
MERSİN-ADANA-GAZİANTEP HIGH STANDARD RAILWAY PROJECT

AIR QUALITY ASSESSMENT AND MODELING REPORT

NOVEMBER 2021

ANKARA



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ABBREVIATIONS

%	Percent
µg/m³	Microgram/cubic meter
µm	Micrometer
CO	Carbon monoxide
EU	European Union
kg	Kilogram
Kcal	Kilocalorie
kJ	Kilojoule
km	Kilometer
m	meter
m/s	meter/second
mg	Milligram
mg/Nm³	Milligram/normal cubic meter
NO	Nitrogen monoxide
NO₂	Nitrogen dioxide
NO_x	Nitrogen oxides
O₂	Oxygen
PM₁₀	Particulate matter with diameter smaller than 10 micrometer
RAMAQ	Regulation on the Assessment and Management of Air Quality
Project	Mersin Gaziantep High Standard Train Project
SO₂	Sulfur dioxide
WHO	World Health Organization

1. INTRODUCTION

The Republic of Turkey State Railways is planned to establish a 286 km High Standard Railway Line from Mersin to Gaziantep via connecting Adana and Osmaniye. This report was prepared to assess the potential impacts of air emissions arising from the construction of Project on the ambient air quality. These potential air quality impacts were assessed for all identified sensitive receptors such as settlements, agricultural lands, vegetation along the project line. In order to determine the relative impacts on the local air quality, a baseline air quality study was undertaken and the potential additional construction impacts modelled to determine their impact on the baseline conditions. Detailed technical information on these studies are presented in following sections.

The modelled air pollutants and their approximate quantities are calculated through the use of emission factors. Contribution to air pollution level and air quality levels in the impact area of the Project as estimated by the air quality modeling studies have then been compared with the pertinent standards. The results of the modeling study have been assessed according to the Regulation on the Assessment and Management of Air Quality (RAMAQ), EU Council Directive 2008/50/EC and WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide.

The following section of this report are structured as follows:

- Section 2 briefly describes the emissions likely to result from the project.
- Section 3 covers air quality standards and their definitions as stipulated in the Turkish Regulations and international regulations.
- Section 4 discusses the methods and emission values used in the modeling study.
- Section 5 provides the background emission results.
- Section 6 presents the results of the modeling study carried out in accordance with the RCAPOI instructions and provides an overall assessment of their possible impacts to the air quality of the region.

2. PROJECT EMISSIONS

Project will comprise of construction and operation phases. Since there is no emission sources during operation (as the trains are electric), modelling studies was carried out for construction phase

2.1. Construction Phase

Mersin Gaziantep High Standard Train Project has planned to locate on a 286 km route and there will be several activities on the route during construction phase. The construction phase activities covers all activities during the construction period including land arrangement, excavation, filling and equipment's movements. Significant pollutant of this step will be dust generated from above activities and the release of engine emissions (such as NOX, SOX, particles, CO, VOC etc.) from construction equipment and vehicles.

2.1.1. Emission Calculation

Railway Construction

Emission sources of the road construction phase equipment will move along the route during the construction period and emissions will not affect all 286 km route at the same time. One of the most important model parameter is meteorological conditions. There are seven meteorological stations along the route. In order to utilize the best meteorological data in the models the route has been divided into seven parts with each part was represented by a different meteorological station. These sections are

- From start point to 14 km
- From 14 km to 50 km
- From 50 km to 90 km
- From 90 km to 135 km
- From 135 km to 200 km
- From 200 km to 250 km
- From 250 km to finish point

Road construction emission factors are derived from the EMEP/EEA Air Pollutant Emission Inventory Guidebook 2019-2.A.5.b-Construction and Demolition- Tier 1 Emission Factors which are shown in 1.

Table 1. Road Construction Emission Factors

Parameter	Emission Factor	Unit
PM ₁₀	2,3	kg/[m2.year]
PM _{2,5}	0,23	kg/[m2.year]

Roads which will be constructed within the project and calculated emissions are shown in Table 2.

Table 2. Railway Construction Emission Calculations

Section		Length (m)	Width (m)	Area (m ²)	Total Emission
0-14	PM ₁₀	14000	30	420,000	2.3 kg/[m ² .year] x 420,000 m ² x (1 year/8760 hours) = 110.27 kg/h
	PM _{2,5}				0.23 kg/[m ² .year] x 420,000 m ² x (1 year/8760 hours) = 11.027/kh
14-50	PM ₁₀	36000	30	1,080,000	2.3 kg/[m ² .year] x 1,080,000 m ² x (1 year/8760 hours) = 283.56 kg/h
	PM _{2,5}				0.23 kg/[m ² .year] x 1,080,000 m ² x (1 year/8760 hours) = 28.356k/h
50-90	PM ₁₀	40000	30	1,200,000	2.3 kg/[m ² .year] x 1,200,000m ² x (1 year/8760 hours) = 315.05 kg/h
	PM _{2,5}				0.23 kg/[m ² .year] x 1,200,000m ² x (1 year/8760 hours) = 31.505k/h
90-135	PM ₁₀	45000	30	1,350,000	2.3 kg/[m ² .year] x 1,350,000m ² x (1 year/8760 hours) = 354.45 kg/h
	PM _{2,5}				0.23 kg/[m ² .year] x 1,350,000m ² x (1 year/8760 hours) = 35.454/kh
135-200	PM ₁₀	65000	30	1,950,000	2.3 kg/[m ² .year] x 1,950,000m ² x (1 year/8760 hours) = 511.98 kg/h
	PM _{2,5}				0.23 kg/[m ² .year] x 1,950,000 m ² x (1 year/8760 hours) = 51.198/kh
200-250	PM ₁₀	50000	30	1,500,000	2.3 kg/[m ² .year] x 1,500,000 m ² x (1 year/8760 hours) = 393.83 kg/h
	PM _{2,5}				0.23 kg/[m ² .year] x 1,500,000 m ² x (1 year/8760 hours) = 39.383/kh
250-286	PM ₁₀	36000	30	1,080,000	2.3 kg/[m ² .year] x 1,080,000 m ² x (1 year/8760 hours) = 283.56 kg/h
	PM _{2,5}				0.23 kg/[m ² .year] x 1,080,000 m ² x (1 year/8760 hours) = 28.356/kh

Construction equipment engine emissions calculated by emission factors derived from *The EMEP/EEA Air Pollutant Emission Inventory Guidebook 2019-Non-Road mobile sources and machinery*. Only SO₂ emissions were calculated stoichiometrically assuming to 7 ppm Sulphur content. All PM mass emission factors reported in this document refer to PM_{2,5}, as the coarse fraction (PM_{2,5-10}) is negligible in vehicle exhausts. Fuel consumption values are obtained from GHG calculations. These emission factors are given in Table 3 emission calculations are shown in Table 4.

Table 3. Construction Phase Engine Emission Factors

Vehicle Type	Fuel Type	Emission Factor (g/tonnes-fuel)					
		SO ₂	CO	NOX	PM ₁₀ =PM _{2,5}	VOC	Total BTEX*
Mobile Combustion in manufacturing industries and construction	Diesel	14 g/kg fuel	10774	32629	2104	3377	901.66

*26.7% of total VOC

Table 4. Construction Phase Engine Emission Calculations

Pollutant	Emission Factor (g/tonnes-fuel)	Fuel consumption (tons/ 4 year)					Total Emission (kg/h)					Limit Values (kg/h)*
		Section					Section					
		Mersin Adana	Adana Toprakkale	Toprakkale Bahçe	Bahçe-Nurdağ	Nurdağ-Gaziantep	Mersin Adana	Adana Toprakkale	Toprakkale bahçe	Bahçe-Nurdağ	Nurdağ-Gaziantep	
SO ₂	14 g/kg fuel	20031	11182	23204	2292	4750	8,00	4,47	9,27	0,92	1,90	60
CO	10774	20031	11182	23204	2292	4750	6,16	3,44	7,13	0,70	1,46	500
NO _x	32629	20031	11182	23204	2292	4750	18,65	10,41	21,61	2,13	4,42	40
PM	2104	20031	11182	23204	2292	4750	1,20	0,67	1,39	0,14	0,29	10
VOC	3377	20031	11182	23204	2292	4750	1,93	1,08	2,24	0,22	0,46	30
BTEX	901.66	20031	11182	23204	2292	4750	0,52	0,29	0,60	0,06	0,12	-

*Limit values stipulated in Turkish Industrial Air Pollution Control Regulation Annex-2 Table 2.1

As all parameters below the limit values, air quality measurement or modelling study was not carried out for gas parameters.

3. AMBIENT AIR QUALITY STANDARDS

In order to assess project emission on receptor locations, Turkish local air quality standards, EU standards and WHO standards were used. Limit and tolerance values of pollutants in the atmosphere are prescribed by the Regulation on the Assessment and Management of Air Quality. These Limit Values are shown in Table 5.

Table 5. Turkish Ambient Air Quality Standards

Parameter	Period	Limit Value
PM ₁₀	24 Hour	50 µg/m ³ (not to be exceeded more than 35 times a calendar year)
	1 Year	40 µg/m ³
PM Deposition	STL	390 mg/m ² day
	LTL	210 mg/m ² day

European Union directives and World Health Organization also have limit values for air pollution prevention (EU Council Directive 2008/50/EC relating to health based standards and objectives for a number of pollutants in ambient air). WHO defines limit values in “Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide” document. IFC Guidelines refers to WHO limit values to evaluate emissions. These limit values are shown in Table 6.

Table 6. Limit Values Stipulated in the International Legislation

Parameter	Averaging Period	EU Limit Value (µg/m ³) ¹	WHO Limit Value (µg/m ³) ²
PM ₁₀	24 hours (for the protection of the human health)	50 (not to be exceeded more than 35 times a calendar year)	50
	Calendar year (for the protection of the human health)	40	20
PM _{2,5}	24 hours	-	25
	Calendar year	20	10

1 Limit Values Stipulated in the “EU Council Directive “2008/50/EC”

2 Limit Values Stipulated in the “WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide”

4. METHODS USED IN MODELING STUDIES

4.1. Model Selection

AERMOD model was employed in the air quality modeling study. AERMOD model, which was developed by United States Environmental Protection Agency (USEPA), is one of the most developed computer models estimating hourly, daily and yearly ground level concentrations (GLCs) on the basis of the real time values. The model enables the calculation of different dispersion models for different sources (point, volume, line) from isolated stacks to fugitive pollutants. Additionally, it can consider conditions like aerodynamic waves and turbulence.

The air quality modelling studies for this assessment were conducted by AIRS Air Quality Management Services with the use of “Lakes Environmental AERMOD View” dispersion model software (under License No: AER0005591). As software, latest version of the AERMOD, “AERMOD 21112” which is released by US EPA on the date 04-22-2021 were used.

AERMOD is working in a network system defined by the user and calculations are made for corner points of each receiving environment segments forming the network. The network system used by AERMOD model can be defined as polar or Cartesian. Additionally, detailed calculations can be made at the discrete receptor points, which can be determined out of the network system.

4.2. Meteorology used in Modelling Study

Meteorological station selection

In order to determine meteorological characteristics of the various sections of the project, the nearest meteorology station observations were used. As mentioned above since the project covers a large area and it is not possible to represent all area by using one station data set, all possible representative meteorology station data are used.

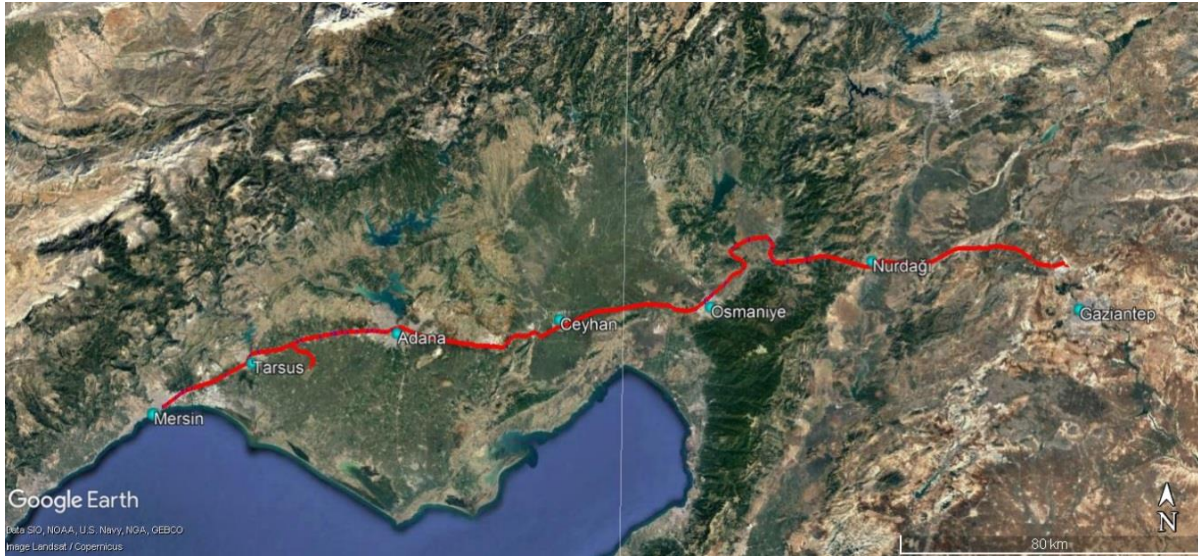


Figure 1. Project area and meteorology stations

Figure 1 shows the project line and national meteorology station of Turkey. There are seven meteorological station through project route, and therefore, the modelling study was divided and carried out on each of the seven section.

4.3. Receptor Network

There are several settlements, agricultural land and vegetation along the project line. In order to estimate all sensitive receptors, a fine receptor system has been created. This receptor system has tiers around project line with different distances as described below

- 1st receptor tier : 50 m away from project center line
- 2nd receptor tier : 100 m away from project center line
- 3rd receptor tier : 200 m away from project center line
- 4th receptor tier : 300 m away from project center line
- 5th receptor tier : 400 m away from project center line
- 6th receptor tier : 500 m away from project center line
- 7th receptor tier : 750 m away from project center line
- 8th receptor tier : 1000 m away from project center line
- Following tiers : ascend with 1000 meter distance from previous tier up to 5 km

These receptor systems are cover all sensitive receptors in project impact area.

5. BASELINE AIR QUALITY ASSESSMENT

In order to determine background air quality, a baseline air quality measurement study was conducted in the ambient air at 15 point for dust deposition and 10 points for PM₁₀ and PM_{2,5} parameters by internationally accredited laboratory. The sampling was undertaken between 17.10.2020 to 17.11.2020 and 29.11.2020 to 29.12.2020 which was a period of time when there were dry conditions and therefore represented the likely worst case baseline conditions. Sampling locations are marked on satellite image in Figure 2 and Figure 3

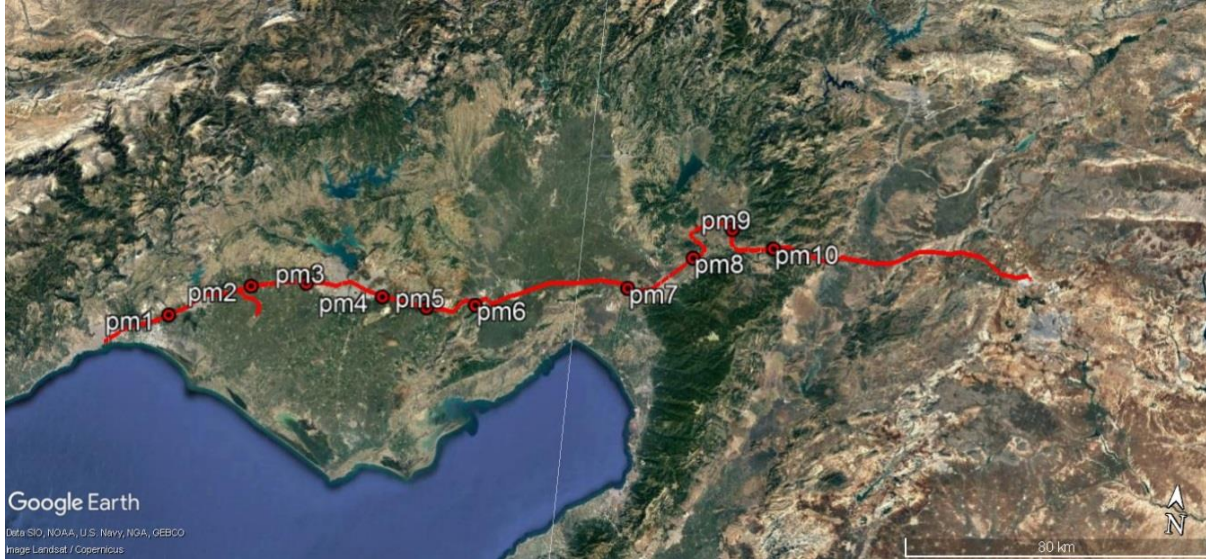


Figure 2. PM₁₀ and PM_{2,5} Air Quality Sampling Points

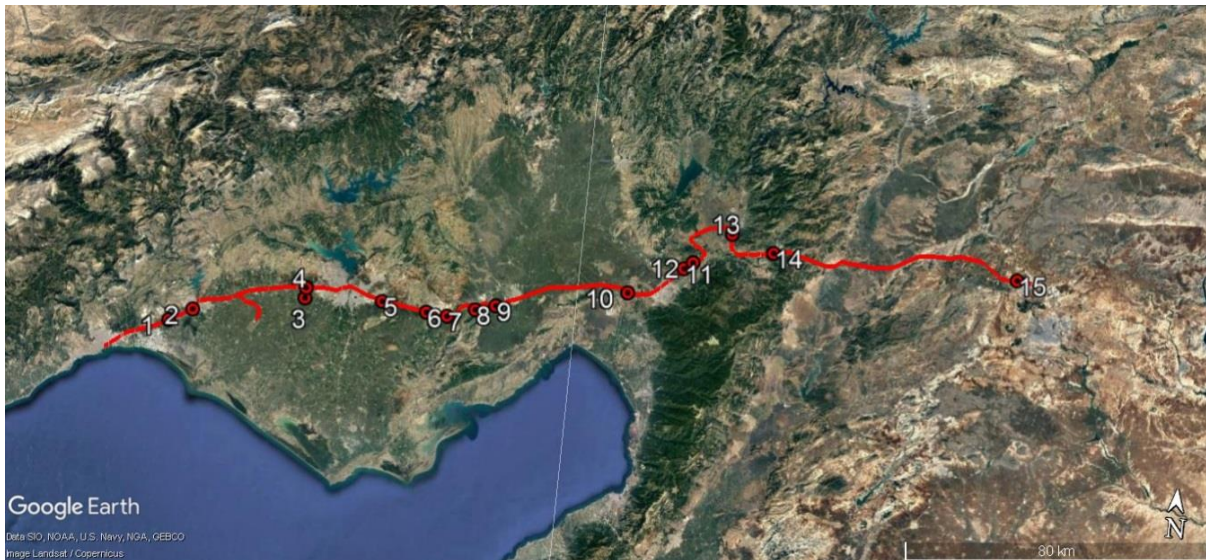


Figure 3. Dust Deposition Air Quality Sampling Points

Baseline air quality measurement results are shown in Table 7 and Table 8.

Table 7. Baseline PM₁₀ and PM_{2.5} Measurement Results

Location				Results (µg/m³)	
ID	Description	Coordinates		PM ₁₀	PM _{2.5}
		West	North		
PM-1	Adnan Menderes	662034	4083758	29.94	24.93
PM-2	Atalar	682491	4094079	30.91	26.62
PM-3	Adana Bati	696718	4096728	34.11	28.15
PM-4	Adana Doğu	716900	4095887	32.98	26.90
PM-5	Suluca	728660	4094638	29.94	25.85
PM-6	Çokçapınar	741248	4096955	26.90	24.08
PM-7	Toprakkale	246541	4105782	18.90	28.17
PM-8	Tehçi	262963	4114771	28.28	19.45
PM-9	Düziçi	272655	4122845	28.15	19.68
PM-10	Bahçe	283657	4118629	27.82	21.30

Table 8. Baseline Dust Deposition Measurement Results

Location			Results (mg/m ² -day)
ID	Coordinates		
	West	North	
Point 1	662034	4083758	158.6
Point 2	667915	4087309	180.5
Point 3	696718	4094079	170.2
Point 4	696718	4096728	146
Point 5	716900	4095887	115.6
Point 6	728660	4094638	154.9
Point 7	734148	4094344	117.7
Point 8	741248	4096955	197.1
Point 9	746400	4098702	120.5
Point 10	246541	4105782	132.3
Point 11	260709	4113060	119.8
Point 12	262963	4114771	103.4
Point 13	272655	4122845	146
Point 14	283657	4118629	112.1
Point 15	347473	4116050	128.1

These results show the average background emissions of each points and represent the air quality of the sampling aershed. It can be seen in the Tables that results are consistent and that shows air quality samplings are not affected by a local source. Results are average of 2 months sampling campaign and as limit values for all parameters are daily and yearly, they are not compared to limit values. These background concentrations are used to determine cumulative impact of the project.

6. RESULTS OF MODELING STUDIES

6.1. Construction Phase Modelling Results

The modeling studies were carried out to estimate the likely dust parameters for construction activities. Air pollution contribution values (APCV) of PM₁₀ determined from the modeling studies are listed in Table 9 and Table 10.

Table 9. Construction Phase PM₁₀ and PM_{2.5} APCV Determined from the Modeling Studies

Section	Parameter	Daily Maximum Results and Coordinates Zone-35 (µg/m ³)	Limit Values(µg/m ³)		
			National Limit Values	EU Limit Values	WHO Limit Values
0 km-14 km	PM ₁₀	0.48 (654921, 4080082)	50	50	50
	PM _{2.5}	0.048 (654921, 4080082)	-	-	25
14 km -50 km	PM ₁₀	8.43 (682306, 4093889)	50	50	50
	PM _{2.5}	0.84 (682306, 4093889)	-	-	25
50 km -90 km	PM ₁₀	13.79 (696718, 4096728)	50	50	50
	PM _{2.5}	1.37 (696718, 4096728)	-	-	25
90 km -135 km	PM ₁₀	20.38 (749476, 4100274)	50	50	50
	PM _{2.5}	2.03 (749476, 4100274)	-	-	25
135 km -200 km	PM ₁₀	10.98 (788035, 4108865)	50	50	50
	PM _{2.5}	1.09 (788035, 4108865)	-	-	25
200 km -250 km	PM ₁₀	3.88 (834206, 4121807)	50	50	50
	PM _{2.5}	0.38 (834206, 4121807)	-	-	25
200 km -finish	PM ₁₀	10.40 (861149, 4126278)	50	50	50
	PM _{2.5}	1.04 (861149, 4126278)	-	-	25

Table 10. Construction Phase Dust Deposition APCV Determined from the Modeling Studies

Section	Parameter	Daily Maximum Results and Coordinates Zone-35 ($\mu\text{g}/\text{m}^3$)	Limit Values($\mu\text{g}/\text{m}^3$)		
			National Limit Values	EU Limit Values	WHO Limit Values
0 km-14 km	Dust Deposition	0.65 (657755, 4081267)	50	50	50
14 km -50 km	Dust Deposition	24.65 (682306, 4093889)	50	50	50
50 km -90 km	Dust Deposition	7.29 (696718, 4096728)	50	50	50
90 km -135 km	Dust Deposition	3.83 (740626, 4097561)	50	50	50
135 km -200 km	Dust Deposition	25.95 (788035, 4108865)	50	50	50
200 km -250 km	Dust Deposition	7.22 (852118, 4124748)	50	50	50
200 km –finish	Dust Deposition	6.52 (873957, 4124320)	50	50	50

In accordance with Table 9 and Table 10, APCV of PM_{10} , $\text{PM}_{2.5}$ and dust deposition to be originated from construction operations are comply with the national and international standards for all periods.

The cumulative concentrations of PM_{10} / $\text{PM}_{2.5}$, and dust deposition including both the background concentrations and daily air emission due to route construction and where applicable, quarry works at the measurement points are given in Table 11 and Table 12, respectively.

Table 11. Cumulative PM_{10} and $\text{PM}_{2.5}$ Concentrations at the Receptors

Location ID	Results ($\mu\text{g}/\text{m}^3$)							
	PM_{10}				$\text{PM}_{2.5}$			
	Background Concentration	Model Results	Cumulative Results	Project Standards	Background Concentration	Model Results	Cumulative Results	Project Standards
PM-1	29,94	1,72	31,66	50	24,93	0,17	25,1	25
PM-2	30,91	2,50	33,41	50	26,62	0,25	26,87	25
PM-3	34,11	13,79	47,9	50	28,15	1,38	29,53	25
PM-4	32,98	8,21	41,19	50	26,90	0,82	27,72	25
PM-5	29,94	9,23	39,17	50	25,85	0,22	26,07	25
PM-6	26,90	2,10	29	50	24,08	0,35	24,43	25
PM-7	18,90	4,67	23,57	50	28,17	0,46	28,63	25
PM-8	28,28	2,67	30,95	50	19,45	0,26	19,71	25
PM-9	28,15	1,24	29,39	50	19,68	0,12	19,8	25
PM-10	27,82	2,06	29,88	50	21,30	0,21	21,51	25

Table 12. Cumulative Dust Deposition Concentrations at the Receptors

Location ID	Results ($\mu\text{g}/\text{m}^3$)			
	Background Concentration	Model Results	Cumulative Results	Project Standards
Point 1	158.6	1.20	159.8	390
Point 2	180.5	1.88	182.38	390
Point 3	170.2	0.08	170.28	390
Point 4	146	7.29	153.29	390
Point 5	115.6	2.67	118.27	390
Point 6	154.9	0.03	154.93	390
Point 7	117.7	2.99	120.69	390
Point 8	197.1	0.24	197.34	390
Point 9	120.5	0.26	120.76	390
Point 10	132.3	2.94	135.24	390
Point 11	119.8	0.34	120.14	390
Point 12	103.4	3.61	107.01	390
Point 13	146	6.70	152.7	390
Point 14	112.1	1.80	113.9	390
Point 15	128.1	0.25	128.35	390

Modelling results at sensitive settlement receptors along the route are given in Table 13

Table 13. Modelling Results at Sensitive Receptors

Province	District	Settlement	Results					
			PM ₁₀	Project Standards	PM _{2.5}	Project Standards	Dust Deposition	Project Standards
Mersin	Akdeniz	Bekirde	0,01	50	0,00	25	0,00	390
Mersin	Akdeniz	Evci	0,31	50	0,03	25	0,06	390
Mersin	Akdeniz	Karacailyas	0,03	50	0,00	25	0,01	390
Mersin	Akdeniz	Karacailyas Emek	0,12	50	0,01	25	0,02	390
Mersin	Akdeniz	Kürkçü	0,01	50	0,00	25	0,01	390
Mersin	Akdeniz	Nacarlı	0,46	50	0,05	25	0,08	390
Mersin	Akdeniz	Nusratiye	0,07	50	0,01	25	0,01	390
Mersin	Akdeniz	Sarıbrahimli	0,18	50	0,02	25	0,05	390
Mersin	Akdeniz	Yalınayak	0,04	50	0,00	25	0,01	390
Mersin	Tarsus	Fatih (Zorbazhark)	8,43	50	0,84	25	24,66	390
Mersin	Tarsus	Kanberhüyüğü	1,78	50	0,18	25	0,99	390
Mersin	Tarsus	Kemalpaşa	1,00	50	0,10	25	0,27	390
Mersin	Tarsus	Konaklar	0,85	50	0,08	25	0,26	390
Mersin	Tarsus	Mithatpaşa	1,27	50	0,13	25	0,68	390
Mersin	Tarsus	Şehitisak	1,50	50	0,15	25	0,37	390
Mersin	Tarsus	Tekeliören	1,04	50	0,10	25	0,17	390
Mersin	Tarsus	Tekfur/Esenler	0,90	50	0,09	25	0,38	390
Mersin	Akdeniz	Tekke	0,02	50	0,00	25	0,02	390
Mersin	Tarsus	Yenice Atalar	8,01	50	0,80	25	19,43	390
Mersin	Tarsus	Yeşilyurt	1,48	50	0,15	25	0,55	390
Mersin	Tarsus	Yunusoğlu	0,98	50	0,10	25	0,36	390

Province	District	Settlement	Results					
			PM ₁₀	Project Standards	PM _{2.5}	Project Standards	Dust Deposition	Project Standards
Adana	Seyhan	Büyük Dikili	0,53	50	0,05	25	0,06	390
Adana	Seyhan	Döşeme	3,67	50	0,37	25	0,14	390
Adana	Seyhan	İstiklal	2,24	50	0,22	25	0,16	390
Adana	Seyhan	Sarı Hamzalı	1,52	50	0,15	25	0,11	390
Adana	Seyhan	Şakirpaşa	2,50	50	0,25	25	0,48	390
Adana	Seyhan	Zeytinli	1,09	50	0,11	25	0,15	390
Adana	Ceyhan	Altıkara	3,01	50	0,39	25	0,08	390
Adana	Ceyhan	Azizli	0,08	50	0,06	25	0,07	390
Adana	Ceyhan	Çakaldere	0,61	50	0,06	25	0,46	390
Adana	Ceyhan	Çokçapınar	5,18	50	0,60	25	0,08	390
Adana	Ceyhan	Gaziosmanpaşa	2,11	50	0,34	25	2,54	390
Adana	Ceyhan	Hamdilli	8,45	50	0,70	25	0,06	390
Adana	Ceyhan	Hürriyet	1,08	50	0,16	25	0,13	390
Adana	Ceyhan	İmran	1,52	50	0,15	25	1,36	390
Adana	Ceyhan	Kuzucak	0,17	50	0,03	25	0,28	390
Adana	Ceyhan	Mithatpaşa	2,67	50	0,32	25	0,14	390
Adana	Ceyhan	Muradiye	8,00	50	0,61	25	0,14	390
Adana	Ceyhan	Rıfatiye/Mustafa Beyli	4,68	50	0,51	25	0,14	390
Adana	Ceyhan	Sirkeli	0,99	50	0,10	25	0,04	390
Adana	Ceyhan	Toktamış	3,66	50	0,43	25	0,14	390
Adana	Ceyhan	Türlübaş	7,40	50	0,74	25	0,13	390
Adana	Sarıçam	Dağcı	3,65	50	0,44	25	0,25	390
Adana	Sarıçam	Misis 1 (Yakapınar)	0,42	50	0,04	25	0,12	390
Adana	Sarıçam	Müminli	3,14	50	0,64	25	0,34	390
Adana	Sarıçam	Suluca	10,95	50	1,09	25	0,36	390
Adana	Sarıçam	Yenimahalle (İncirlik)	0,42	50	0,04	25	0,68	390
Adana	Sarıçam	Yürekli	0,43	50	0,06	25	0,21	390
Adana	Yüreğir	Misis 2 (Yakapınar)	1,11	50	0,11	25	0,21	390
Osmaniye	Toprakkale	Dağıstan	4,27	50	0,43	25	25,96	390
Osmaniye	Toprakkale	Maymunsuyu/Sazlık	2,16	50	0,36	25	0,25	390
Osmaniye	Toprakkale	Sayhüyüğü	1,42	50	0,14	25	0,73	390
Osmaniye	Toprakkale	Karataş	0,99	50	0,10	25	0,11	390
Osmaniye	Toprakkale	Kumarlı	0,47	50	0,05	25	0,13	390
Osmaniye	Merkez	Akyar	0,39	50	0,04	25	0,32	390
Osmaniye	Merkez	Alibeyli	0,28	50	0,03	25	0,18	390
Osmaniye	Merkez	Alibeyli/Esenevler Mahallesi	0,81	50	0,08	25	0,15	390
Osmaniye	Merkez	Raufbey	0,67	50	0,07	25	0,22	390
Osmaniye	Merkez	Rızaiye	1,13	50	0,11	25	0,02	390
Osmaniye	Merkez	Şekerdere	0,47	50	0,05	25	0,08	390
Osmaniye	Merkez	Tehçi	0,99	50	0,10	25	0,14	390
Osmaniye	Merkez	Yaverpaşa	0,59	50	0,06	25	0,06	390

Province	District	Settlement	Results					
			PM ₁₀	Project Standards	PM _{2.5}	Project Standards	Dust Deposition	Project Standards
Osmaniye	Merkez	Yaverpaşa/Yeşilyurt	0,84	50	0,08	25	1,46	390
Osmaniye	Merkez	Yenimahalle	1,33	50	0,13	25	1,04	390
Osmaniye	Düziçi	Çamiçi	1,33	50	0,13	25	1,34	390
Osmaniye	Düziçi	Çiftlik	10,98	50	1,10	25	0,07	390
Osmaniye	Düziçi	Ellek/Şehit Ali Gökçe	0,90	50	0,09	25	0,23	390
Osmaniye	Düziçi	Karacaören	1,73	50	0,17	25	0,26	390
Osmaniye	Düziçi	Üzümlü	0,38	50	0,04	25	0,03	390
Osmaniye	Düziçi	Yarbaşı	0,38	50	0,04	25	0,02	390
Osmaniye	Düziçi	Yazlamazlı	0,32	50	0,03	25	0,25	390
Osmaniye	Bahçe	Arıklıkaş	0,67	50	0,07	25	0,42	390
Osmaniye	Bahçe	Cumhuriyet Mahallesi	0,73	50	0,07	25	0,10	390
Osmaniye	Bahçe	Çamlıca	0,12	50	0,01	25	0,09	390
Osmaniye	Bahçe	Nohut	0,19	50	0,02	25	0,21	390
Osmaniye	Bahçe	Arıcaklı	0,34	50	0,03	25	0,14	390
Osmaniye	Bahçe	Aslanlı	0,15	50	0,01	25	0,10	390
Osmaniye	Bahçe	Aşağı Arıcaklı (Ayrılanizyeni harman)	0,10	50	0,01	25	0,11	390
Osmaniye	Bahçe	İslam	1,07	50	0,11	25	0,21	390
Osmaniye	Bahçe	Kaman	1,59	50	0,16	25	0,27	390
Osmaniye	Bahçe	Kızlaç	1,04	50	0,10	25	0,13	390
Kahramanmaraş	Pazarcık	Evri Pınarbaşı	0,21	50	0,02	25	0,06	390
Kahramanmaraş	Pazarcık	Evri Taşbiçme	0,26	50	0,03	25	0,06	390
Gaziantep	Nurdağ	Olucak	0,38	50	0,04	25	0,96	390
Gaziantep	Nurdağ	Aslanlı	0,27	50	0,03	25	0,35	390
Gaziantep	Nurdağ	Çakmak	0,26	50	0,03	25	0,07	390
Gaziantep	Nurdağ	Hisar	0,25	50	0,02	25	0,17	390
Gaziantep	Nurdağ	İçerisi (Çakmak)	1,16	50	0,12	25	0,09	390
Gaziantep	Nurdağ	Kömürler	0,23	50	0,02	25	0,12	390
Gaziantep	Nurdağ	Kurudere	0,06	50	0,01	25	0,00	390
Gaziantep	Nurdağ	Satırhöyük	0,45	50	0,05	25	0,06	390
Gaziantep	Nurdağ	Yenimahalle	0,28	50	0,03	25	0,01	390
Gaziantep	Şehitkamil	Ağaçlı	0,14	50	0,01	25	0,02	390
Gaziantep	Şehitkamil	Aktoprak	0,24	50	0,02	25	0,01	390
Gaziantep	Şehitkamil	Atalar	0,72	50	0,07	25	0,08	390
Gaziantep	Şehitkamil	Cerityeniyapan	0,52	50	0,05	25	0,01	390
Gaziantep	Şehitkamil	Eskişarkaya	0,54	50	0,05	25	0,05	390
Gaziantep	Şehitkamil	Nesimi	0,03	50	0,00	25	0,01	390
Gaziantep	Şehitkamil	Sarılar	0,18	50	0,02	25	24,66	390
Gaziantep	Şehitkamil	Üçgöze	1,37	50	0,14	25	0,99	390
Gaziantep	Şehitkamil	Yenişarkaya	0,92	50	0,09	25	0,27	390
Gaziantep	Şehitkamil	Yeşilce	0,17	50	0,02	25	0,26	390

According to Table 13, air quality modelling results comply with project standard at sensitive receptors for each parameter. Because of the distance to emission sources and prevailing wind direction, some results are very low.

In addition to these sensitive receptors, air quality modelling study was conducted with a very fine receptors grids and this grid system covers all sensitive areas (such as settlements, agricultural areas etc).

The modelling dispersion results for the seven section are shown on the satellite images along with settlement names in Figure 4 to Figure 24. These dispersion map satellite image sections are;

- From start point to 14 km
- From 14 km to 50 km
- From 50 km to 90 km
- From 90 km to 135 km
- From 135 km to 200 km
- From 200 km to 250 km
- From 250 km to finish point



Figure 4. Daily Average Maximum APCV of PM₁₀ from 0 km-14 km

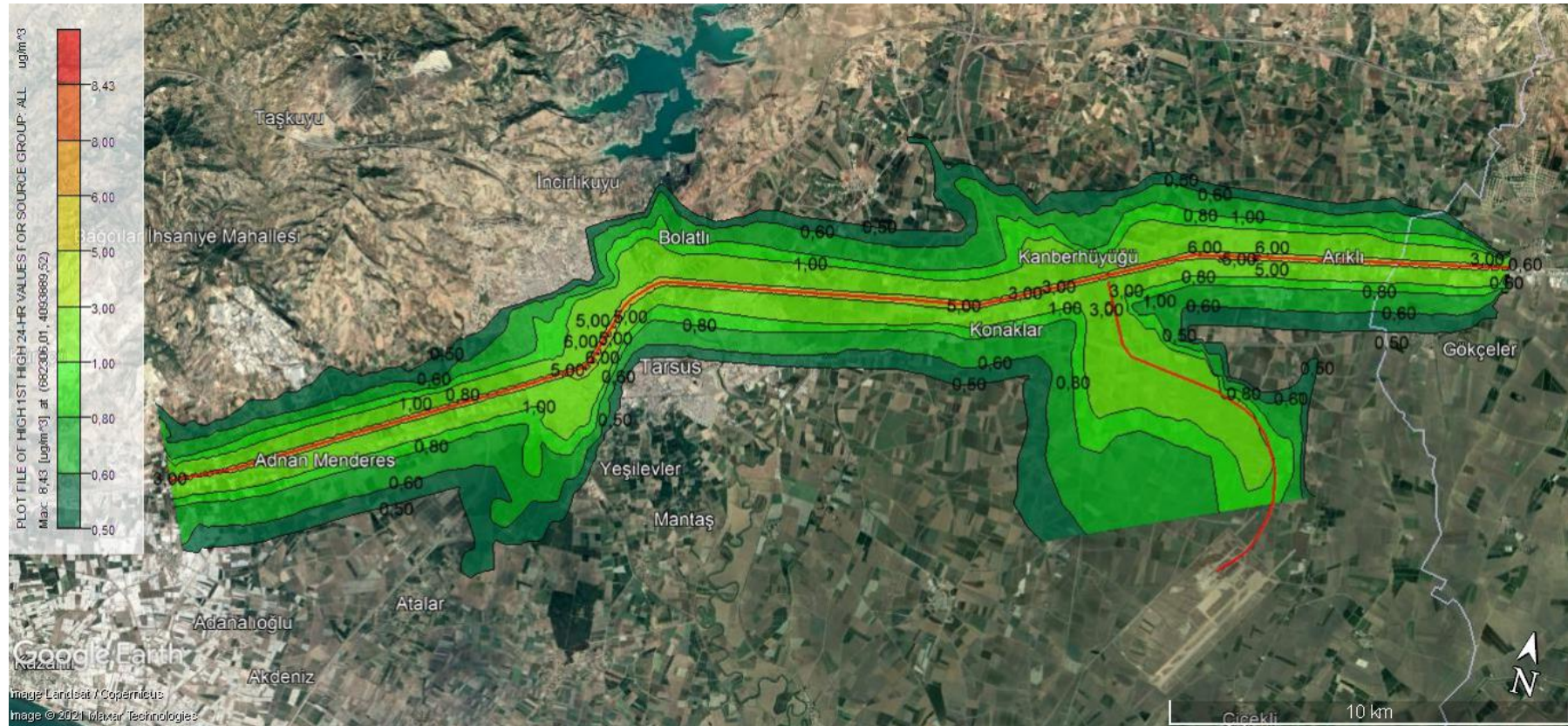


Figure 5. Daily Average Maximum APCV of PM₁₀ from 14 km-50 km

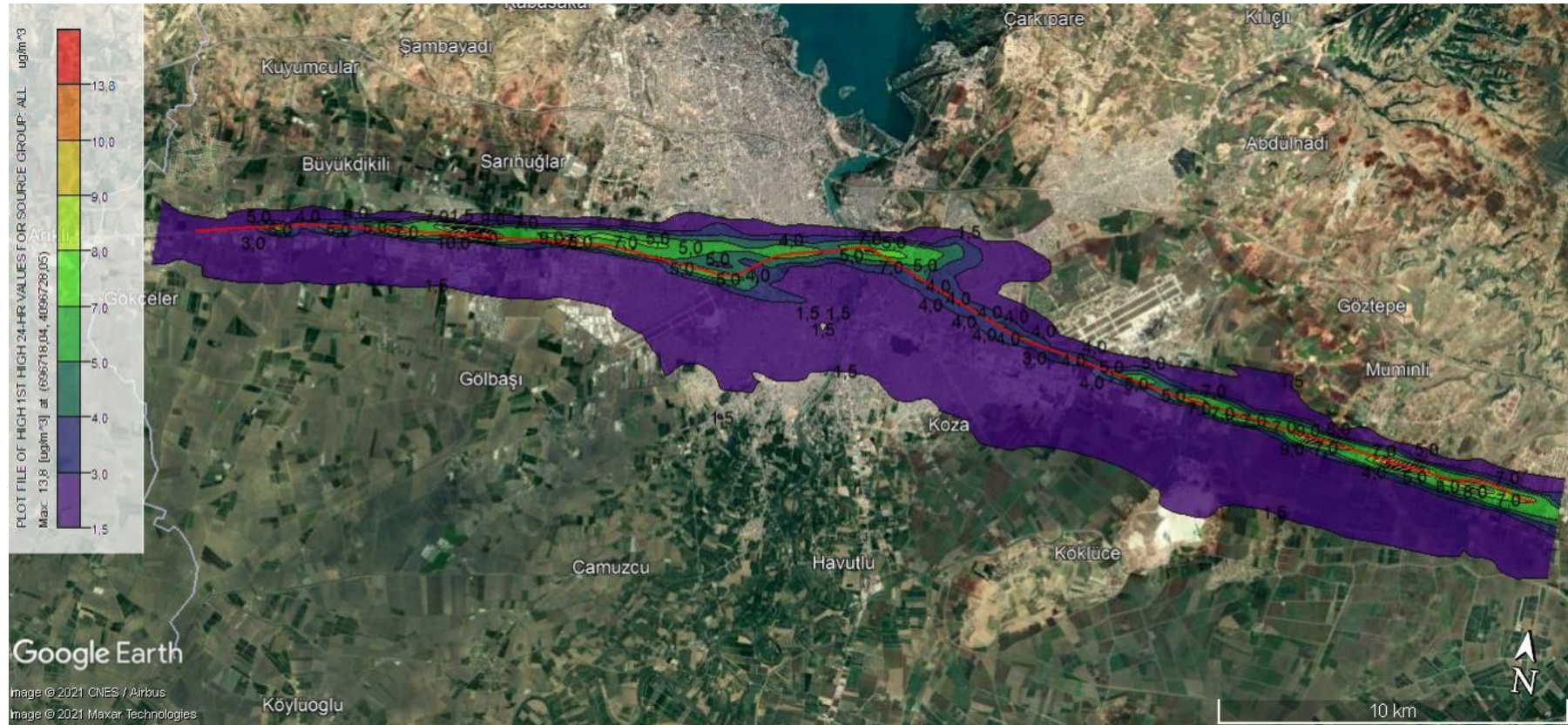


Figure 6. Daily Average Maximum APCV of PM₁₀ from 50 km-90 km

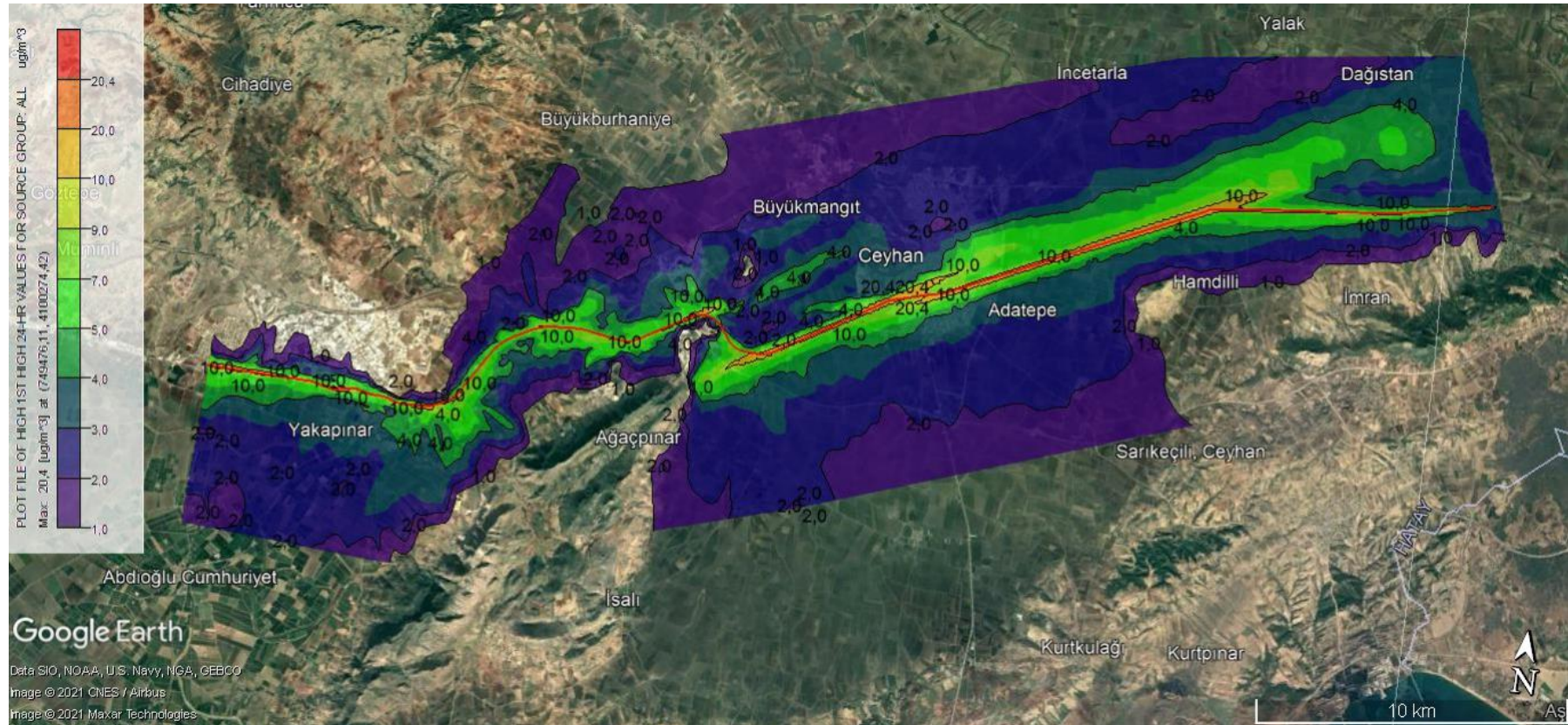


Figure 7. Daily Average Maximum APCV of PM₁₀ from 90 km-135 km

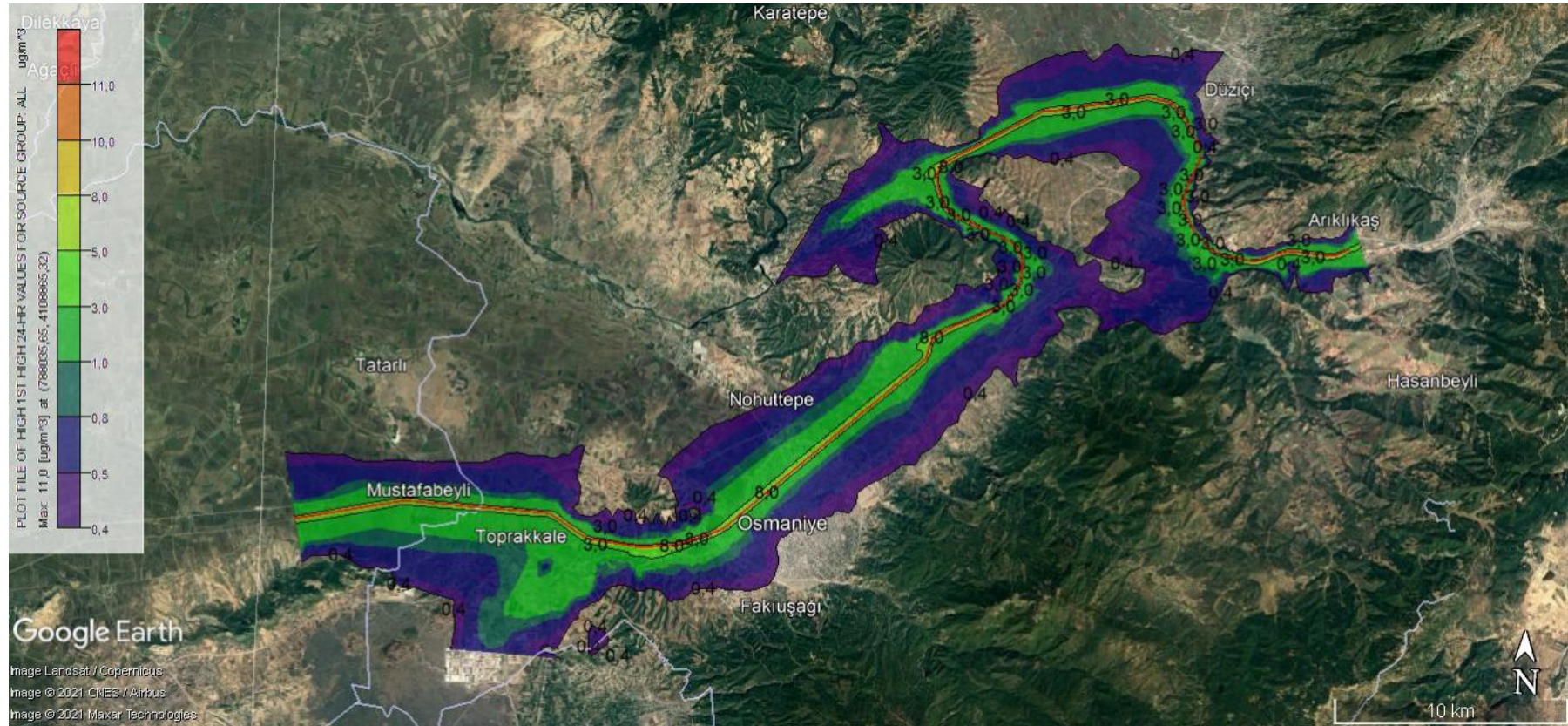


Figure 8. Daily Average Maximum APCV of PM₁₀ from 135 km-200 km

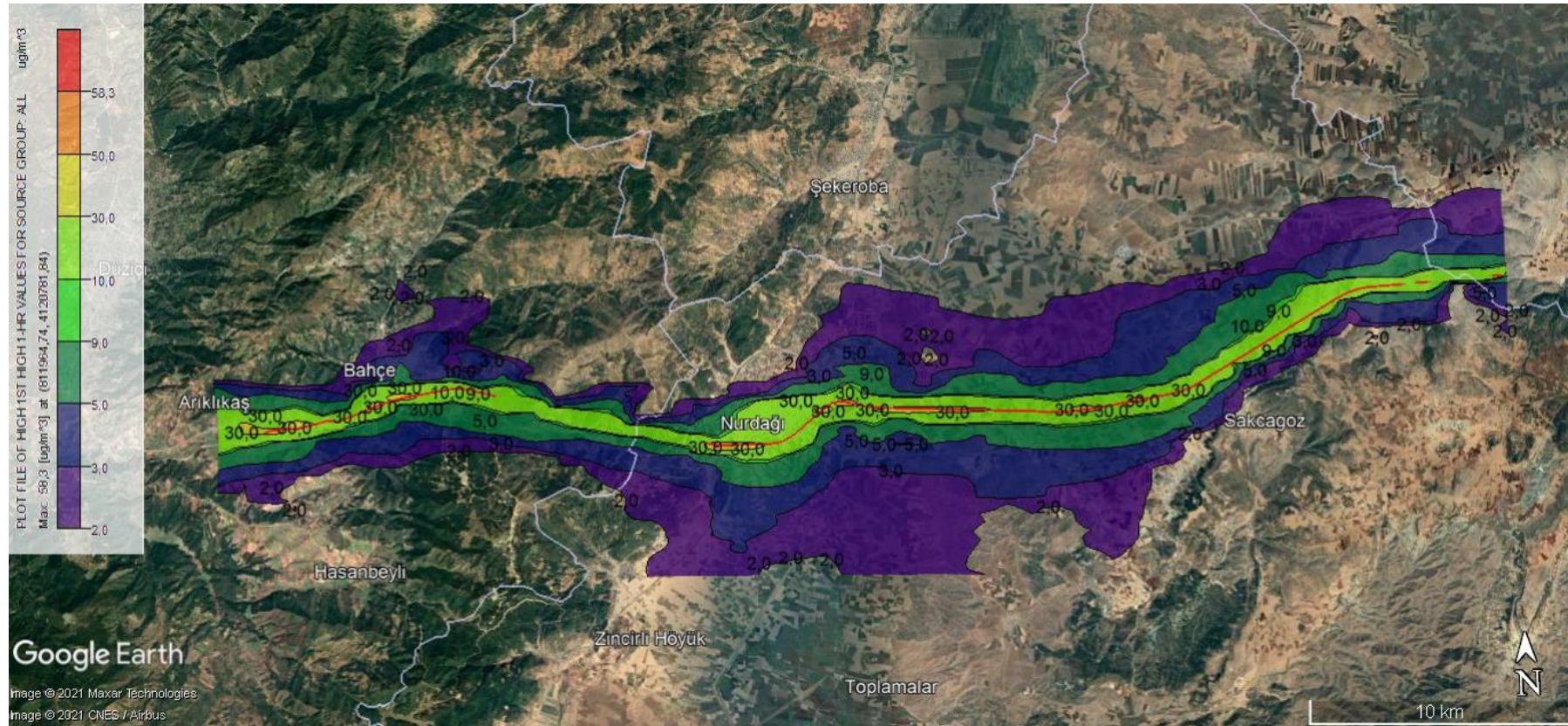


Figure 9. Daily Average Maximum APCV of PM₁₀ from 200 km-250 km

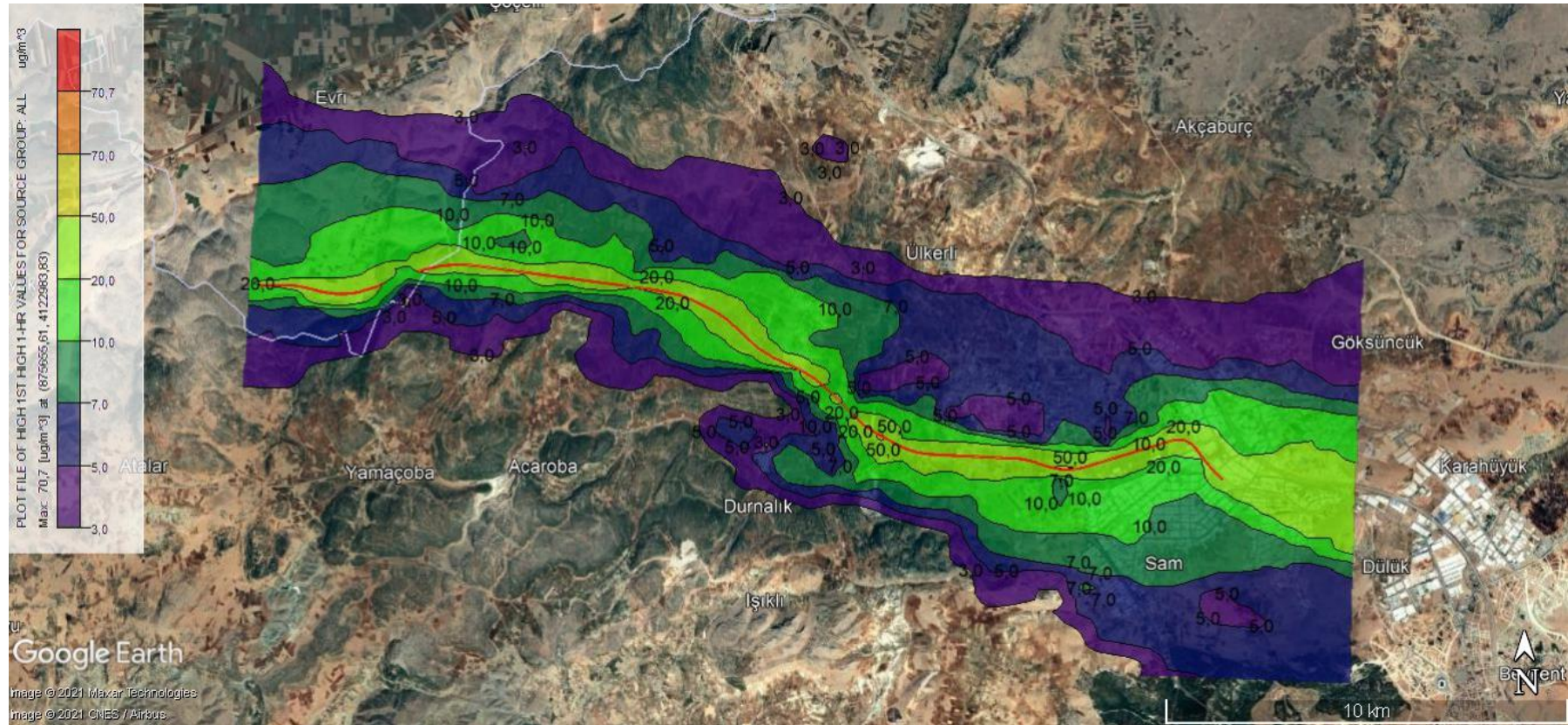


Figure 10. Daily Average Maximum APCV of PM₁₀ from 250 km-finish



Figure 11. Daily Average Maximum APCV of PM_{2.5} from 0 km-14 km

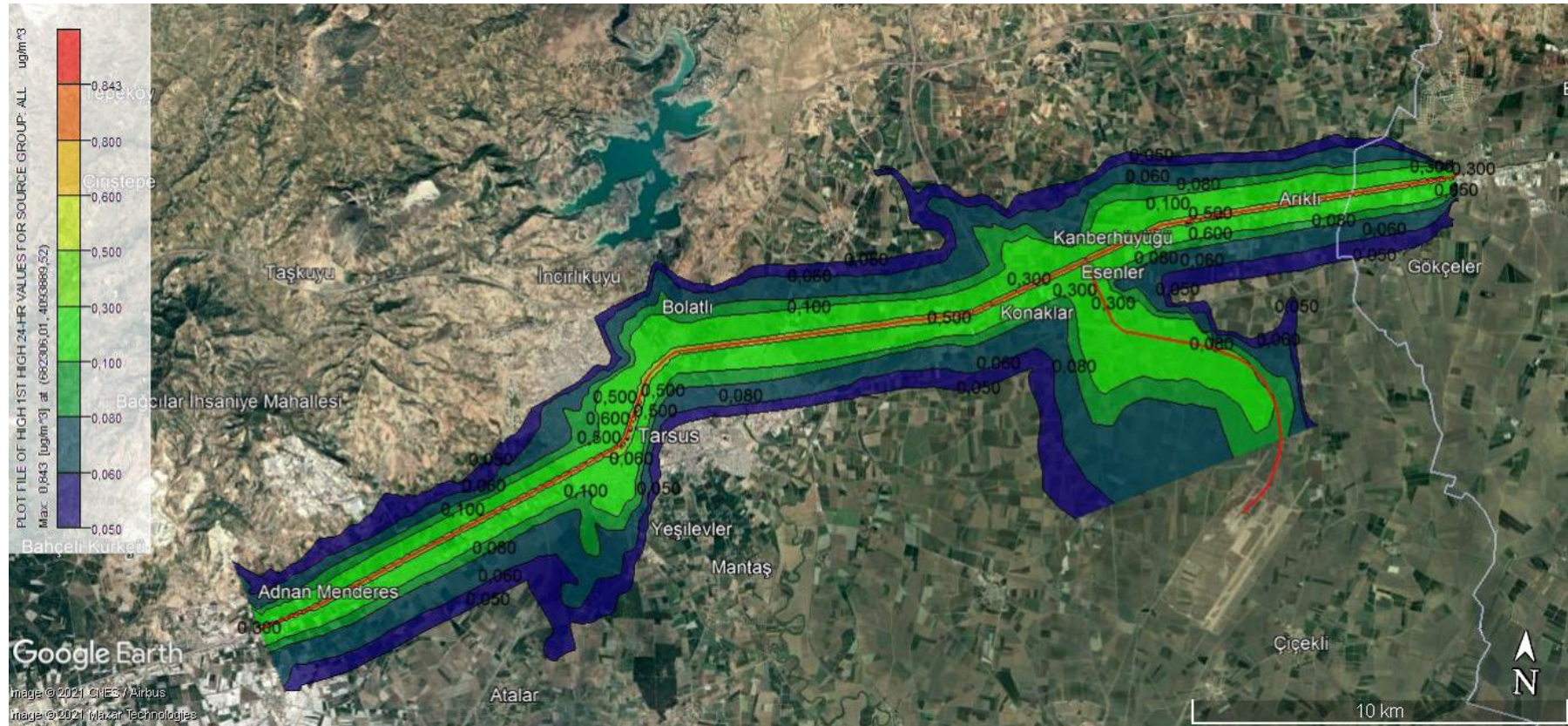


Figure 12. Daily Average Maximum APCV of $PM_{2.5}$ from 14 km-50 km

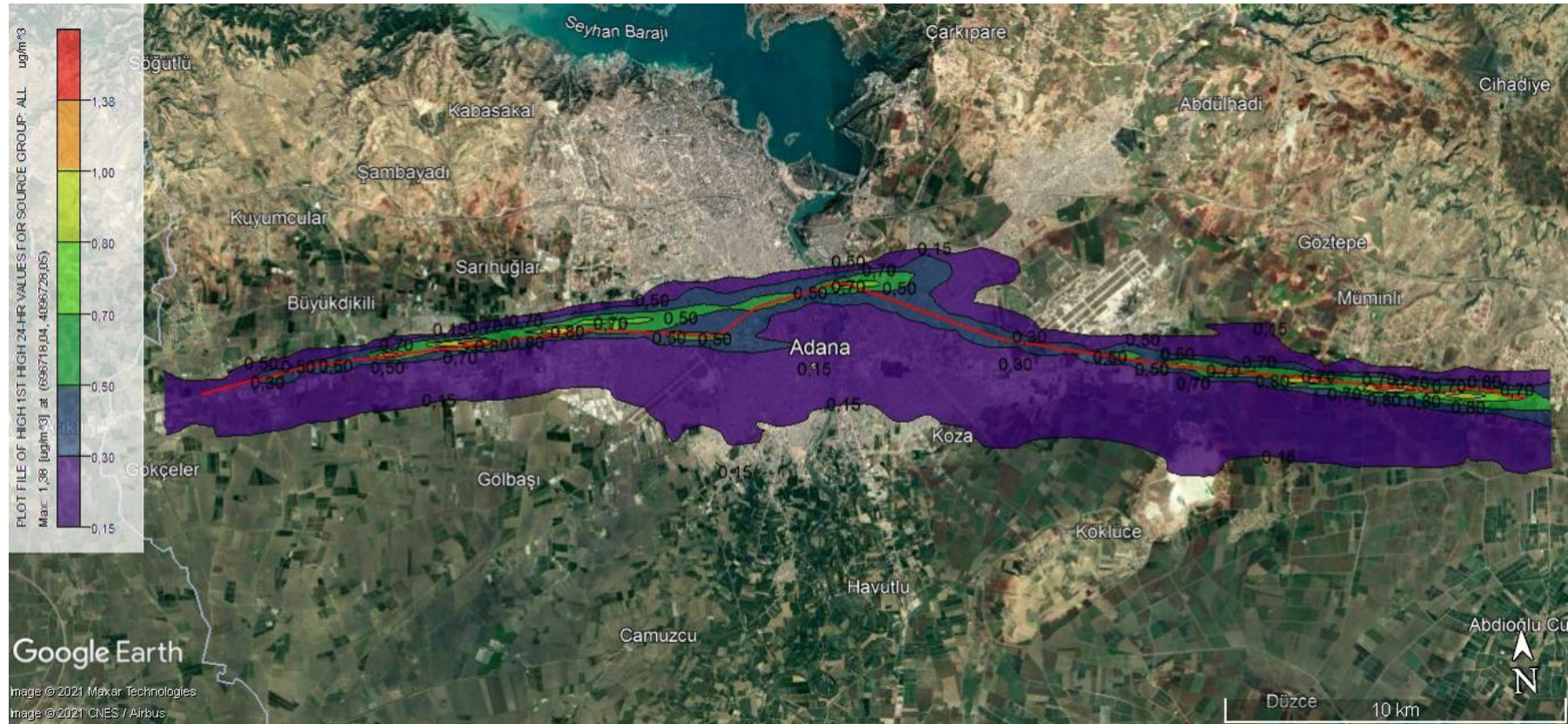


Figure 13. Daily Average Maximum APCV of $PM_{2.5}$ from 50 km-90 km

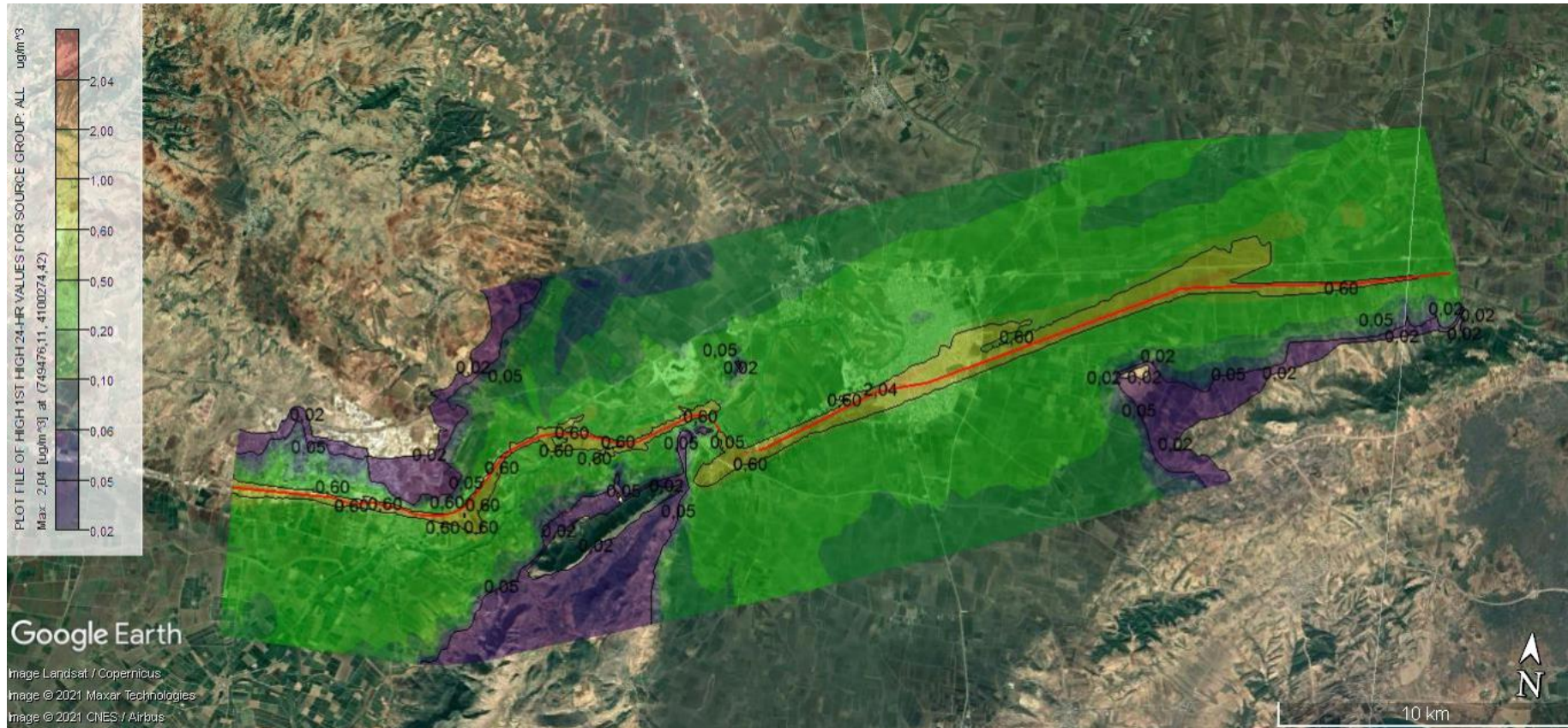


Figure 14. Daily Average Maximum APCV of PM_{2.5} from 90 km-135 km

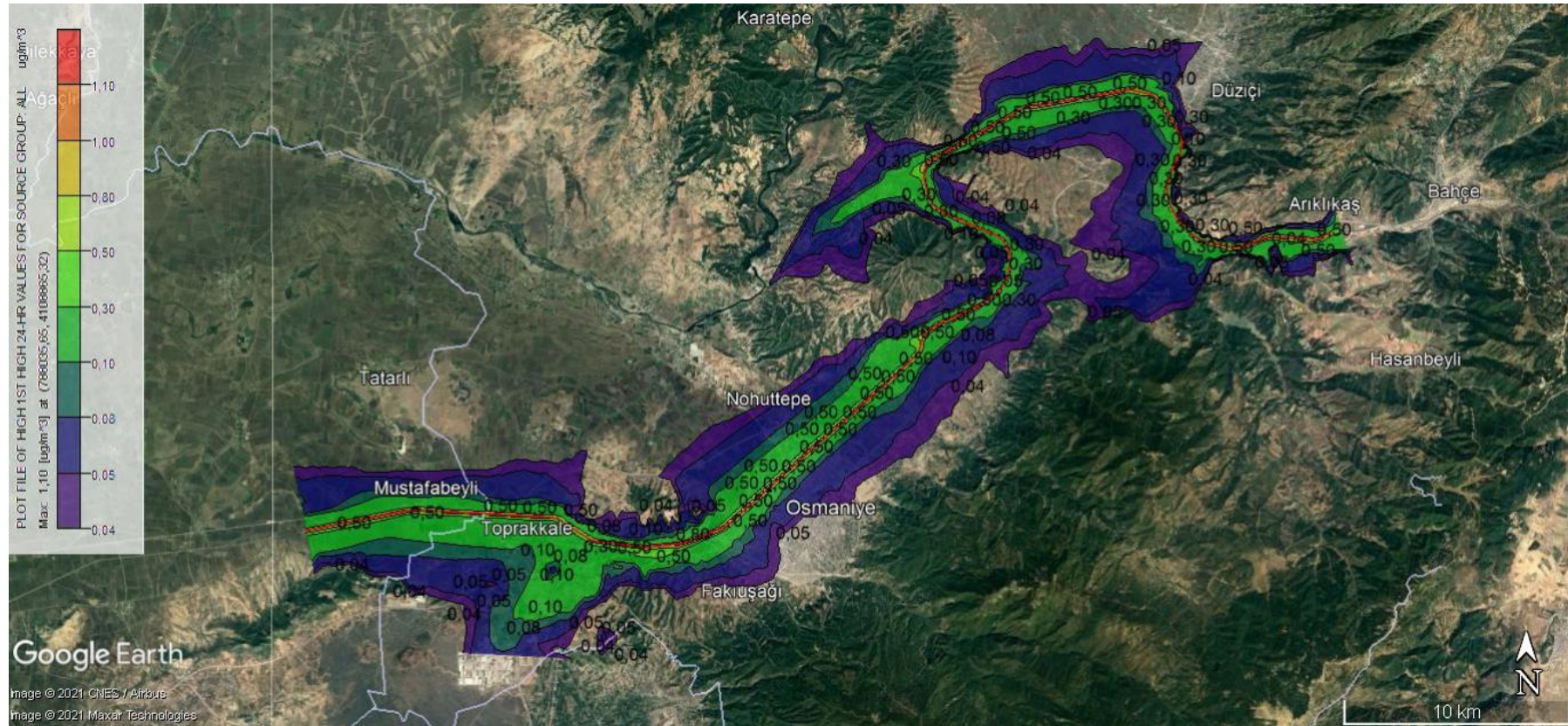


Figure 15. Daily Average Maximum APCV of PM_{2.5} from 135 km-200 km

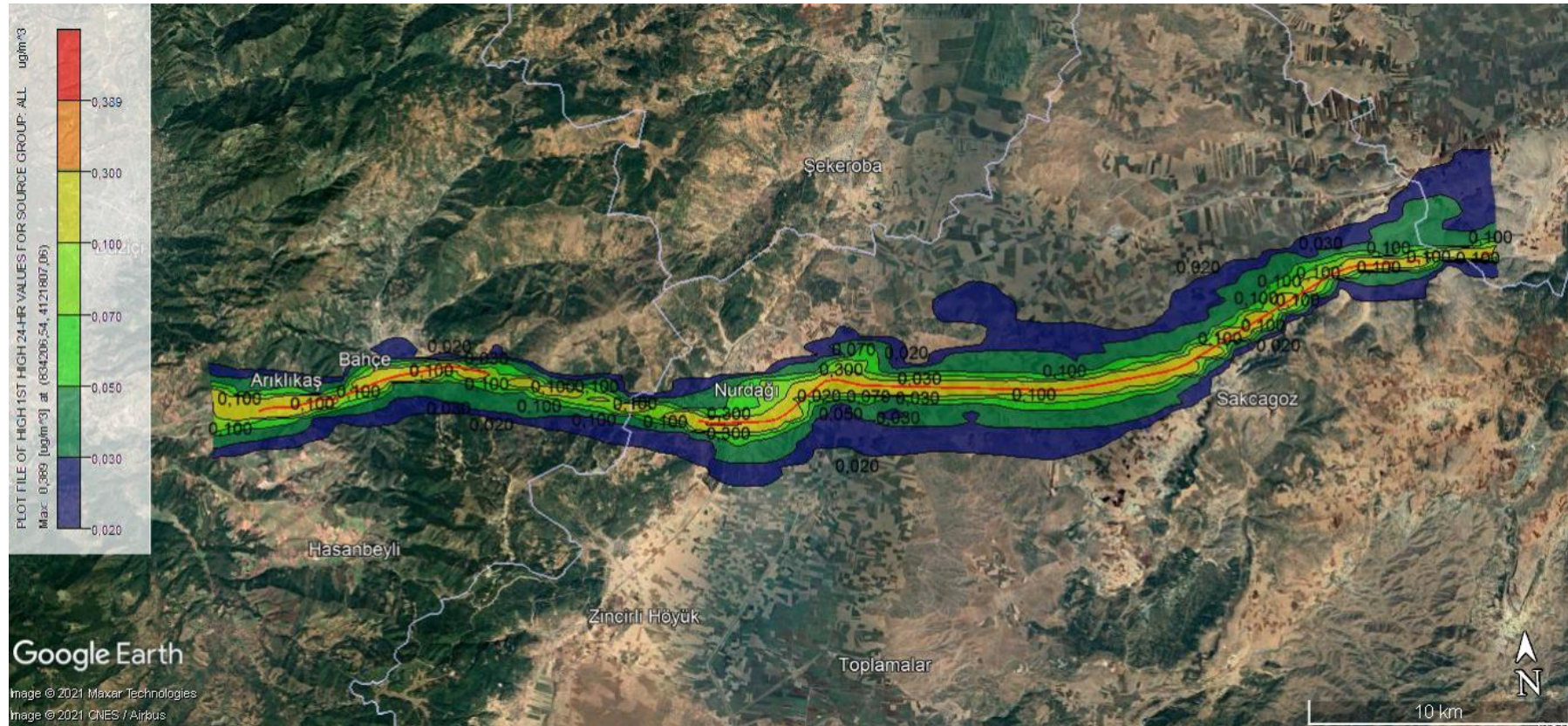


Figure 16. Daily Average Maximum APCV of $PM_{2.5}$ from 200 km-250 km

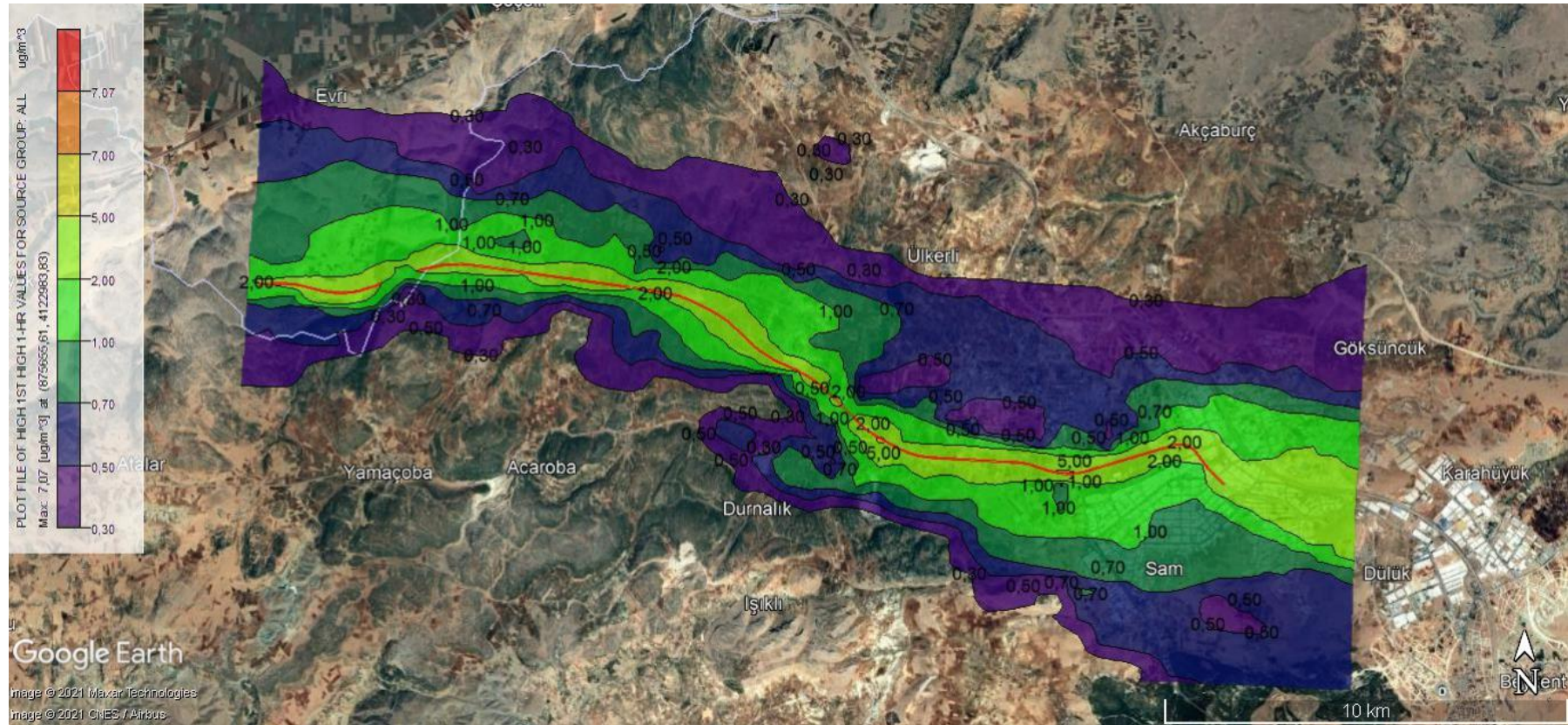


Figure 17. Daily Average Maximum APCV of $PM_{2.5}$ from 250 km-finish



Figure 18. Monthly Average Maximum APCV of Dust Deposition from 0 km-14 km



Figure 19. Monthly Average Maximum APCV of Dust Deposition from 14 km-50 km



Figure 20. Monthly Average Maximum APCV of Dust Deposition from 50 km-90 km

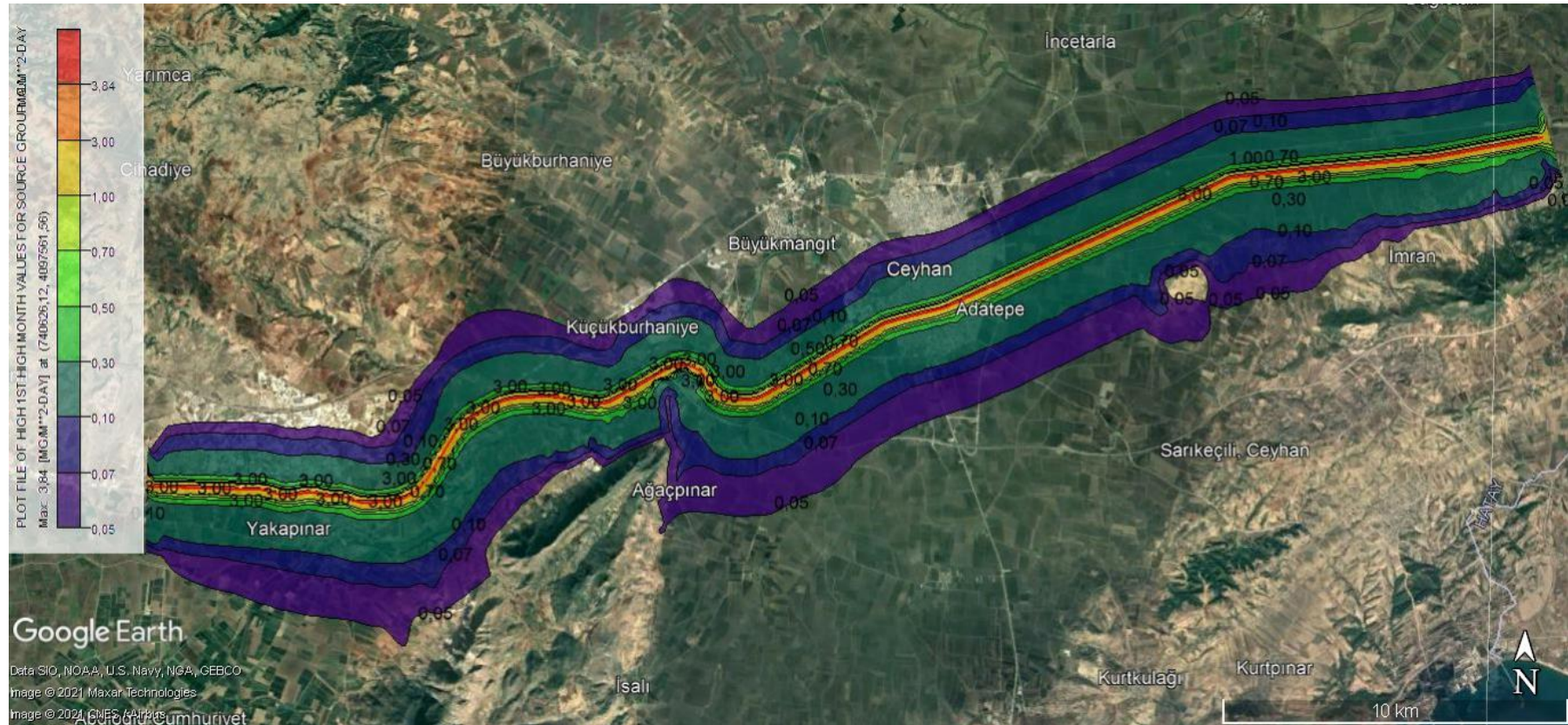


Figure 21. Monthly Average Maximum APCV of Dust Deposition from 90 km-135 km



Figure 22. Monthly Average Maximum APCV of Dust Deposition from 135 km-200 km

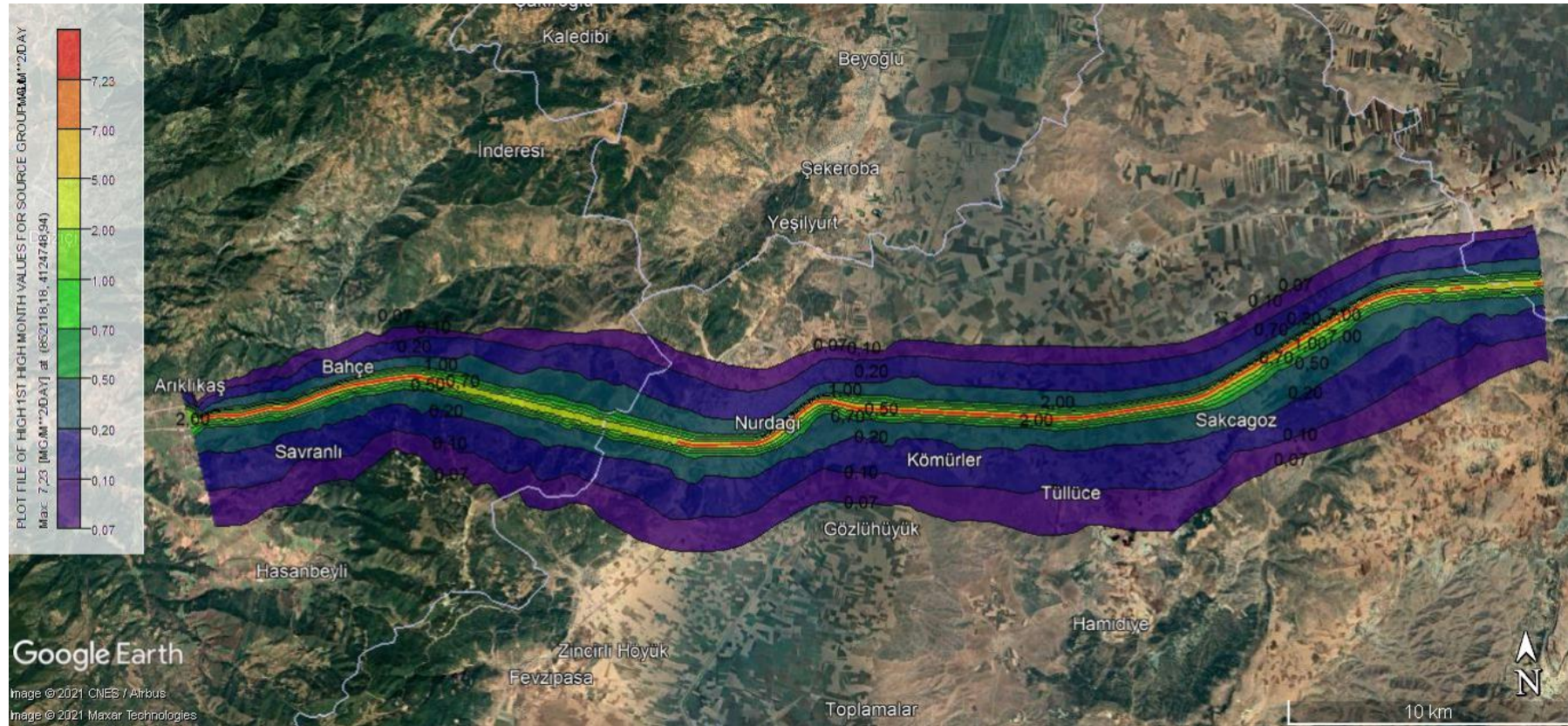


Figure 23. Monthly Average Maximum APCV of Dust Deposition from 200 km-250 km

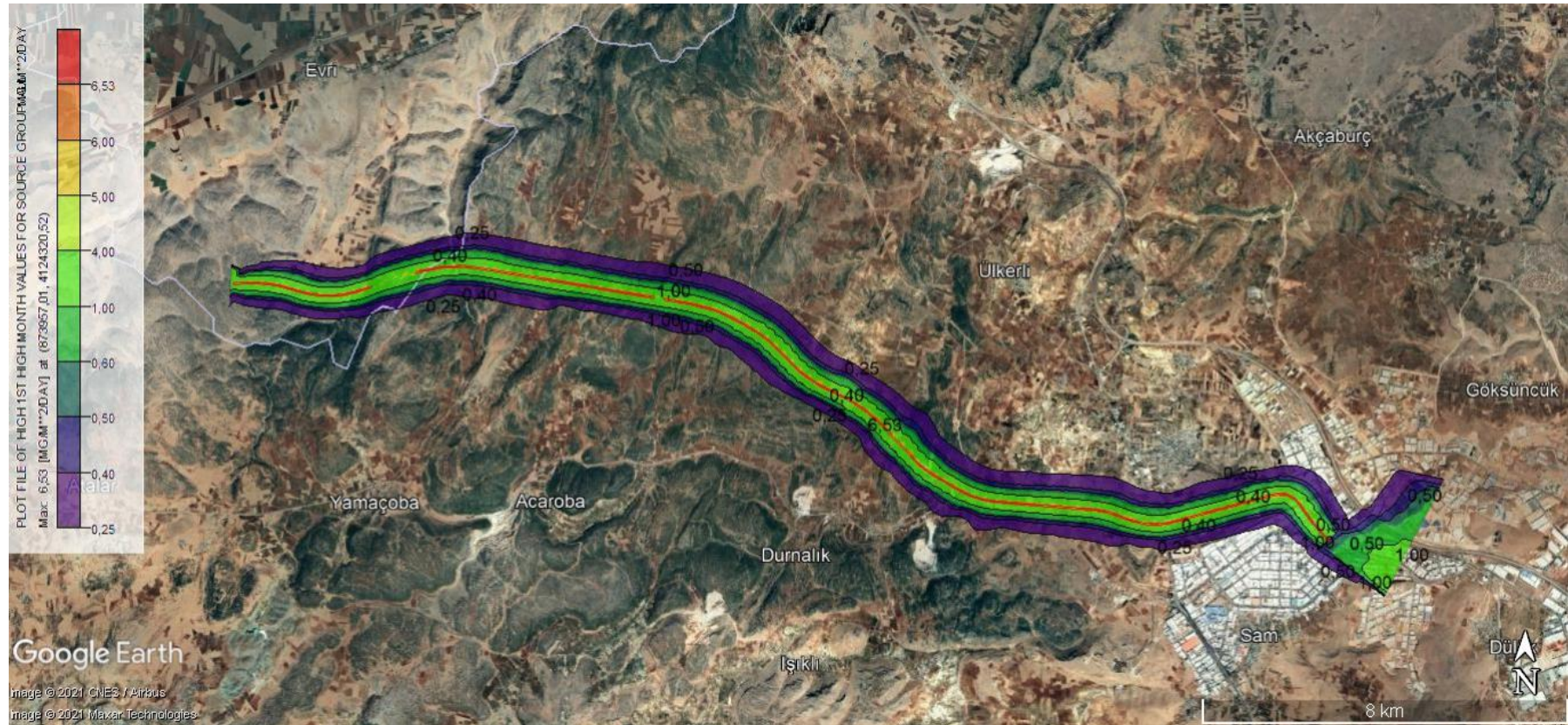


Figure 24. Monthly Average Maximum APCV of Dust Deposition from 250 km-finish