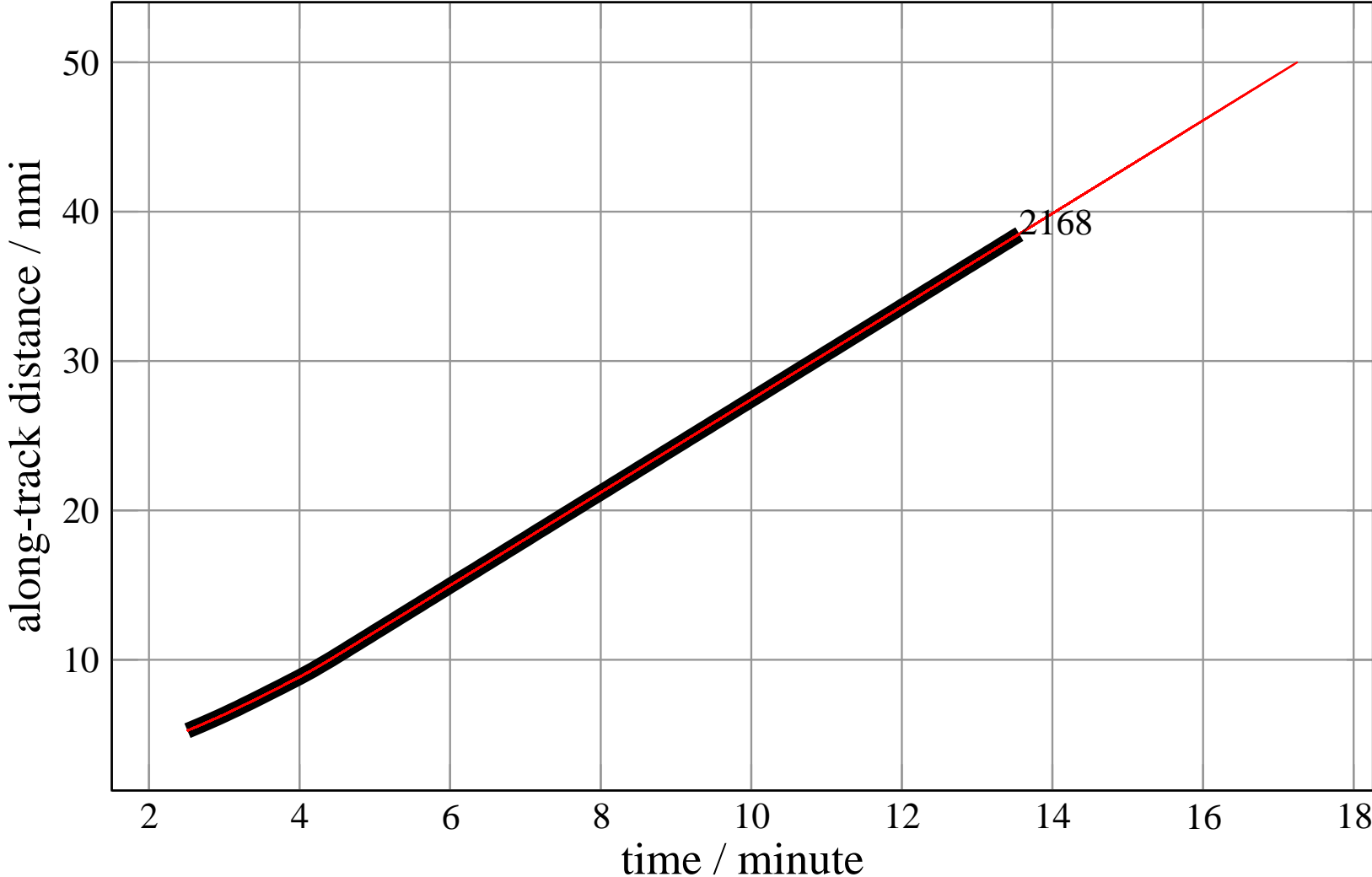
Along-Track Distance

2167 (CRJ7 E DAL/13R Dep)



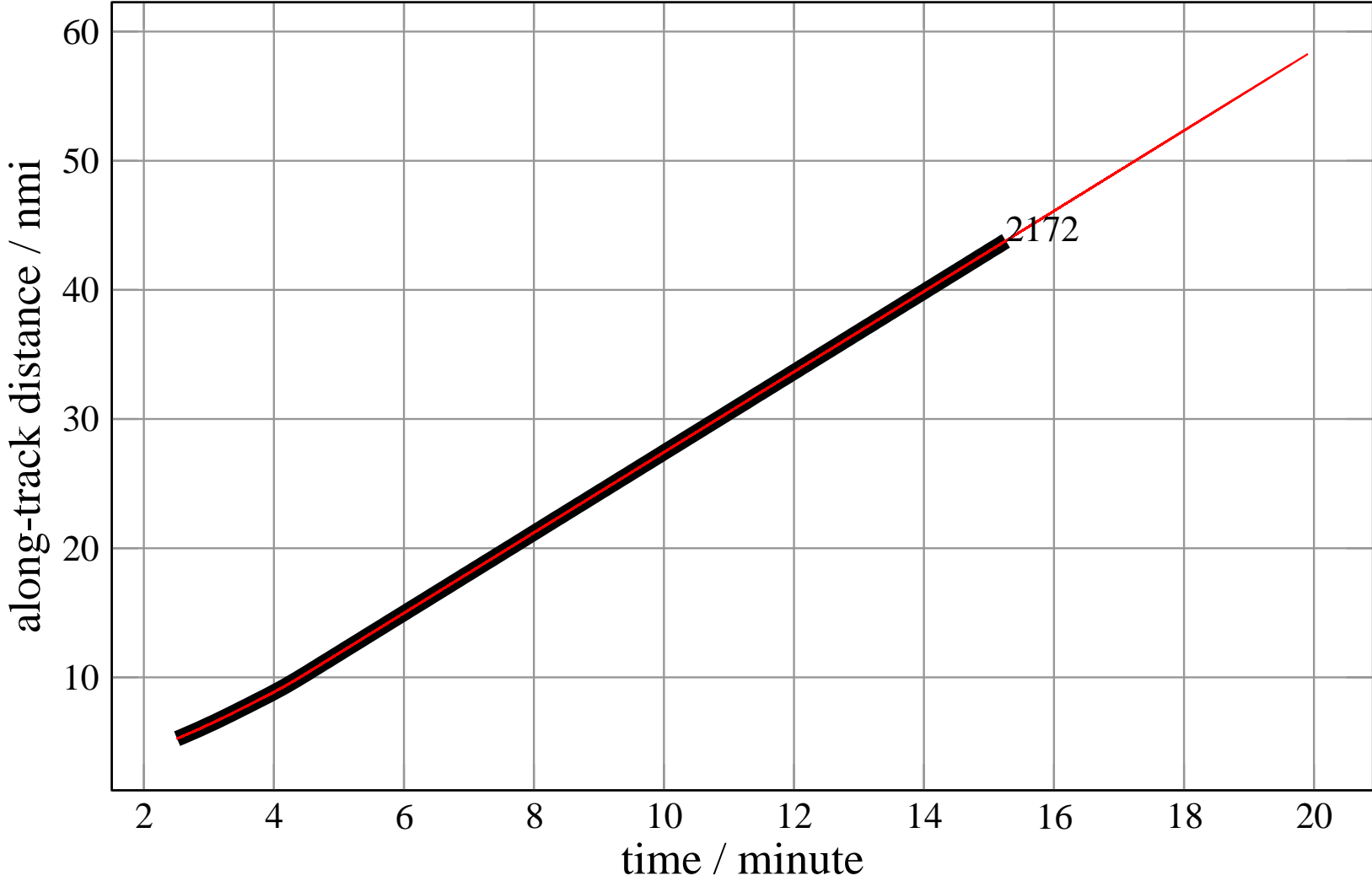
Along-Track Distance

2168 (CRJ2 E DAL/13R Dep)



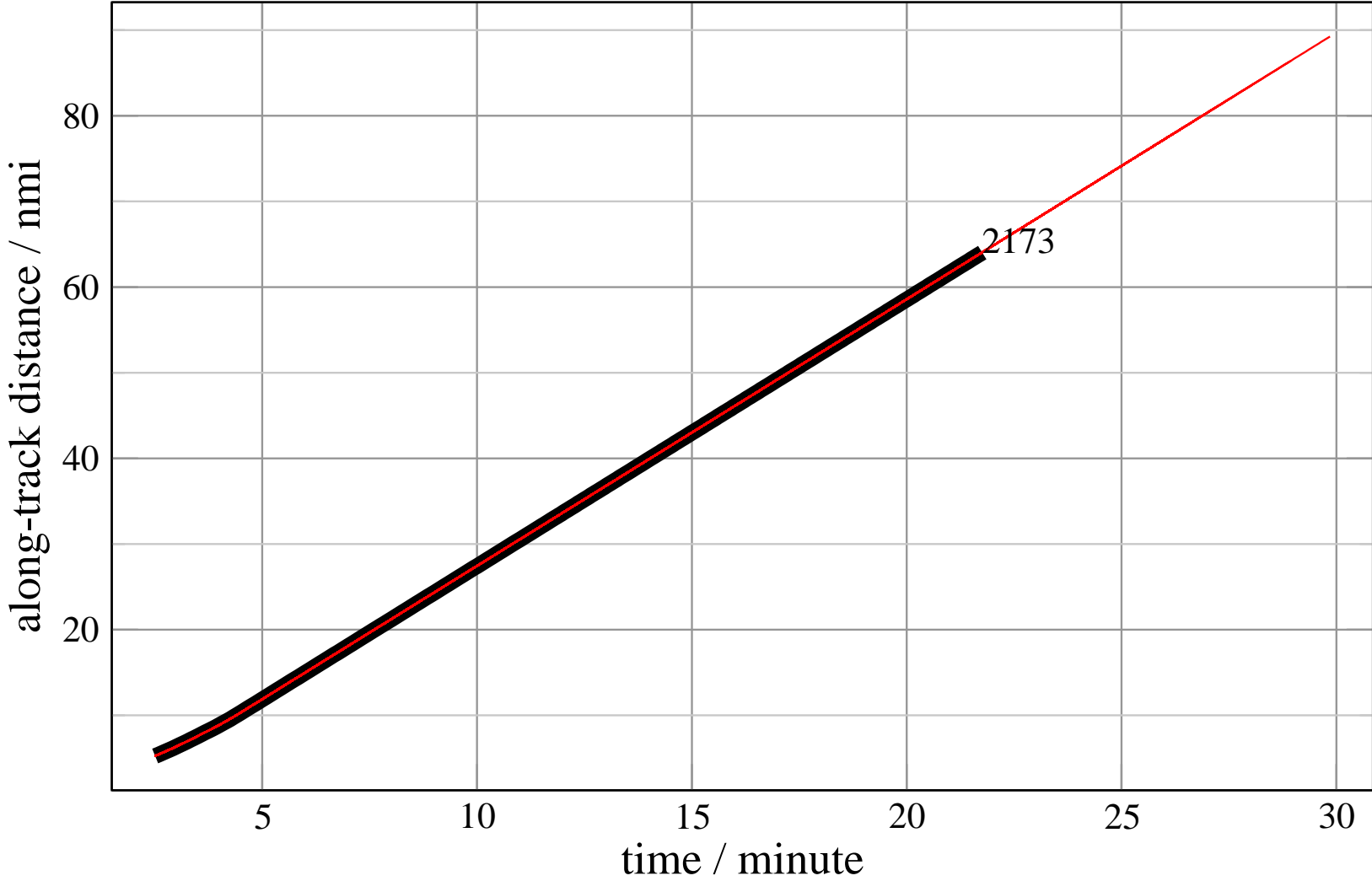
Along-Track Distance

2172 (B737 D DAL/13R Dep)



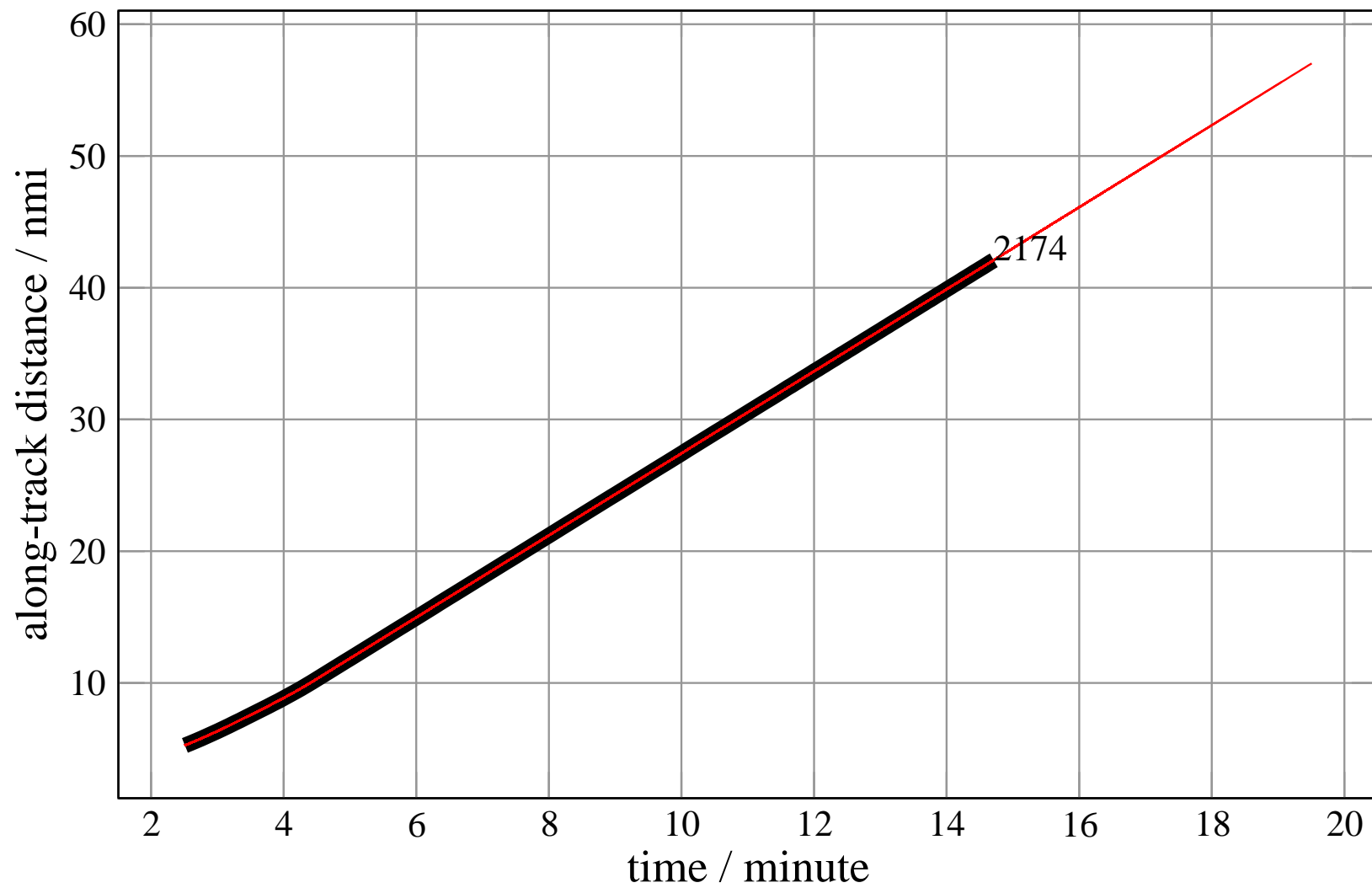
Along-Track Distance

2173 (B733 D DAL/13R Dep)



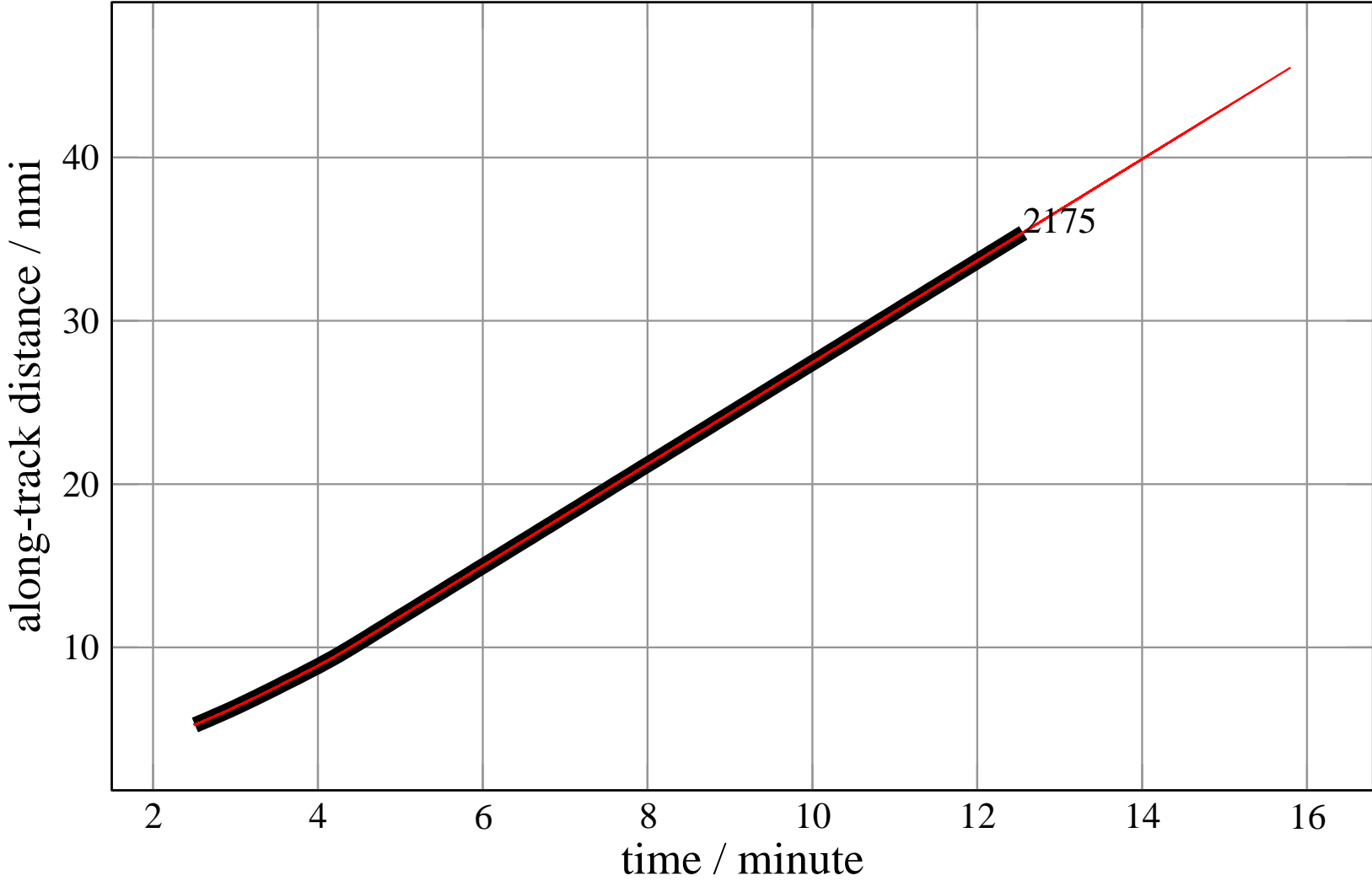
Along-Track Distance

2174 (B737 D DAL/13R Dep)



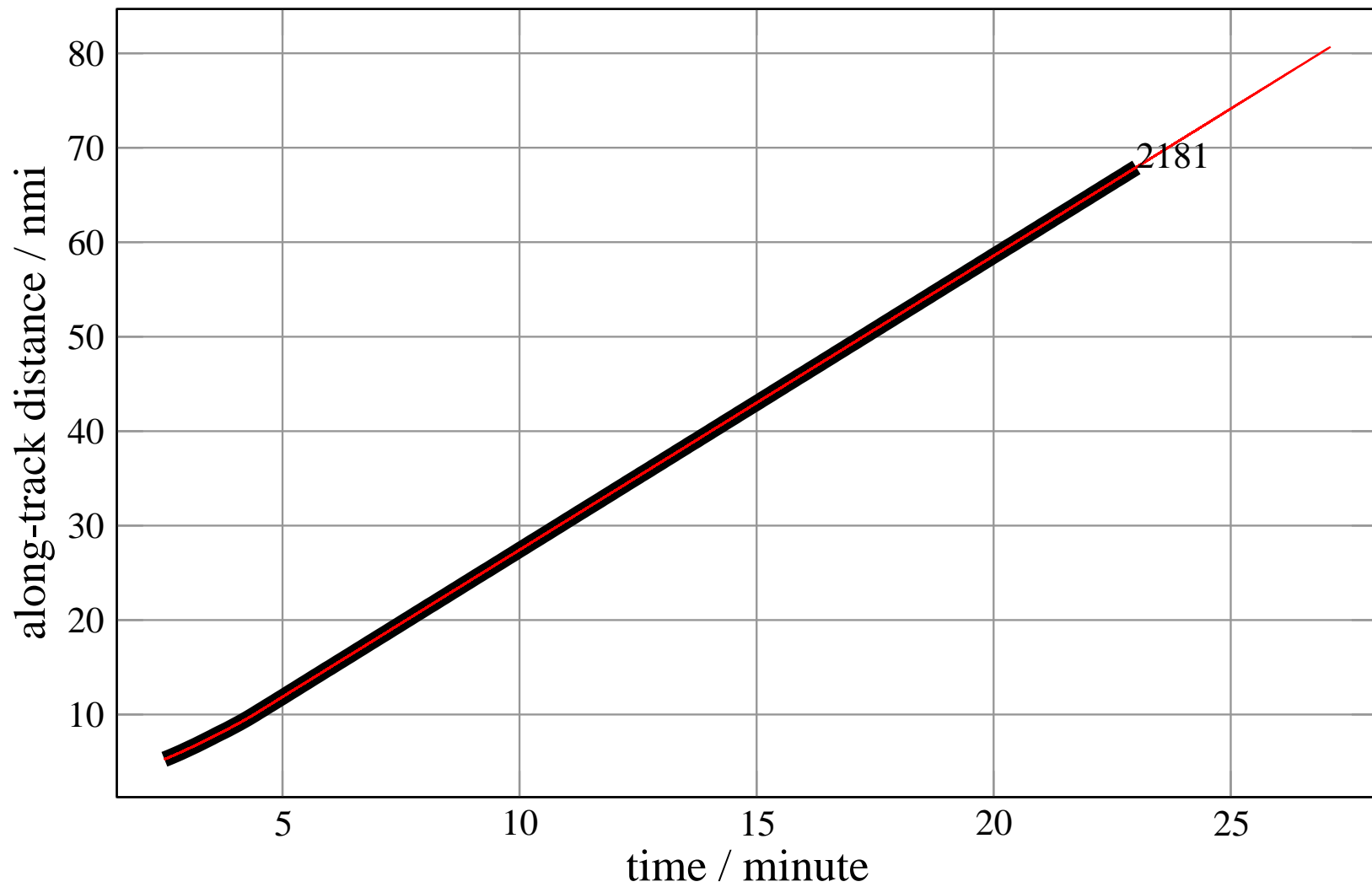
Along-Track Distance

2175 (B733 D DAL/13R Dep)



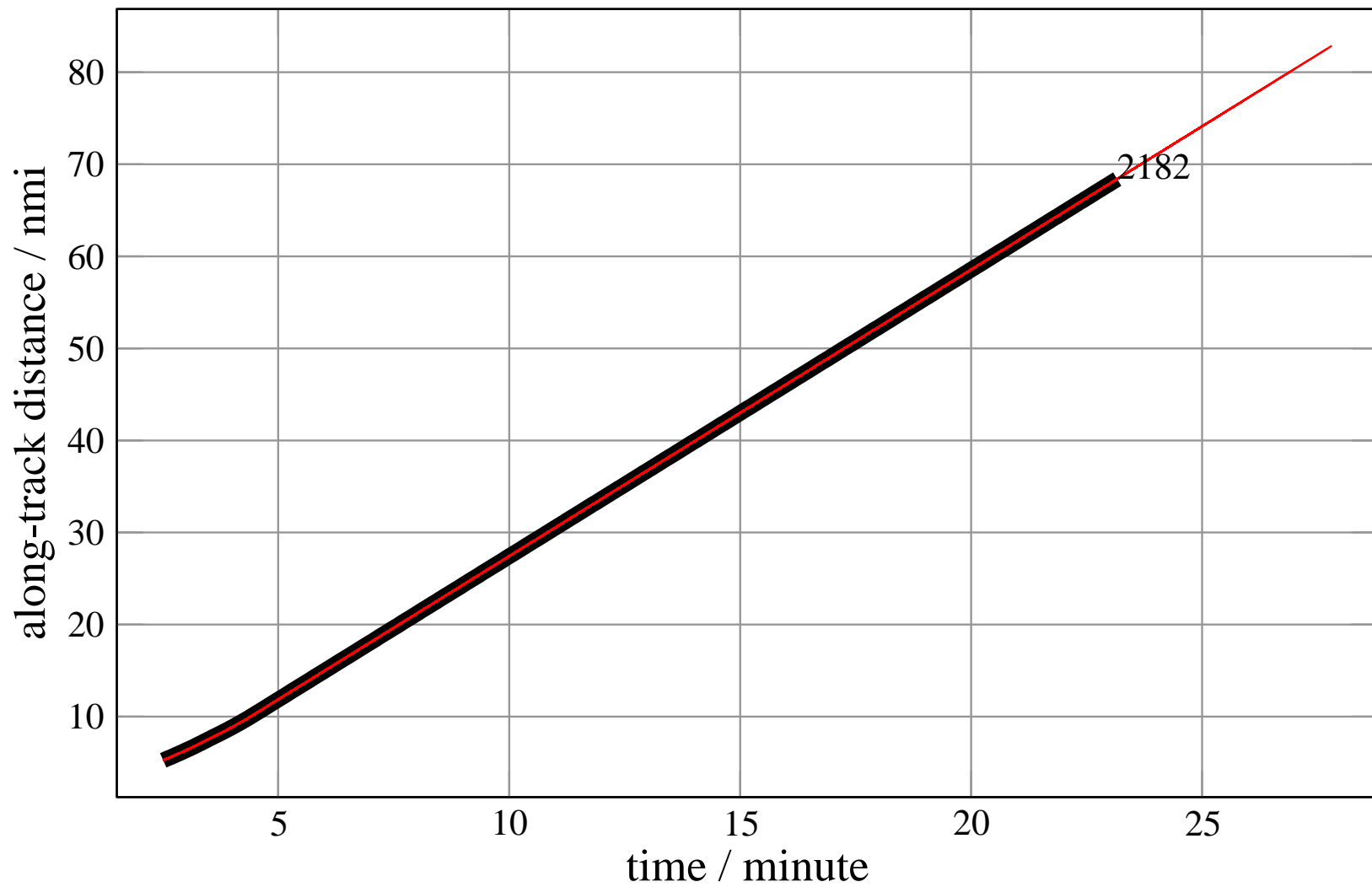
Along-Track Distance

2181 (B733 D DAL/13R Dep)



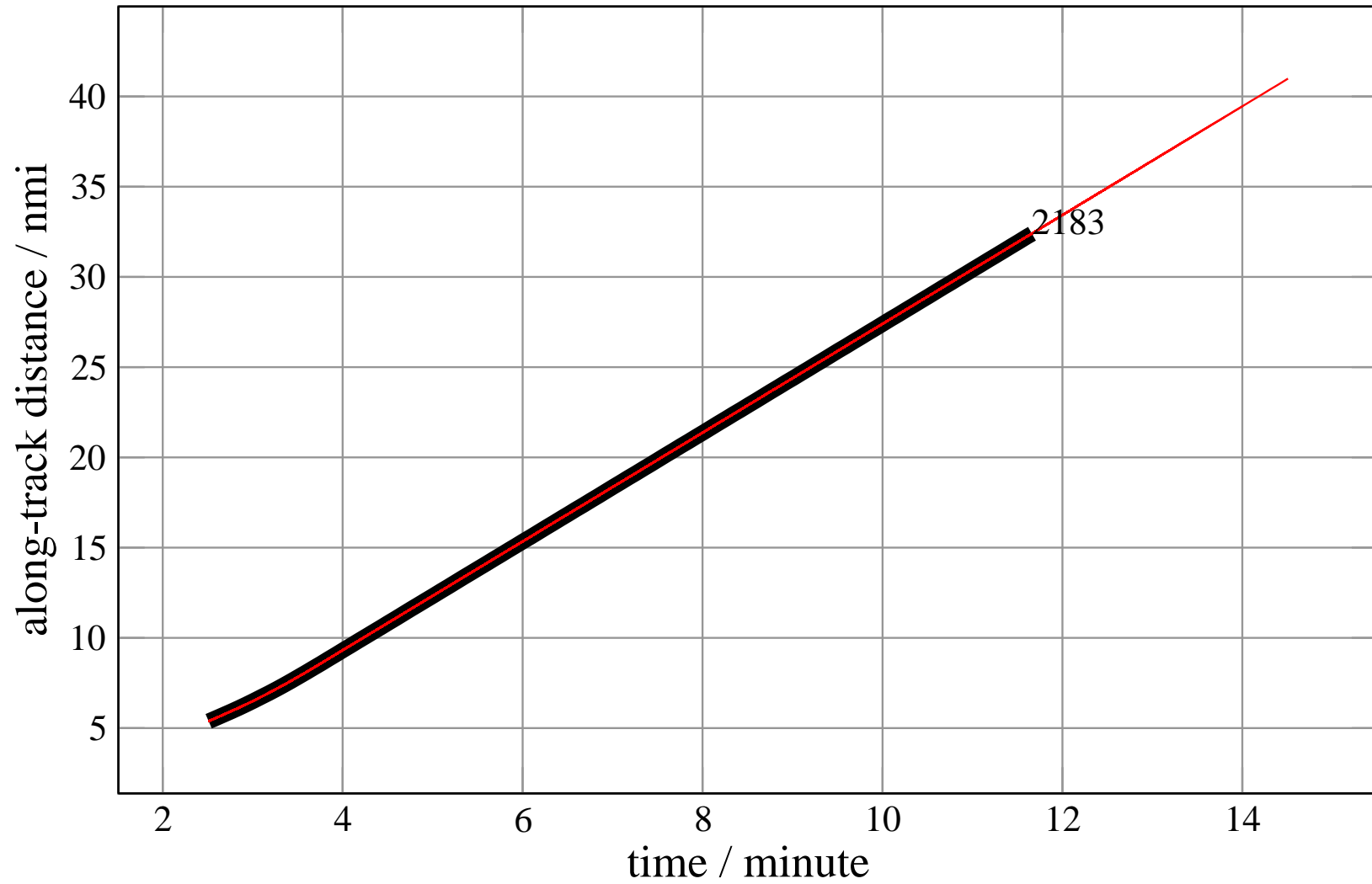
Along-Track Distance

2182 (B737 D DAL/13R Dep)



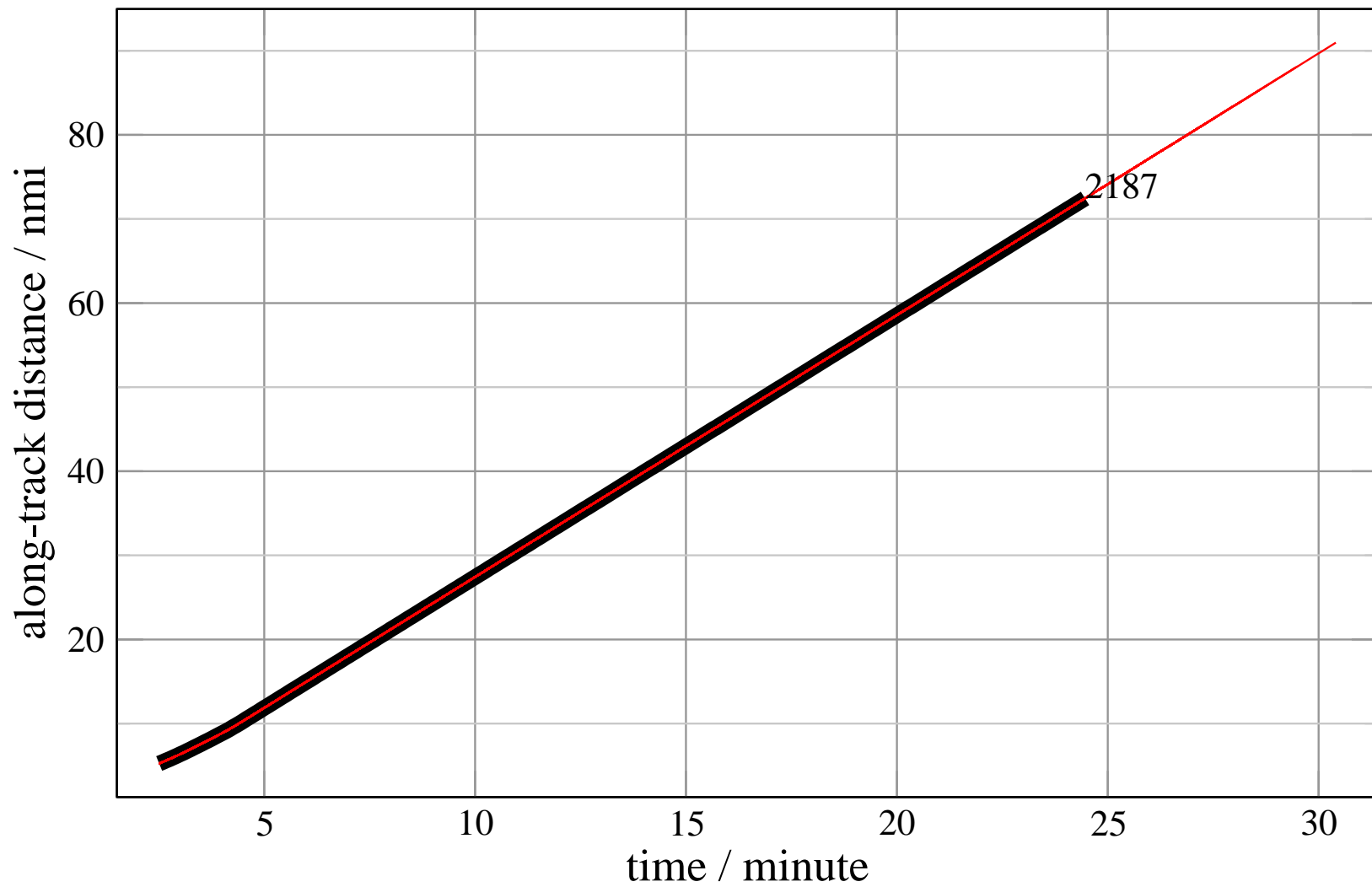
Along-Track Distance

2183 (WW24 F DAL/13R Dep)



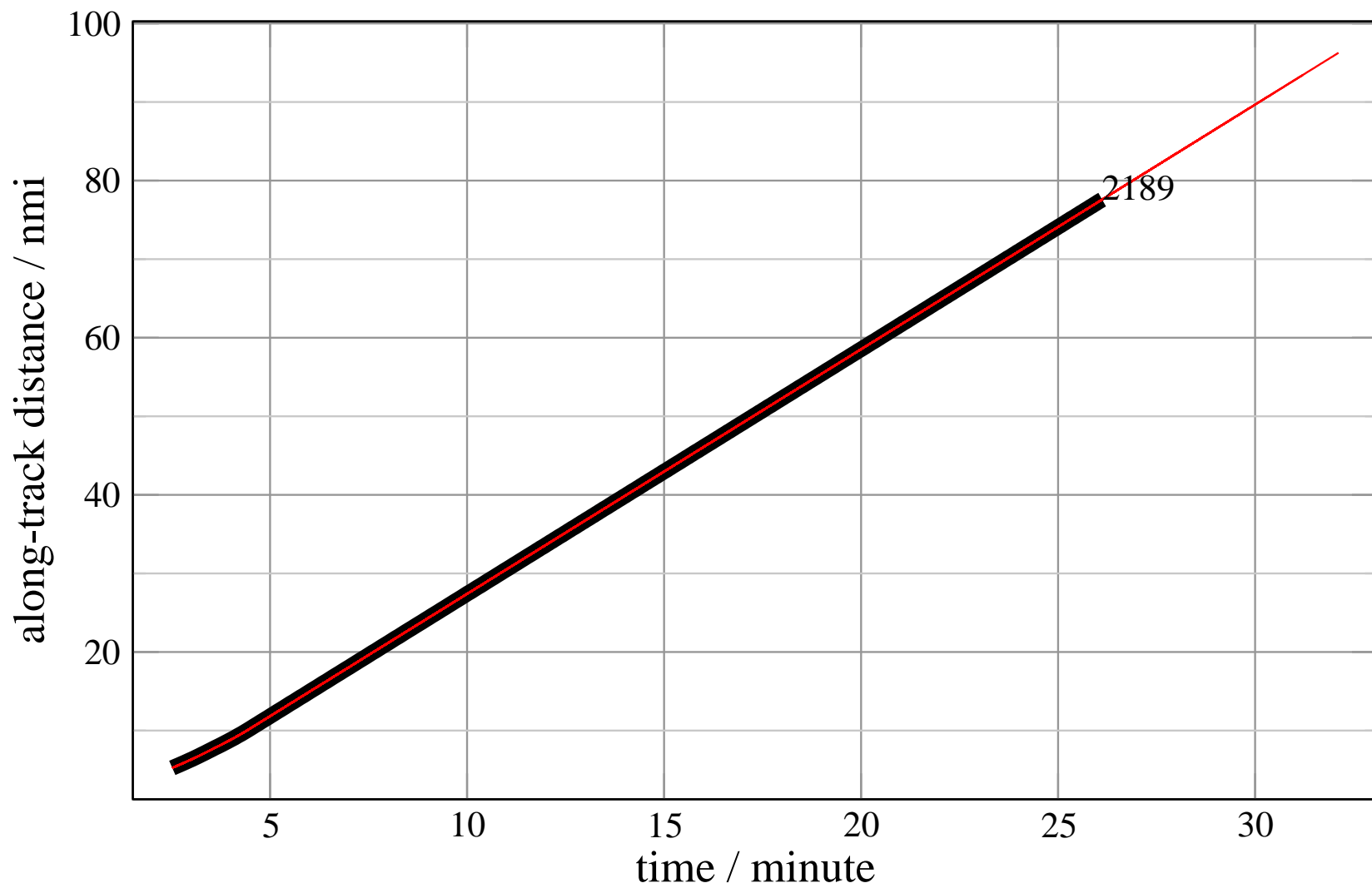
Along-Track Distance

2187 (C560 F DAL/13R Dep)



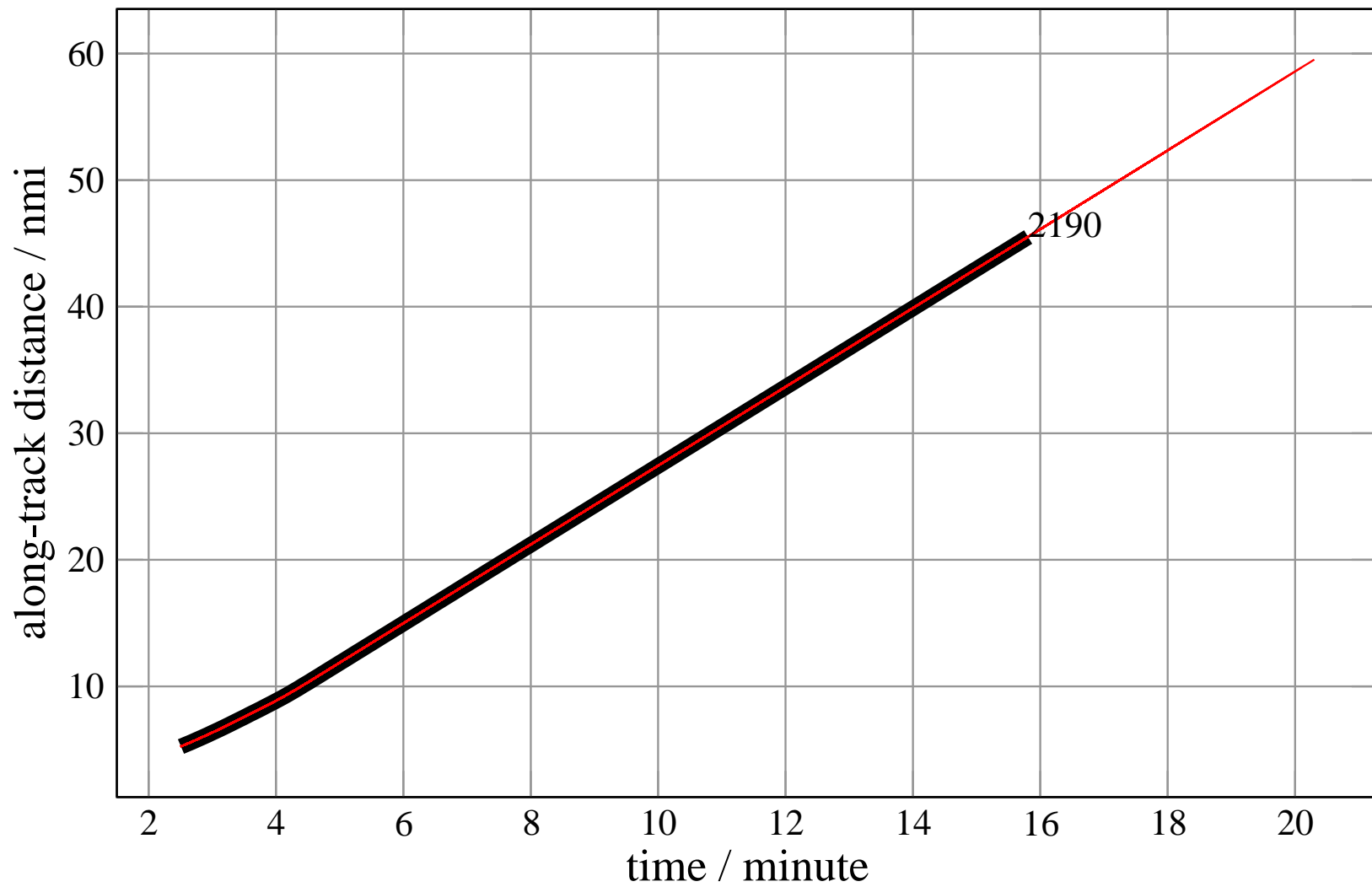
Along-Track Distance

2189 (B737 D DAL/13R Dep)



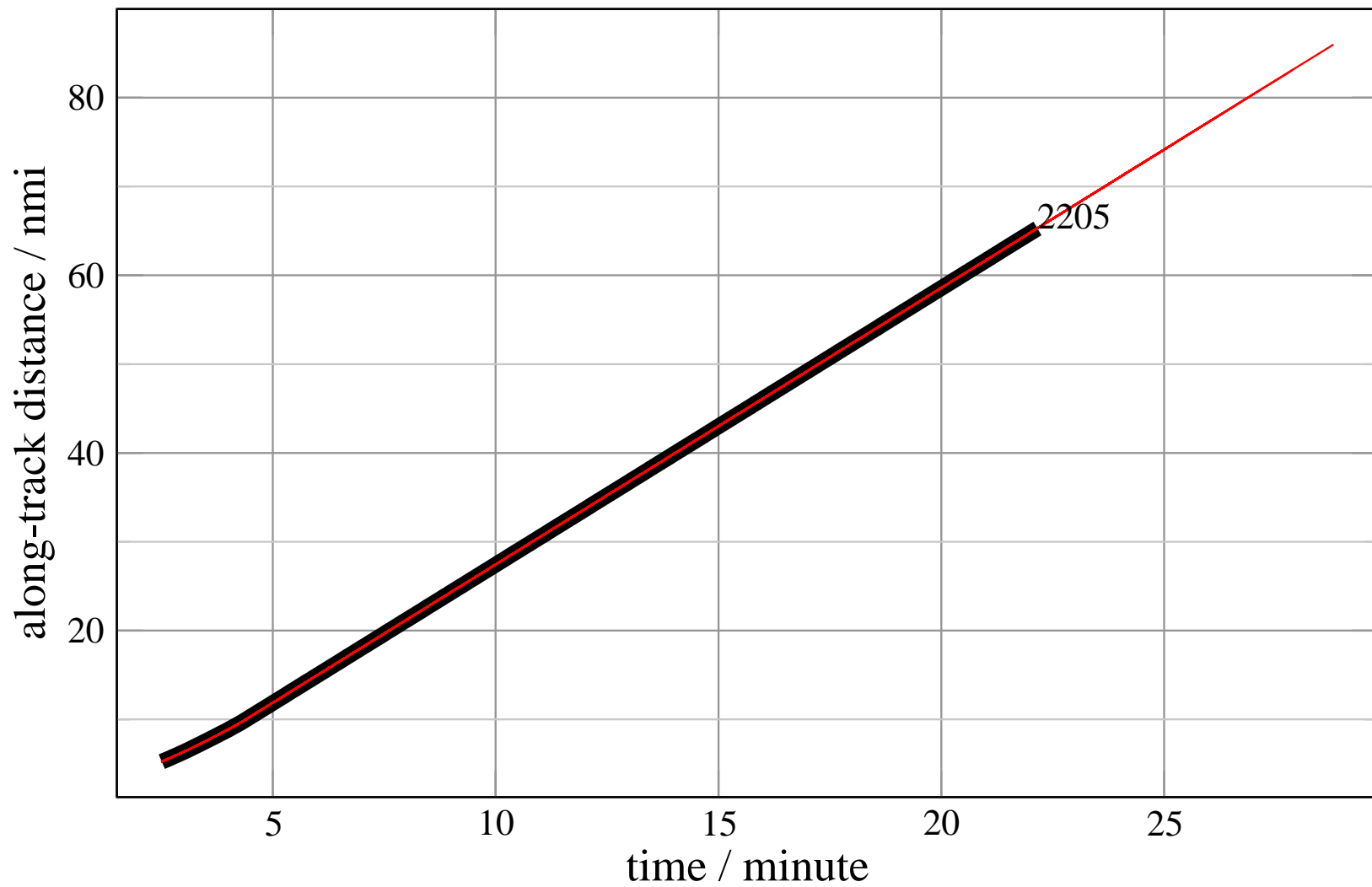
Along-Track Distance

2190 (B733 D DAL/13R Dep)



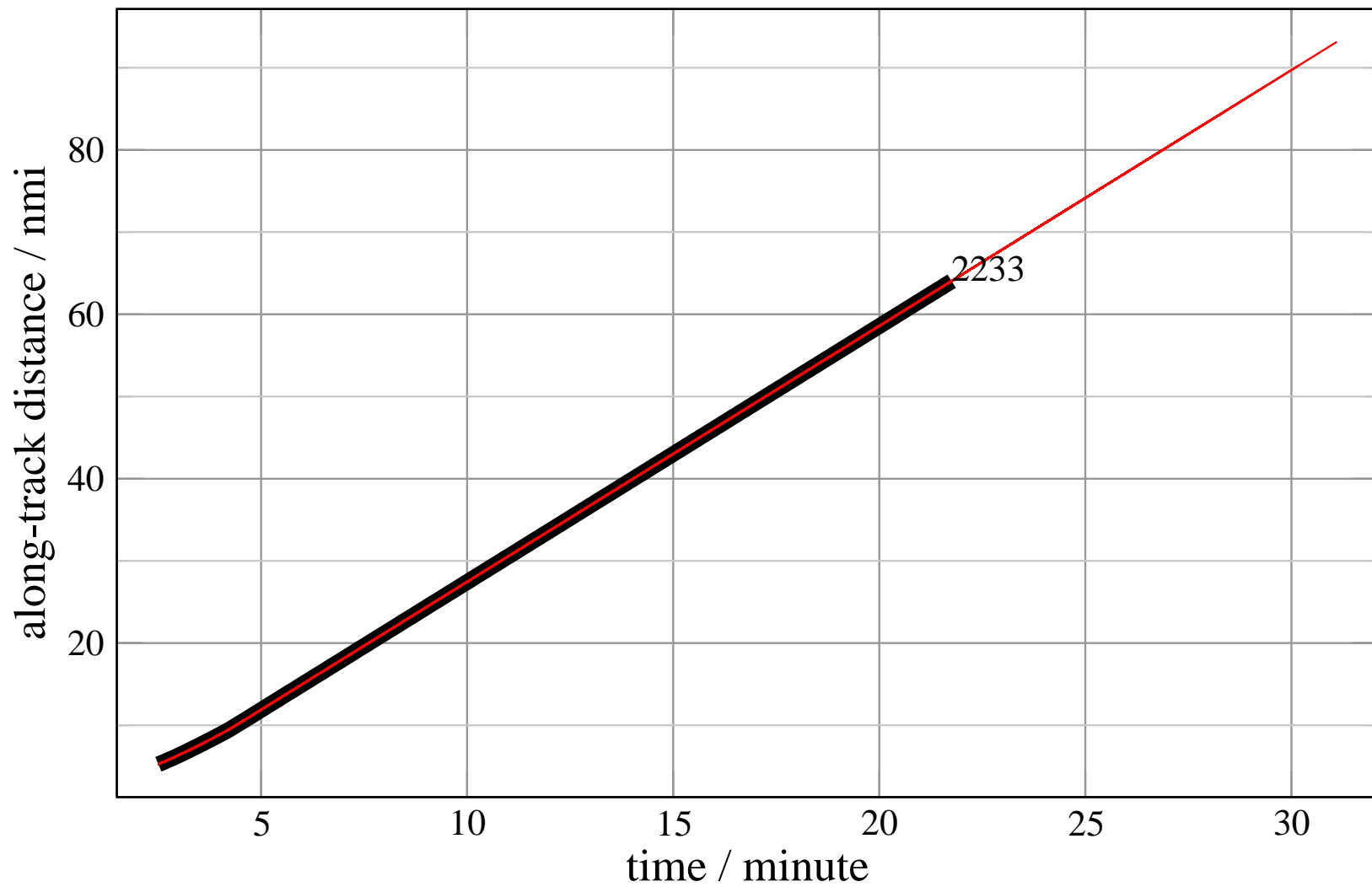
Along-Track Distance

2205 (B737 D DAL/13R Dep)



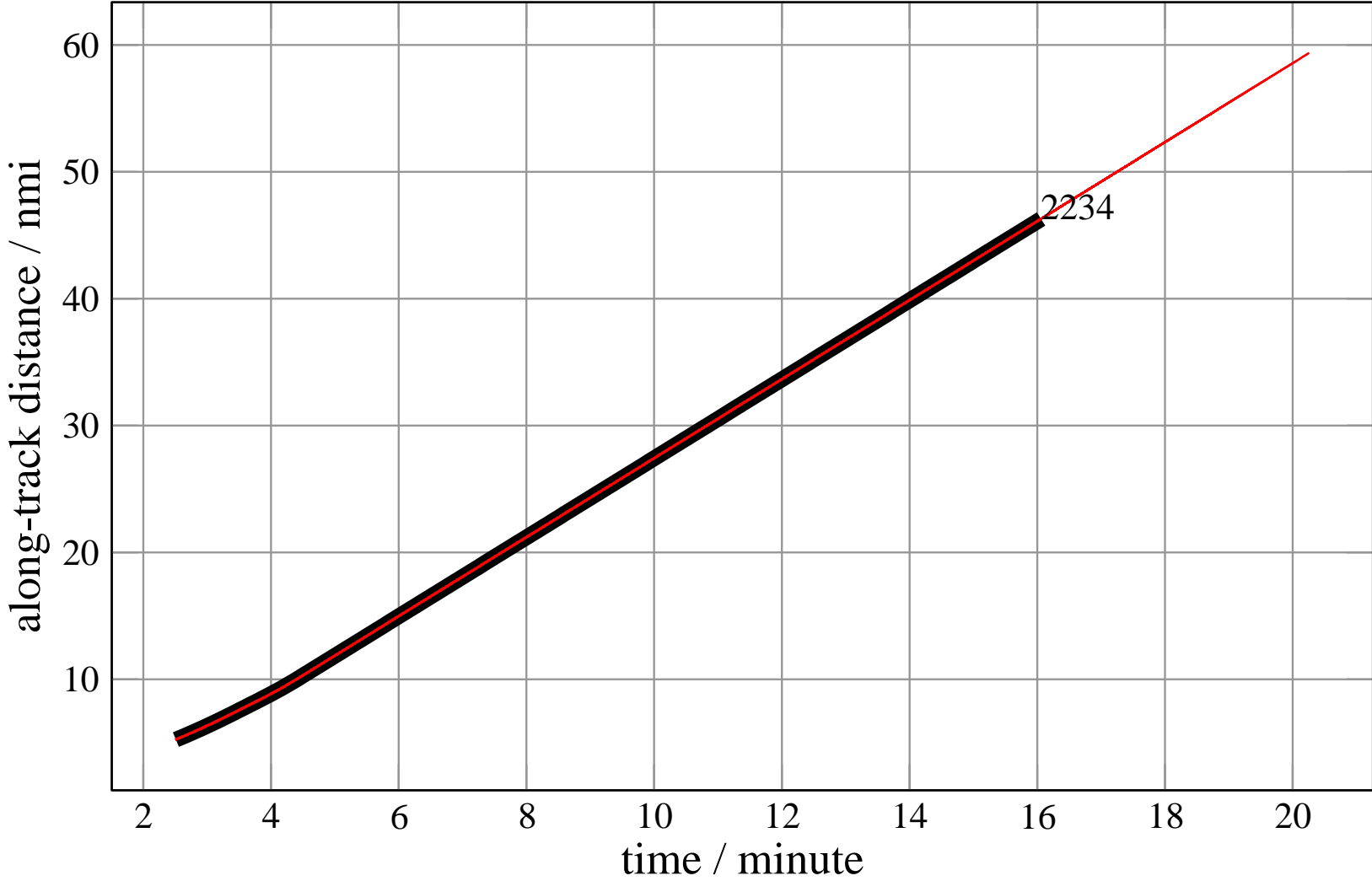
Along-Track Distance

2233 (CL60 E DAL/13R Dep)



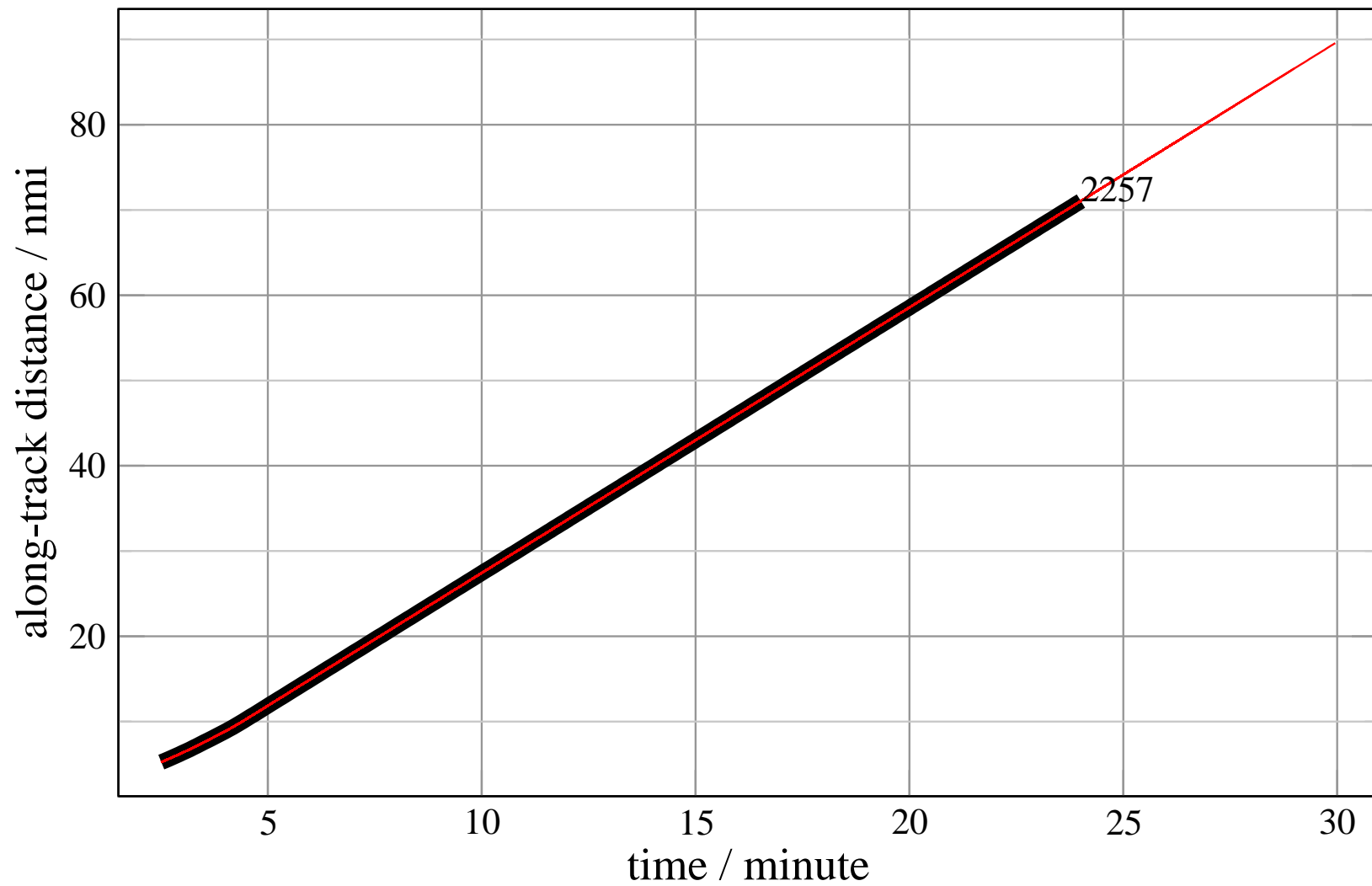
Along-Track Distance

2234 (CRJ2 E DAL/13R Dep)



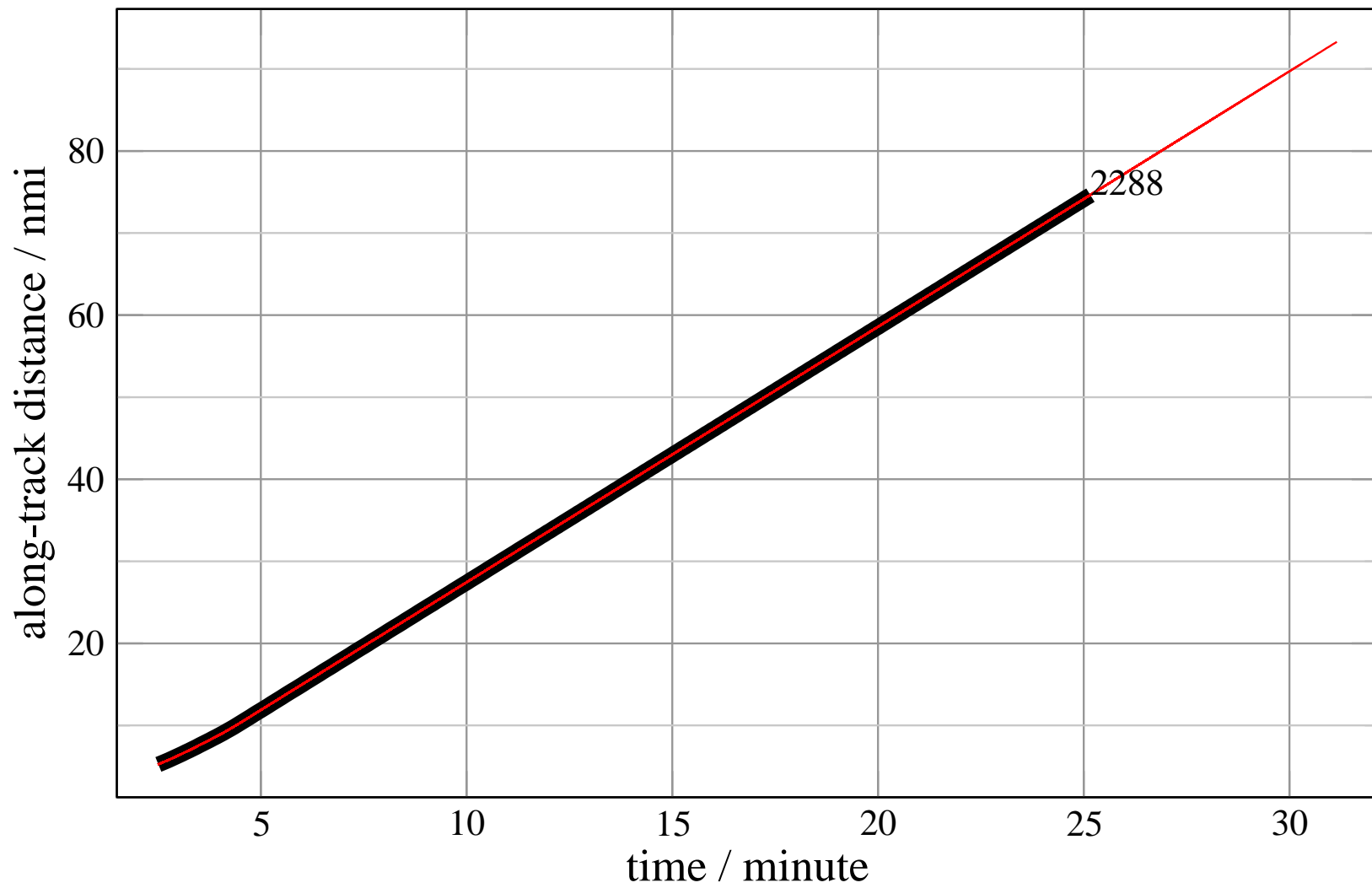
Along-Track Distance

2257 (FA50 F DAL/13R Dep)



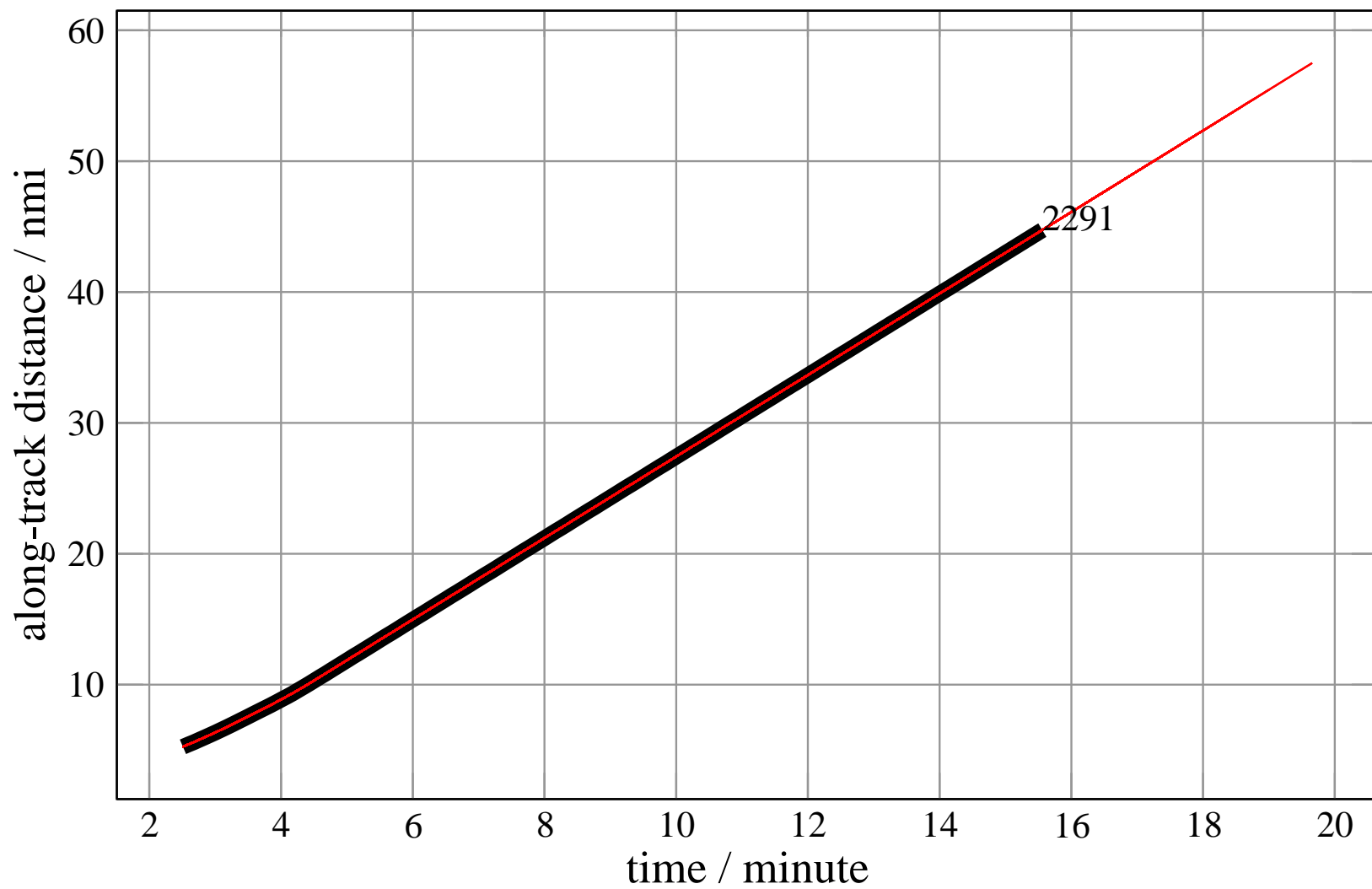
Along-Track Distance

2288 (B737 D DAL/13R Dep)



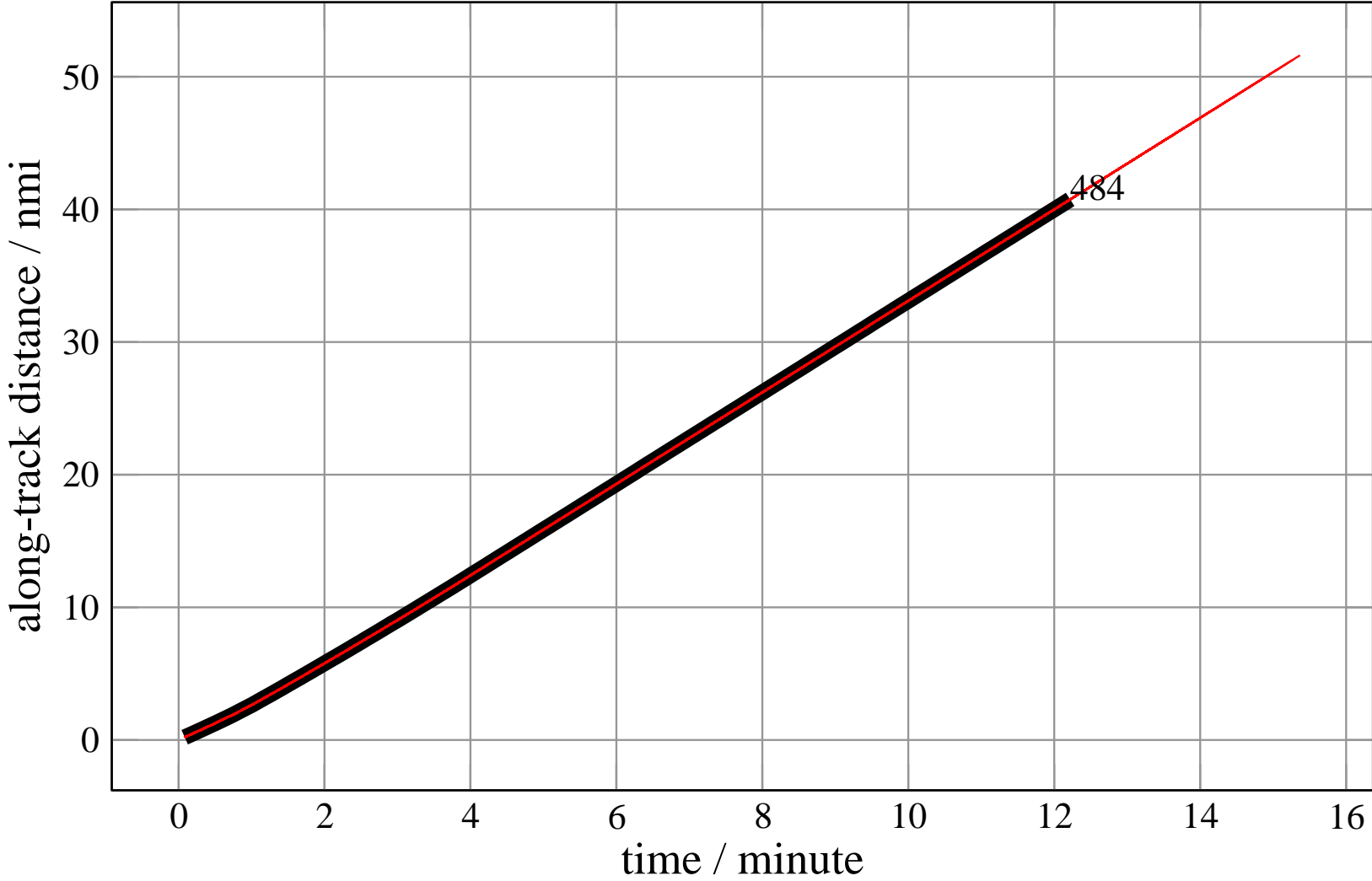
Along-Track Distance

2291 (B733 D DAL/13R Dep)



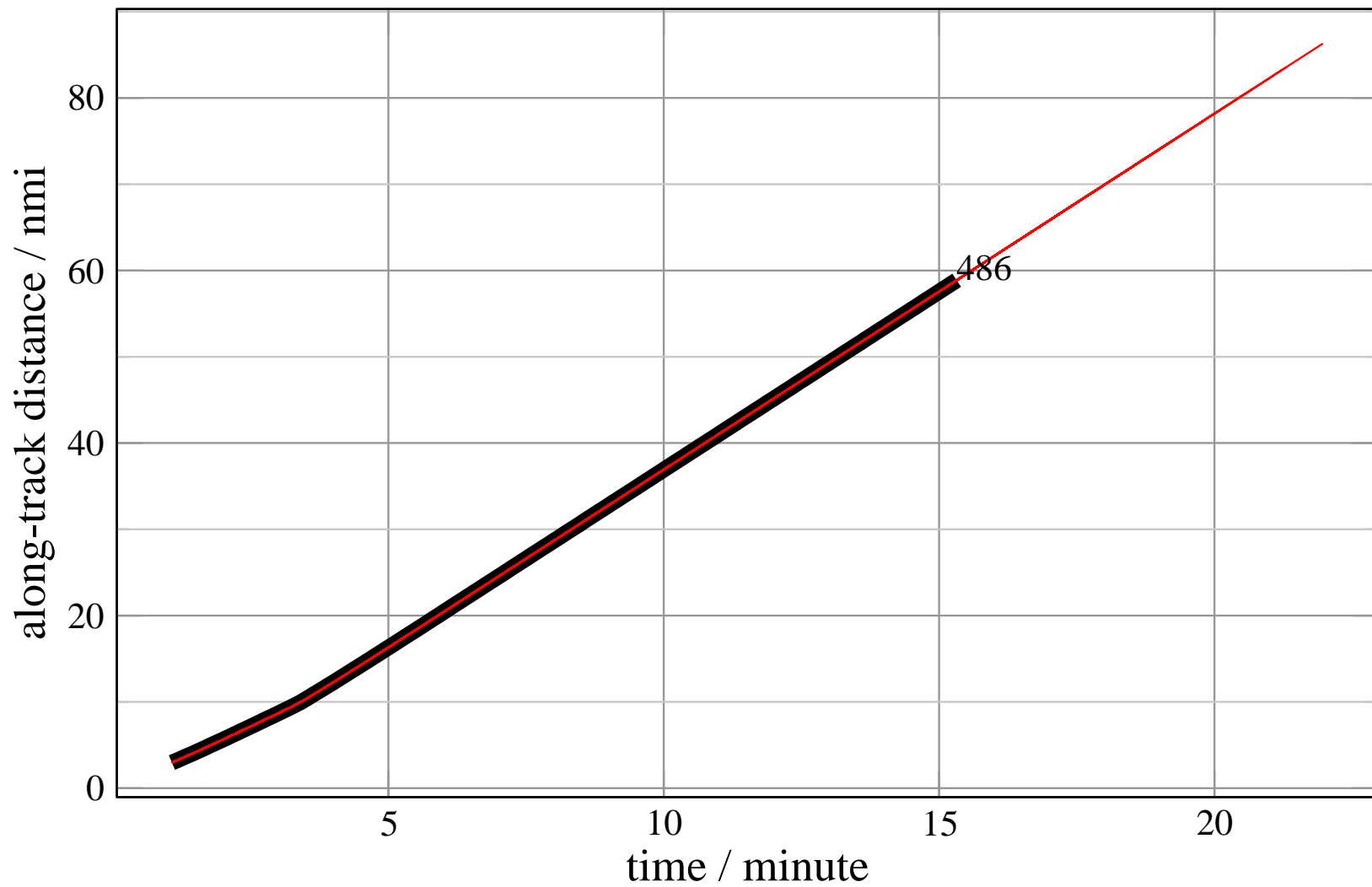
Along-Track Distance

484 (CRJ2 E DFW/17R Dep)



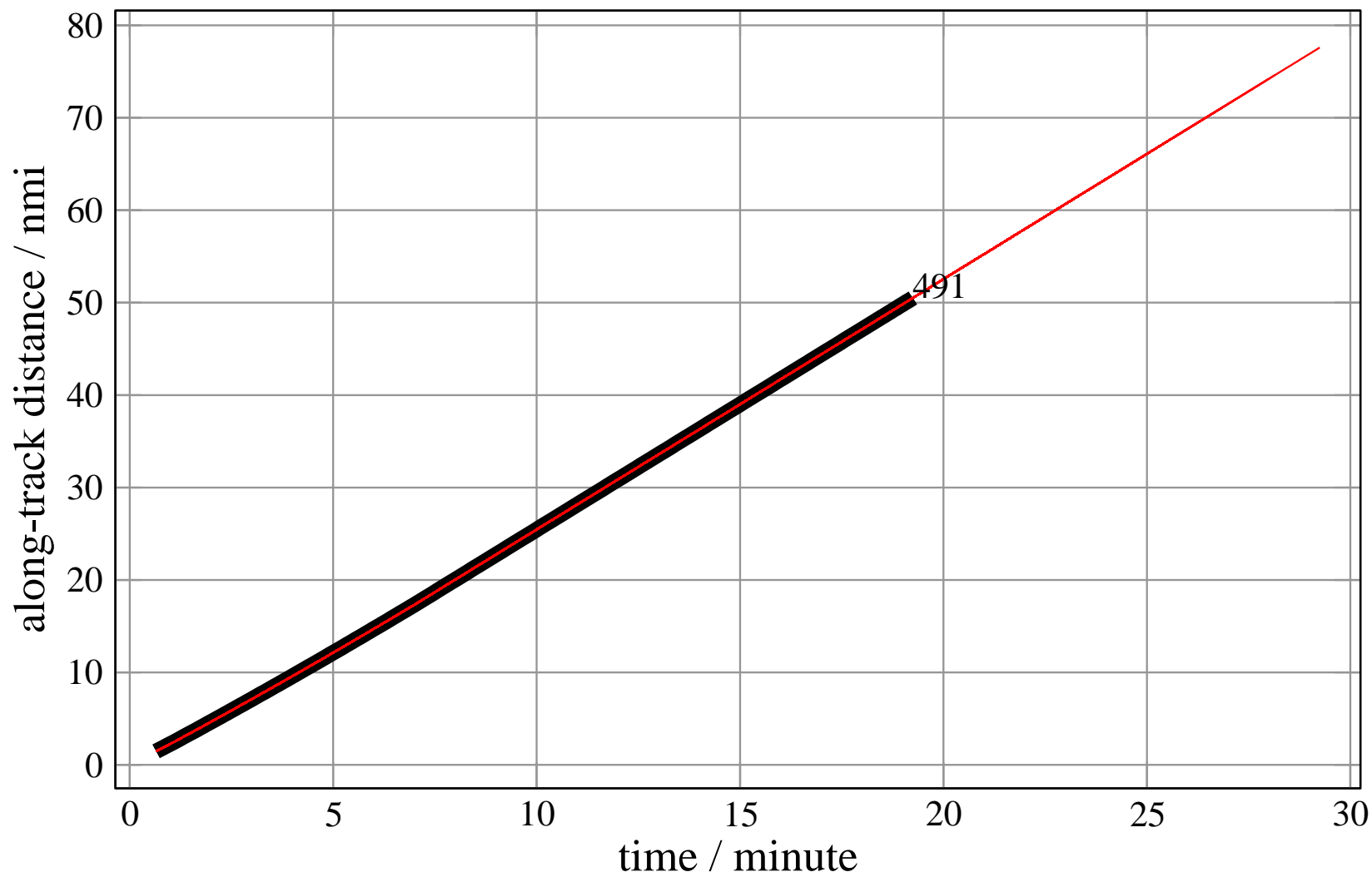
Along-Track Distance

486 (MD83 D DFW/17R Dep)



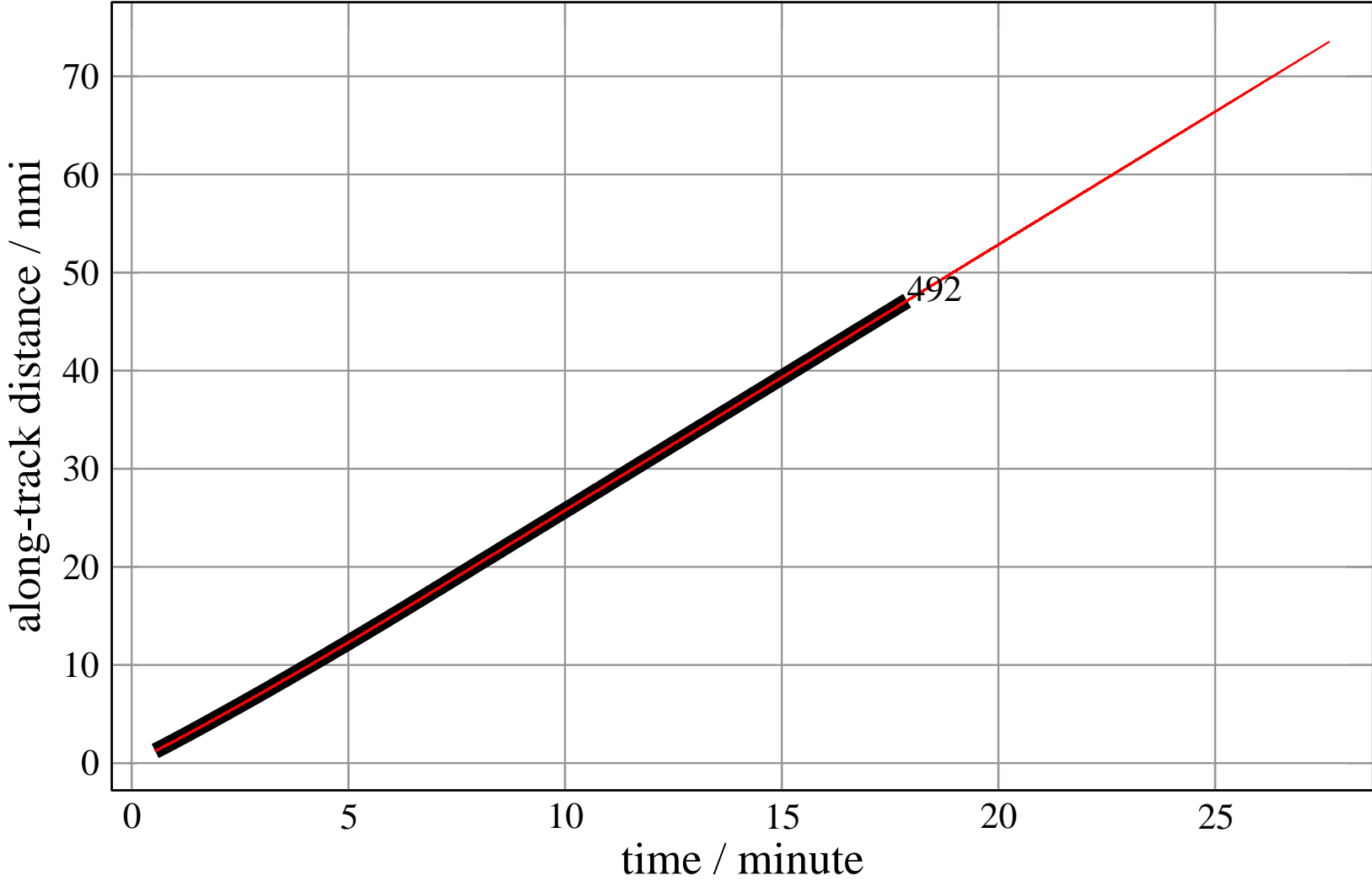
Along-Track Distance

491 (BE99 F DFW/18L Dep)



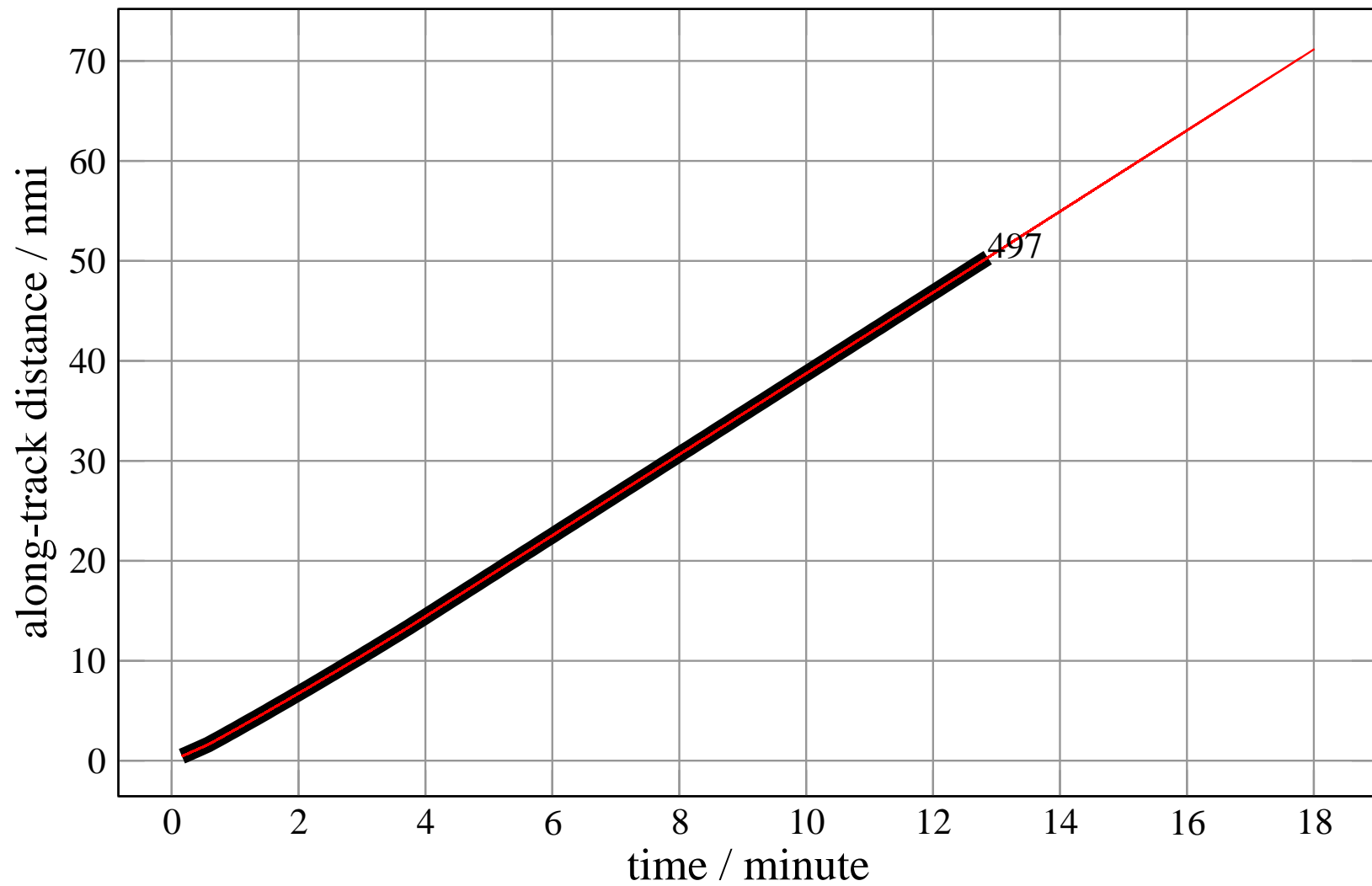
Along-Track Distance

492 (BE99 F DFW/18L Dep)



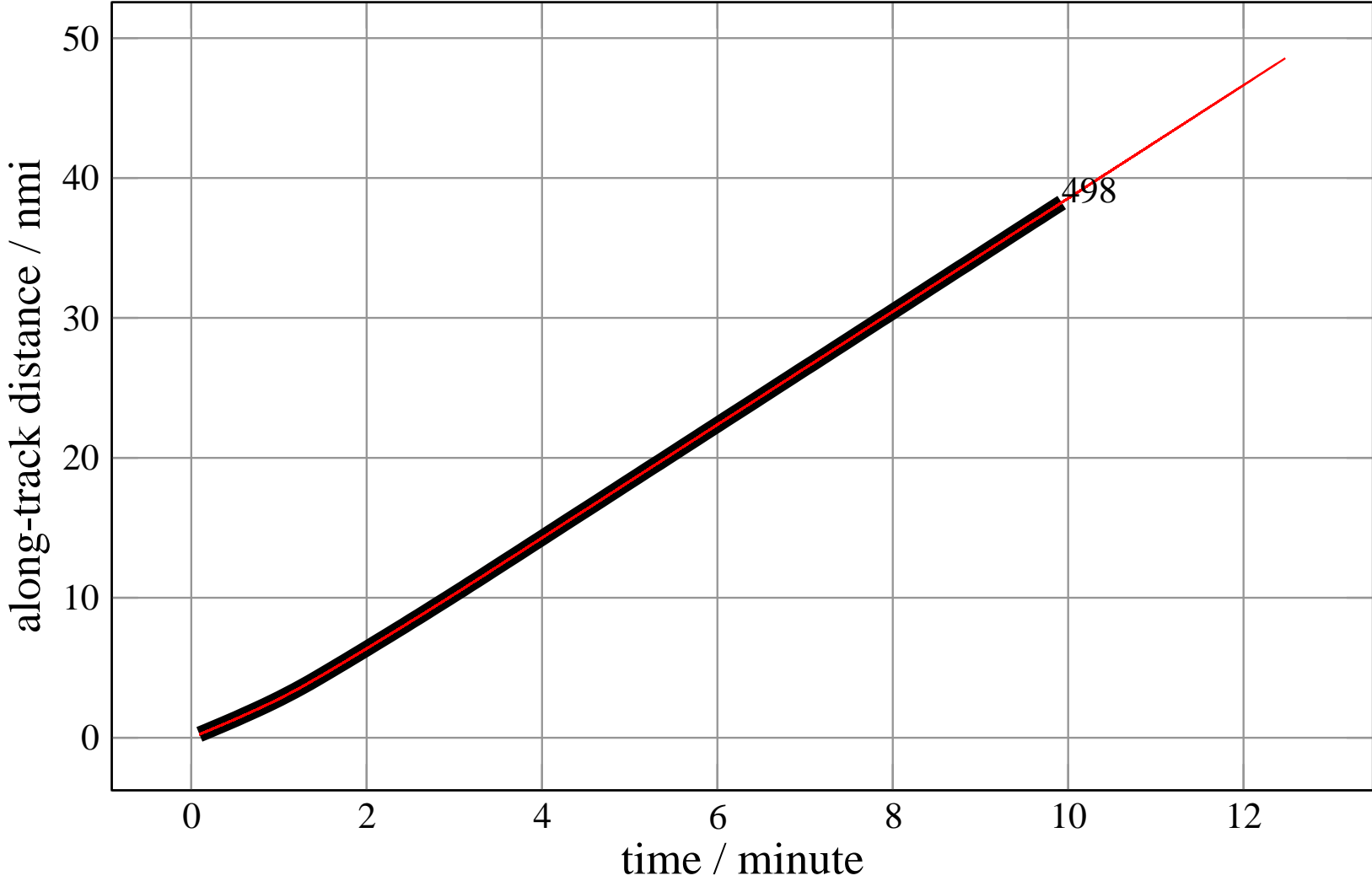
Along-Track Distance

497 (MD88 D DFW/17R Dep)



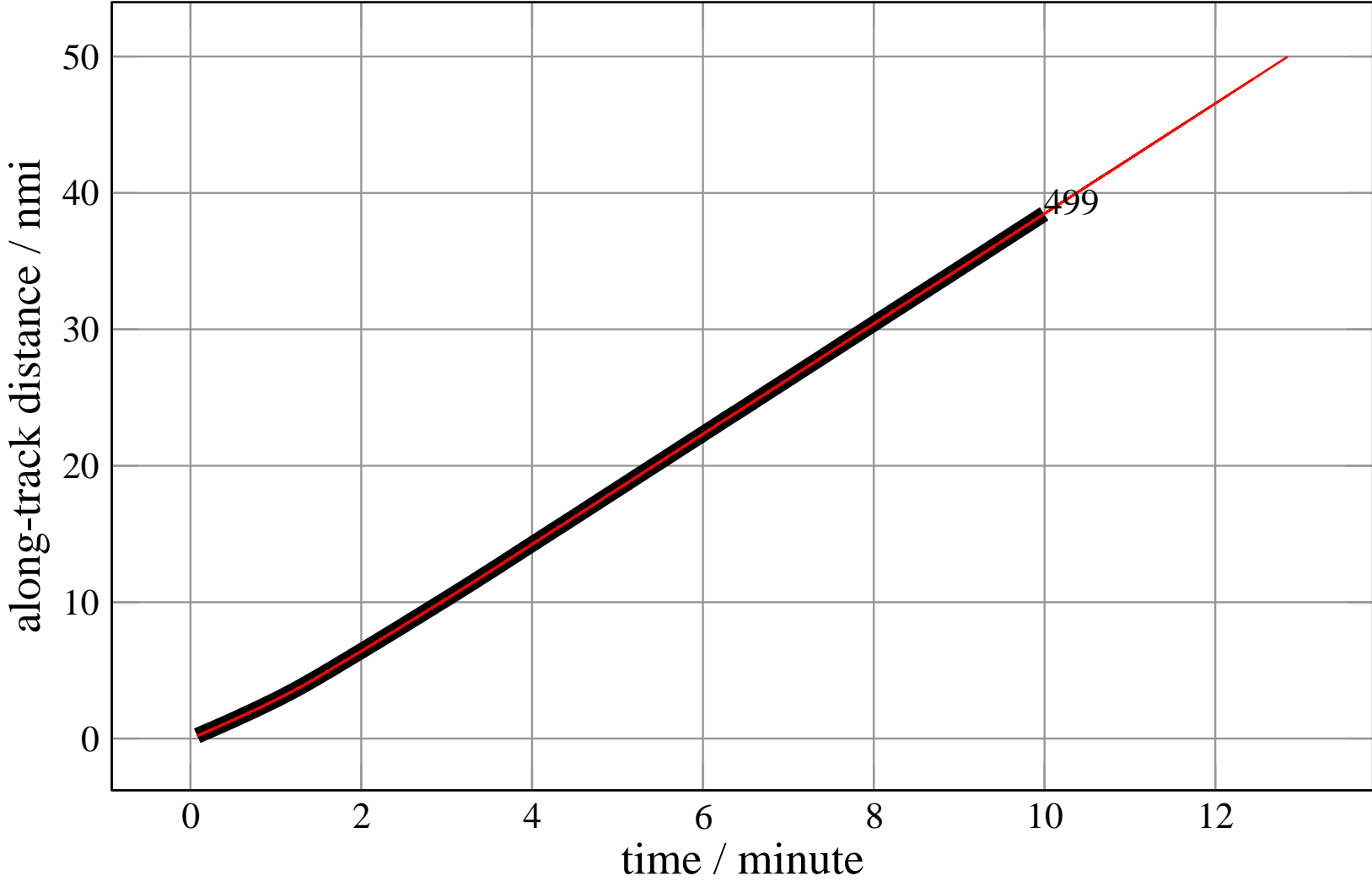
Along-Track Distance

498 (E135 E DFW/18L Dep)



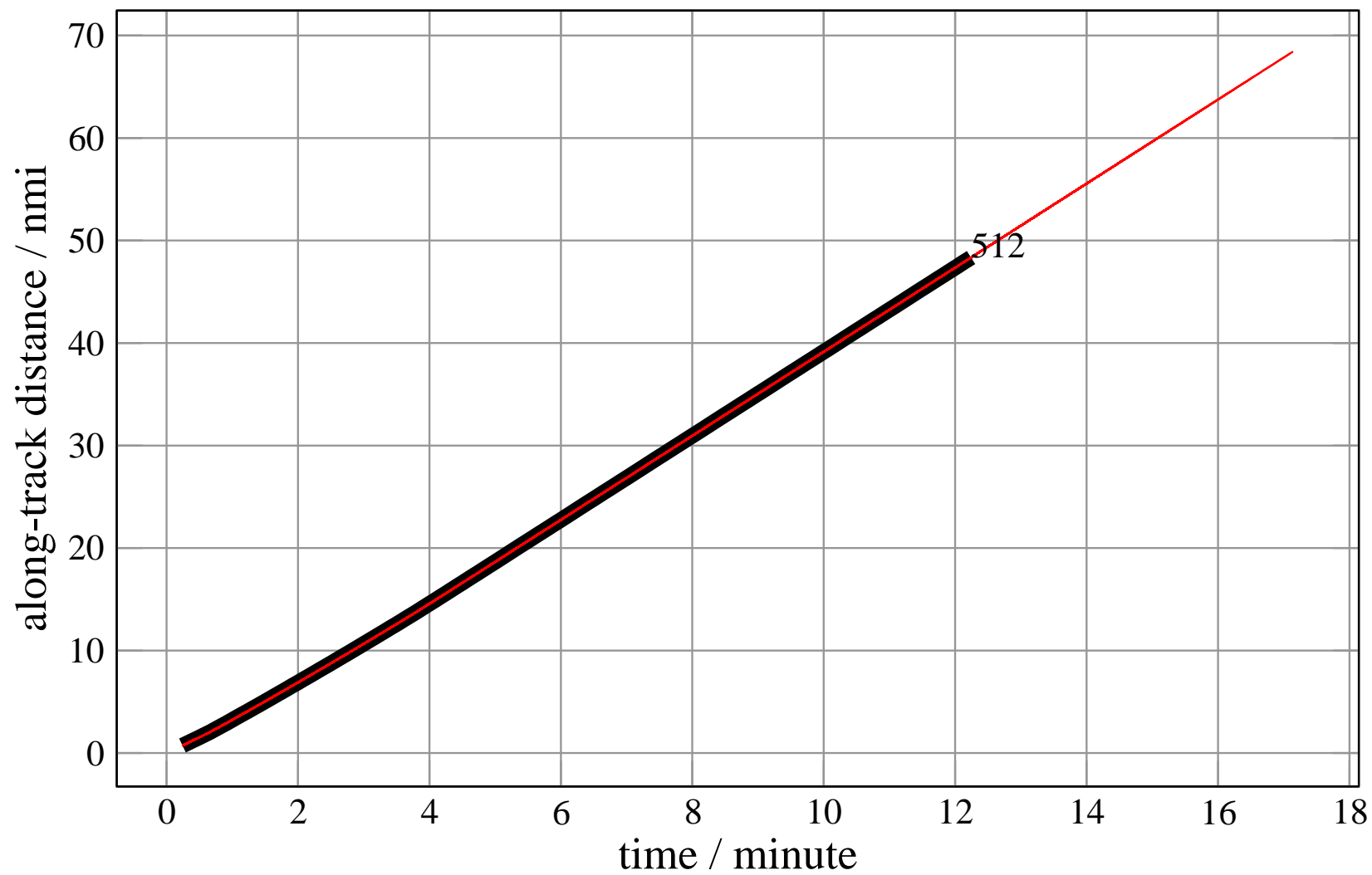
Along-Track Distance

499 (E145 E DFW/17R Dep)



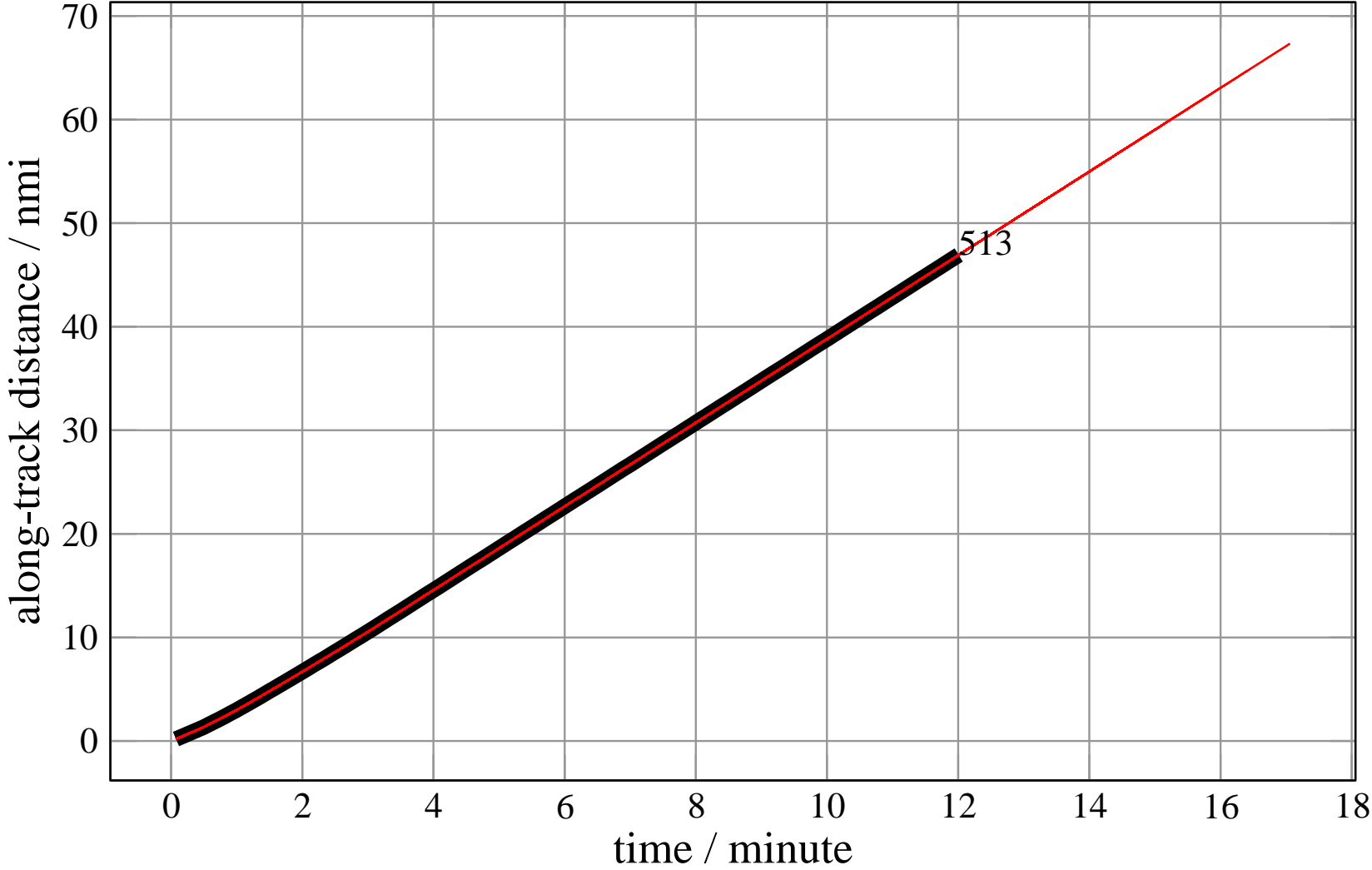
Along-Track Distance

512 (B752 D DFW/17R Dep)



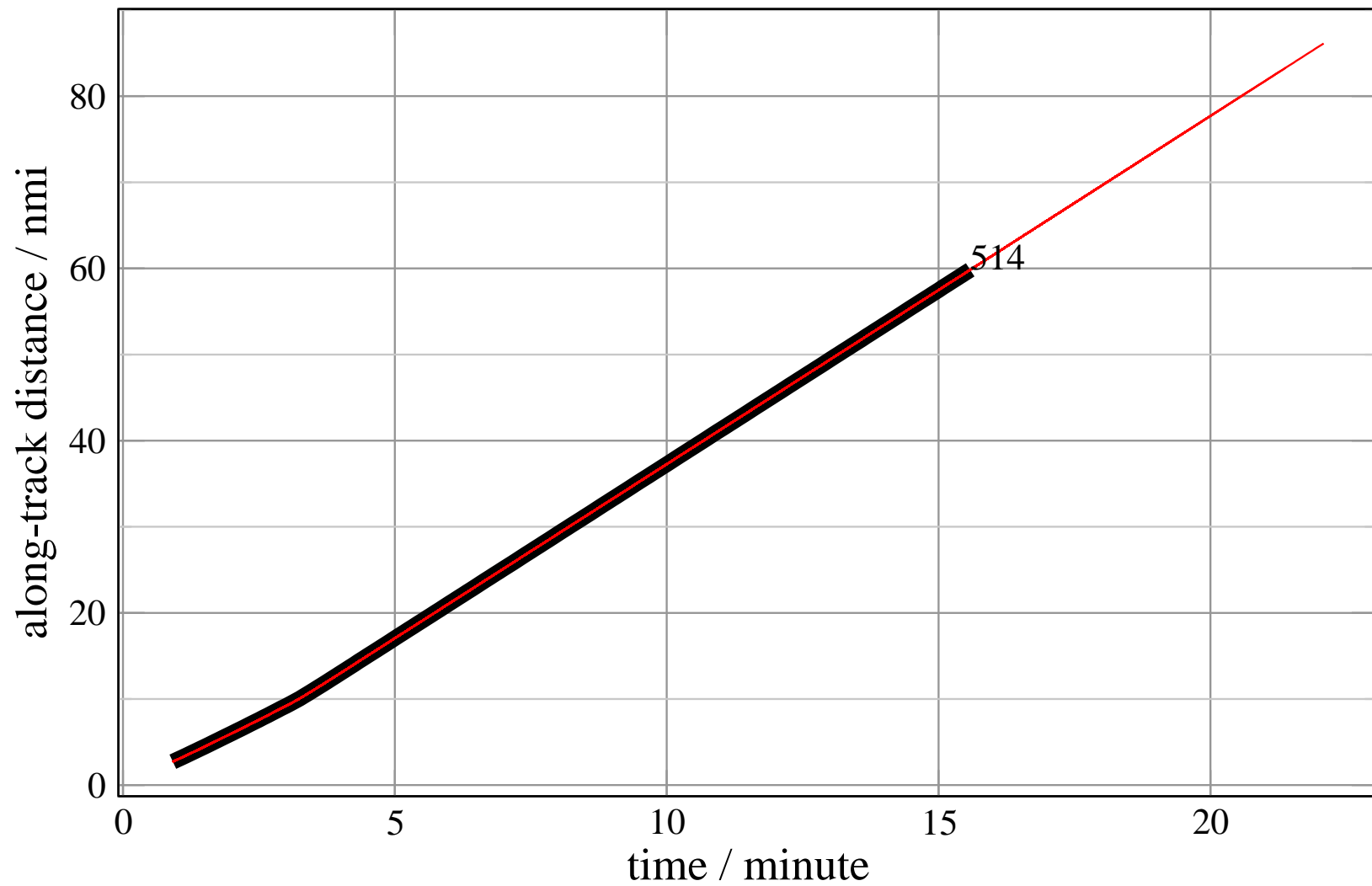
Along-Track Distance

513 (A320 D DFW/18L Dep)



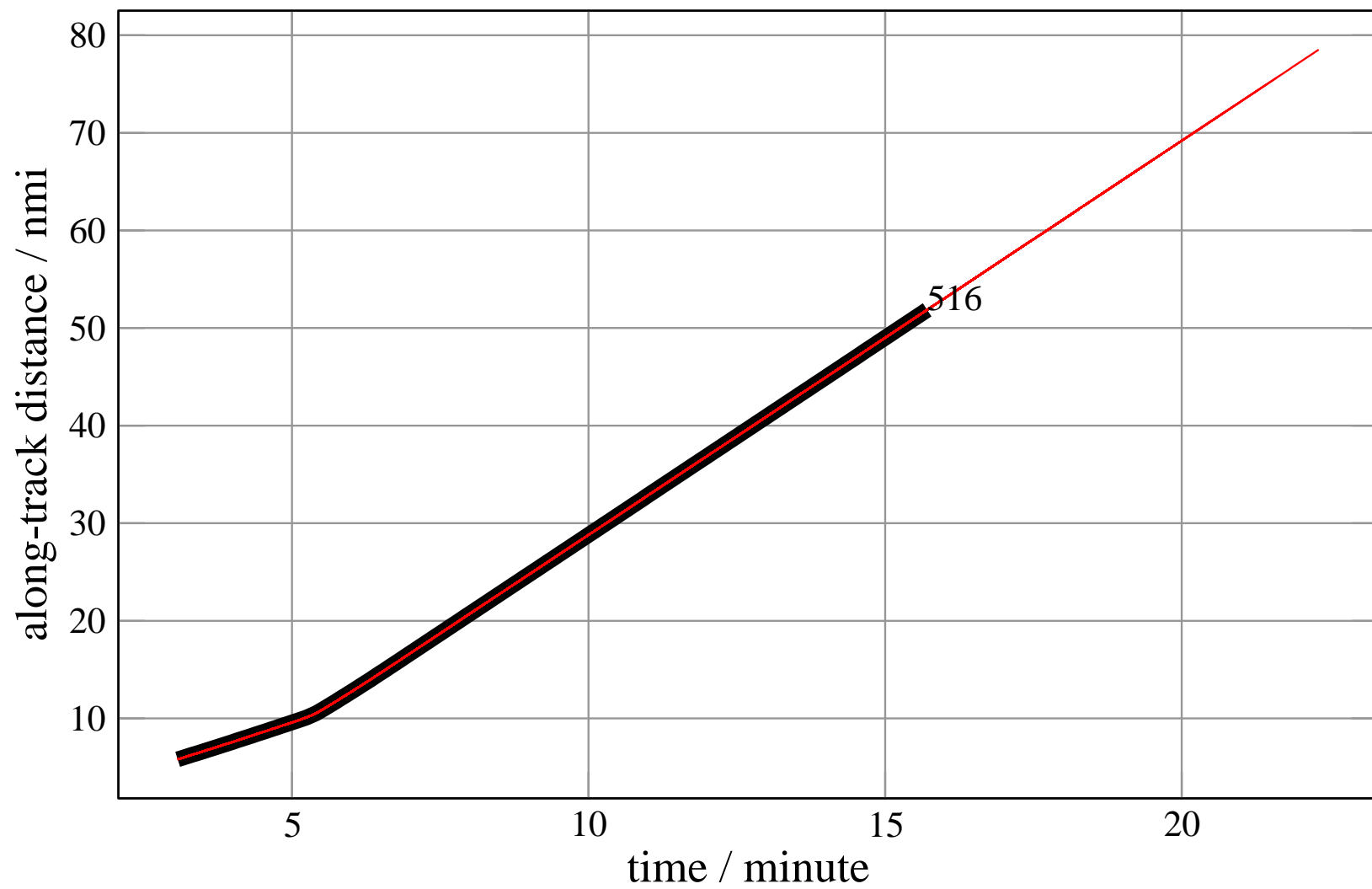
Along-Track Distance

514 (E170 E DFW/17R Dep)



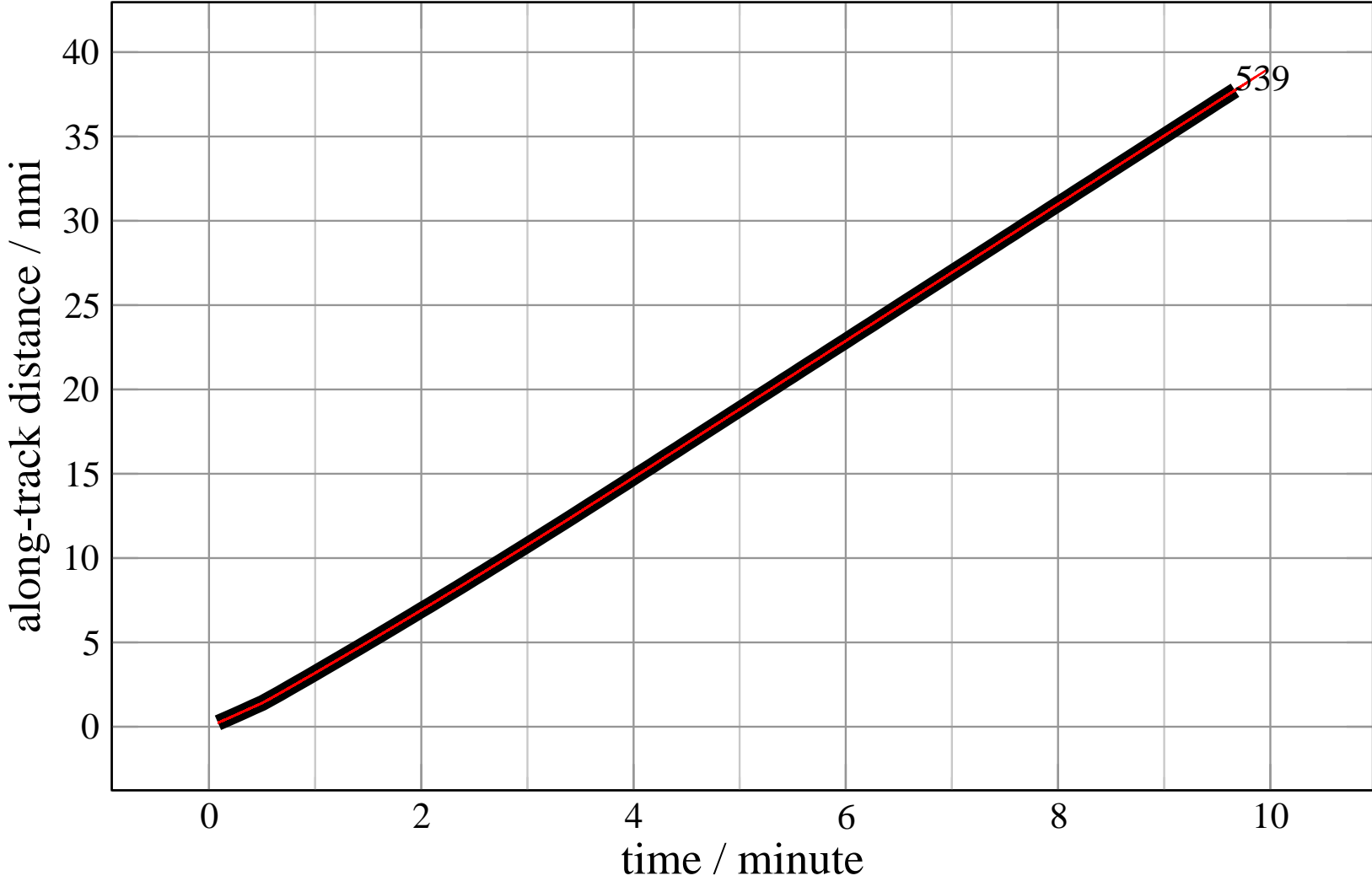
Along-Track Distance

516 (E145 E DFW/18L Dep)



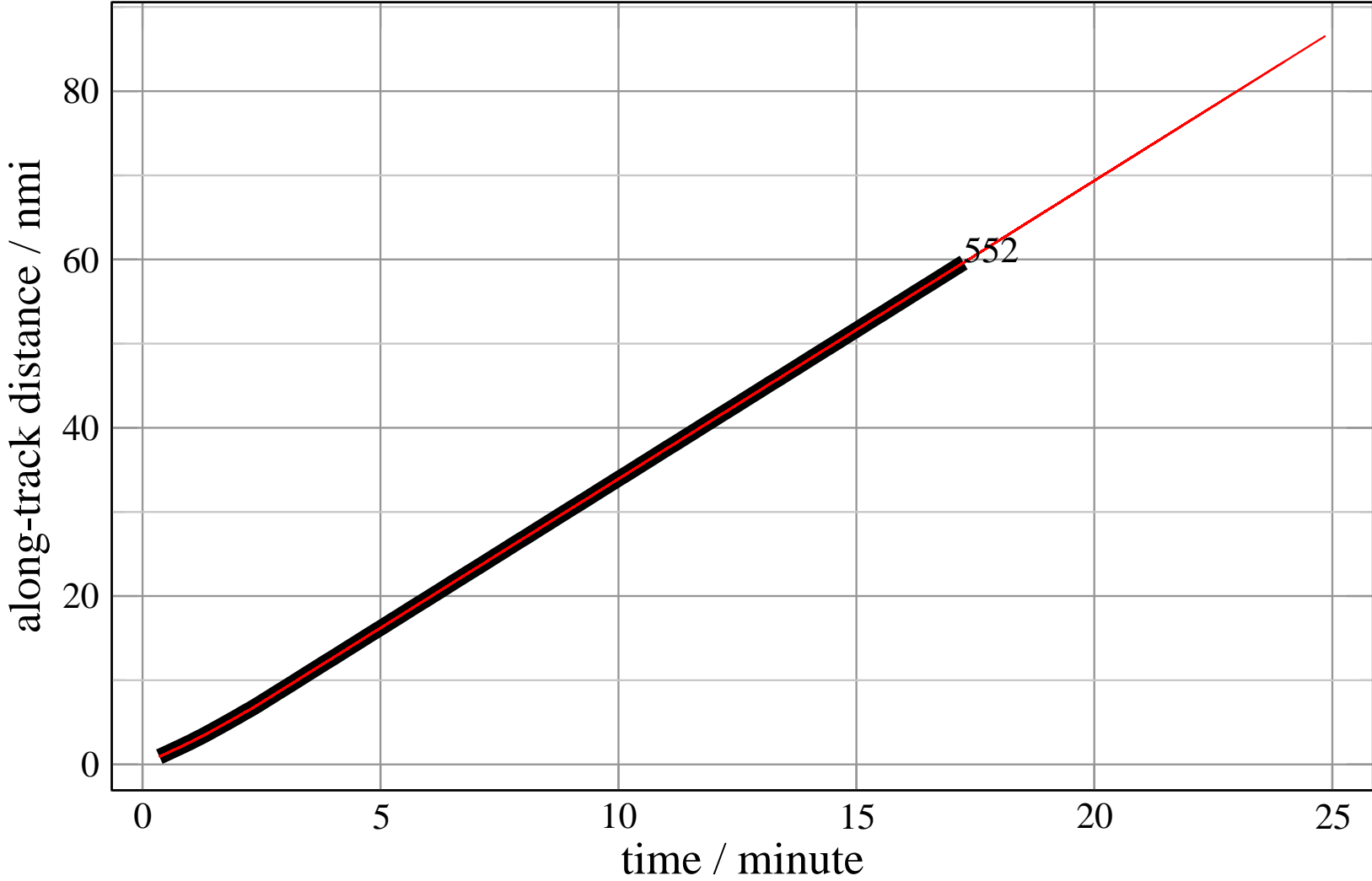
Along-Track Distance

539 (MD82 D DFW/18L Dep)



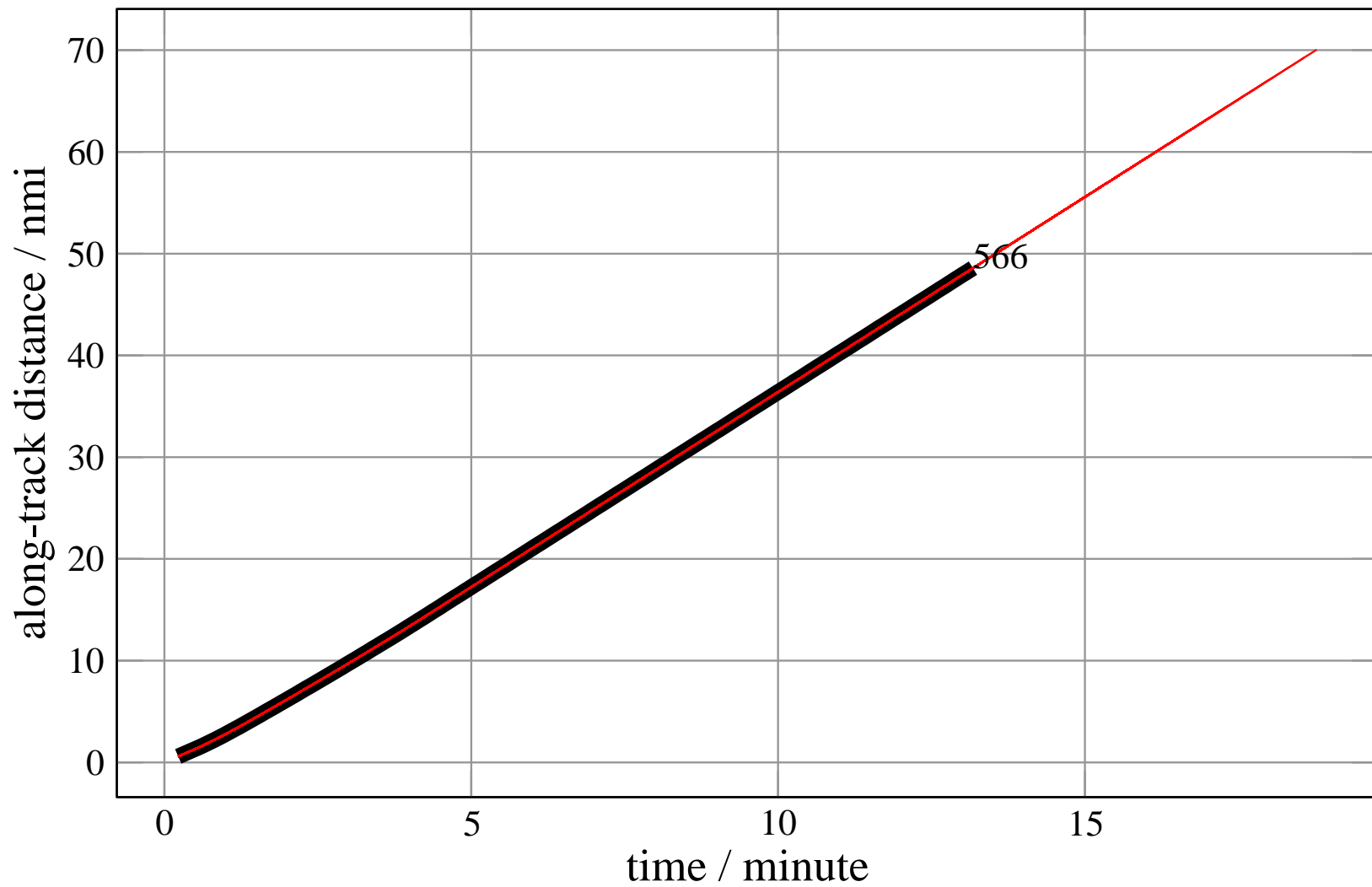
Along-Track Distance

552 (E145 E DFW/18L Dep)



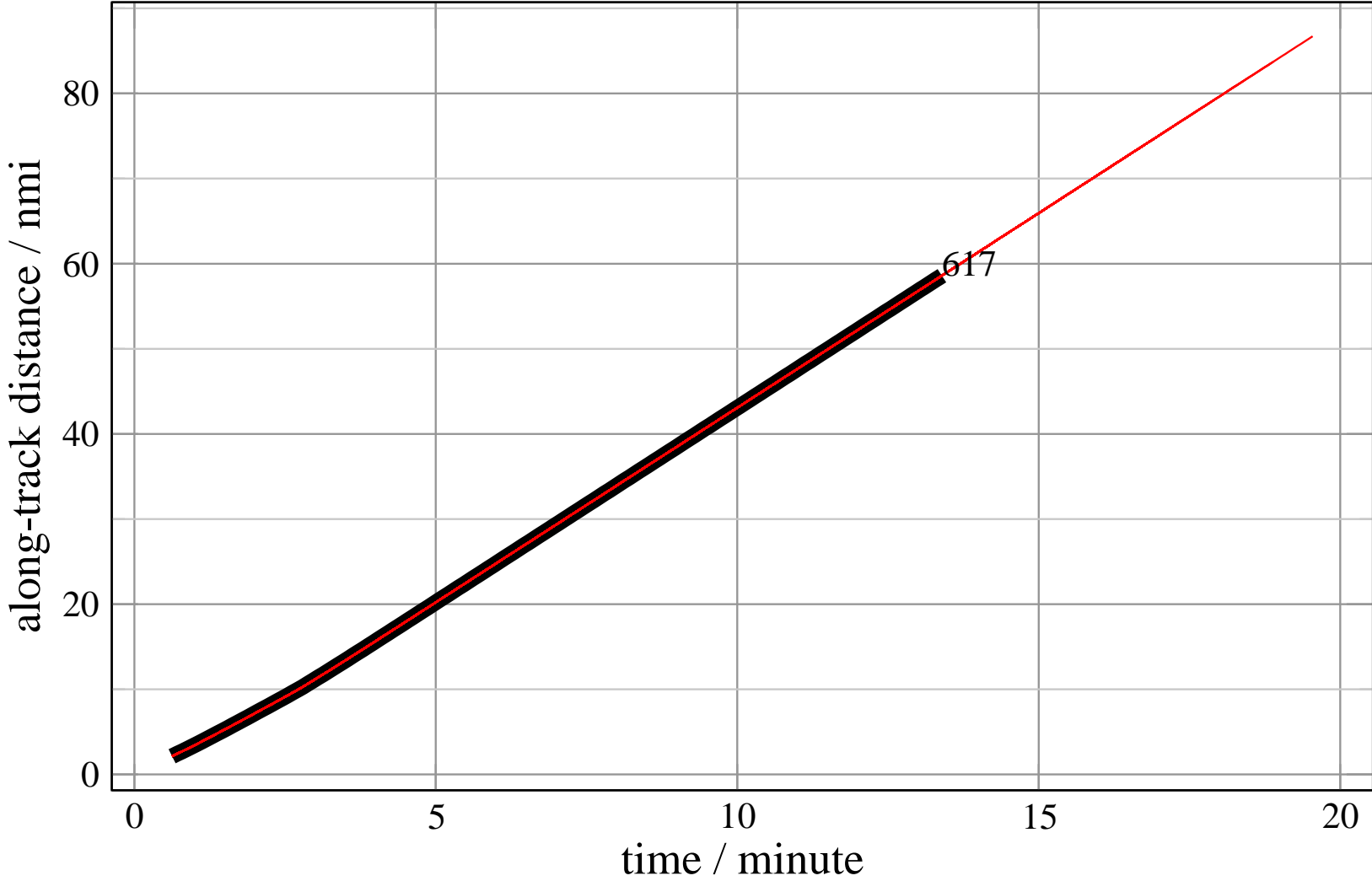
Along-Track Distance

566 (CRJ7 E DFW/18L Dep)



Along-Track Distance

617 (B744 B DFW/18L Dep)



Along-Track Distance

892 (E135 E DFW/18L Dep)

