AERMOD MODELİ TANITIMI

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AERMOD Modeli Kimlik Bilgileri

- **Model Adı :** AERMOD
- **Son Revizyon Tarihi :** 10/12/2012

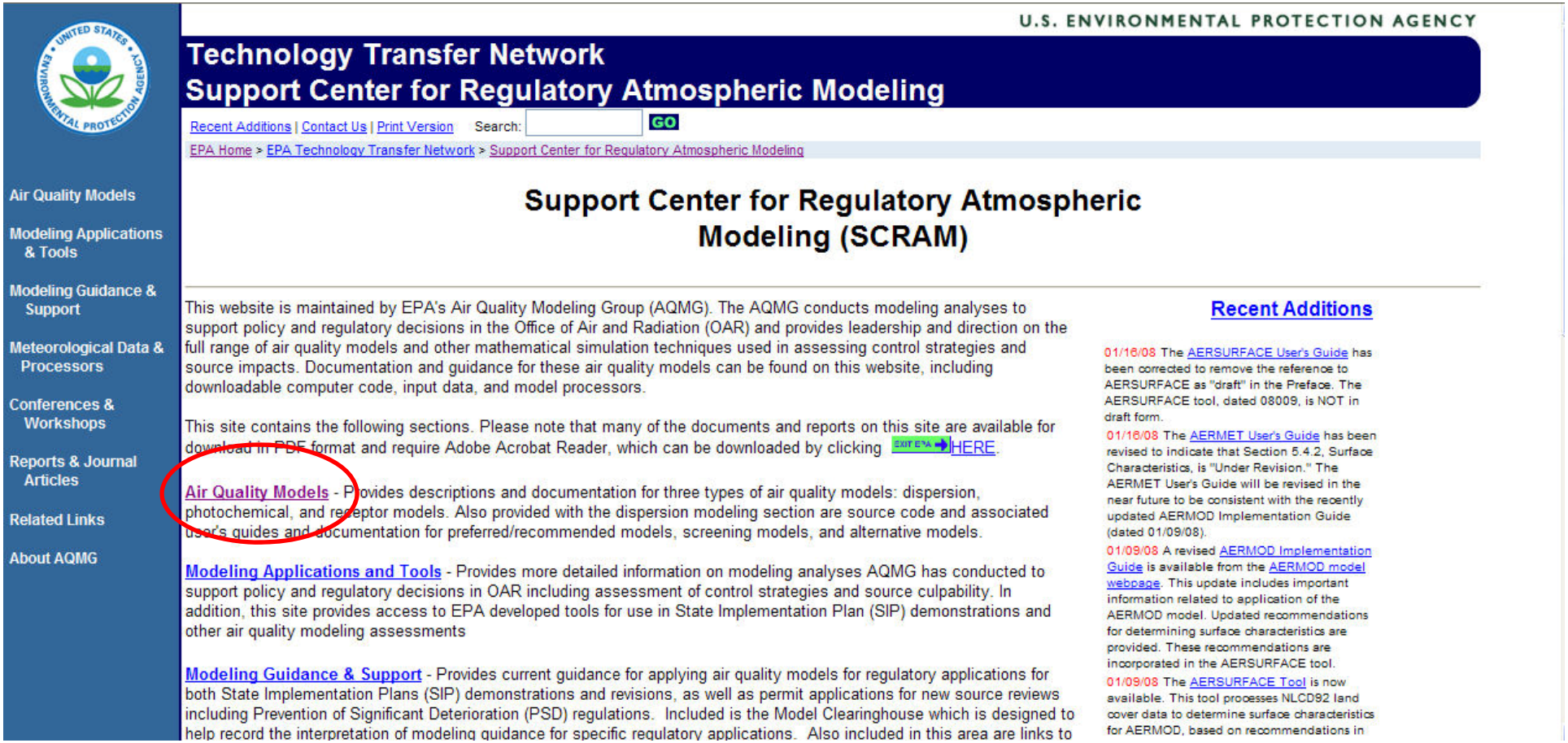
- **Hazırlayan :** AERMIC (American Meteorological Society (AMS)/United States Environmental Protection Agency (EPA) Regulatory Model Improvement Committee)

Modelin Tarihçesi

- Amerikan Çevre Koruma Örgütü USEPA (United States Environmental Protection Agency) ve Amerikan Meteoroloji Topluluğu (American Meteorology Society) işbirliğinde 1991 yılında "Model Geliştirme Komitesi" (AERMIC) ismiyle bir komite oluşturulmuştur.
- AERMIC tarafından 1991 yılında hazırlanmaya başlanan AERMOD modeli 21 Nisan 2000 tarihinde mevzuat gereği model çalışmalarının gerçekleştirilmesi için önerilmiştir.
- 5 Aralık 2005 tarihinde resmi olarak kullanılması istenmiştir.
- 9 Aralık 2006 tarihi itibariyle ISCST3 ile değiştirilmiştir.
- Halen sürekli güncellenen bir modeldir.
- Halen tüm dünyada kabul gören ve çok yaygın olarak kullanılan bir modeldir.

AERMOD MODELİ ÜCRETSİZDİR !!!

http://www.epa.gov/scram001



U.S. ENVIRONMENTAL PROTECTION AGENCY

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Support Center for Regulatory Atmospheric Modeling

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Support Center for Regulatory Atmospheric Modeling (SCRAM)

This website is maintained by EPA's Air Quality Modeling Group (AQMG). The AQMG conducts modeling analyses to support policy and regulatory decisions in the Office of Air and Radiation (OAR) and provides leadership and direction on the full range of air quality models and other mathematical simulation techniques used in assessing control strategies and source impacts. Documentation and guidance for these air quality models can be found on this website, including downloadable computer code, input data, and model processors.

This site contains the following sections. Please note that many of the documents and reports on this site are available for download in PDF format and require Adobe Acrobat Reader, which can be downloaded by clicking EXIT EPA HERE.

Air Quality Models - Provides descriptions and documentation for three types of air quality models: dispersion, photochemical, and receptor models. Also provided with the dispersion modeling section are source code and associated user's guides and documentation for preferred/recommended models, screening models, and alternative models.

Modeling Applications and Tools - Provides more detailed information on modeling analyses AQMG has conducted to support policy and regulatory decisions in OAR including assessment of control strategies and source culpability. In addition, this site provides access to EPA developed tools for use in State Implementation Plan (SIP) demonstrations and other air quality modeling assessments

Modeling Guidance & Support - Provides current guidance for applying air quality models for regulatory applications for both State Implementation Plans (SIP) demonstrations and revisions, as well as permit applications for new source reviews including Prevention of Significant Deterioration (PSD) regulations. Included is the Model Clearinghouse which is designed to help record the interpretation of modeling guidance for specific regulatory applications. Also included in this area are links to

Recent Additions

01/16/08 The AERSURFACE User's Guide has been corrected to remove the reference to AERSURFACE as "draft" in the Preface. The AERSURFACE tool, dated 08009, is NOT in draft form.

01/16/08 The AERMET User's Guide has been revised to indicate that Section 5.4.2, Surface Characteristics, is "Under Revision." The AERMET User's Guide will be revised in the near future to be consistent with the recently updated AERMOD Implementation Guide (dated 01/09/08).

01/09/08 A revised AERMOD Implementation Guide is available from the AERMOD model webpage. This update includes important information related to application of the AERMOD model. Updated recommendations for determining surface characteristics are provided. These recommendations are incorporated in the AERSURFACE tool.

01/09/08 The AERSURFACE Tool is now available. This tool processes NLCD92 land cover data to determine surface characteristics for AERMOD, based on recommendations in

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Air Quality Models

Air quality models use mathematical and numerical techniques to simulate the physical and chemical processes that affect air pollutants as they disperse and react in the atmosphere. Based on inputs of meteorological data and source information like emission rates and stack height, these models are designed to characterize primary pollutants that are emitted directly into the atmosphere and, in some cases, secondary pollutants that are formed as a result of complex chemical reactions within the atmosphere. These models are important to our air quality management system because they are widely used by agencies tasked with controlling air pollution to both identify source contributions to air quality problems and assist in the design of effective strategies to reduce harmful air pollutants. For example, air quality models can be used during the permitting process to verify that a new source will not exceed ambient air quality standards or, if necessary, determine appropriate additional control requirements. In addition, air quality models can also be used to predict future pollutant concentrations from multiple sources after the implementation of a new regulatory program, in order to estimate the effectiveness of the program in reducing harmful exposures to humans and the environment.

The most commonly used air quality models include the following:

Dispersion Modeling - These models are typically used in the permitting process to estimate the concentration of pollutants at specified ground-level receptors surrounding an emissions source.

Photochemical Modeling - These models are typically used in regulatory or policy assessments to simulate the impacts from all sources by estimating pollutant concentrations and deposition of both inert and chemically reactive pollutants over large spatial scales.

Receptor Modeling - These models are observational techniques which use the chemical and physical characteristics of gases and particles measured at source and receptor to both identify the presence of and to quantify source contributions to receptor concentrations.

Additional Information about air quality models can be found at **Related Links**.

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Modeling Applications & Tools
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Dispersion Modeling

Dispersion modeling uses mathematical formulations to characterize the atmospheric processes that disperse a pollutant emitted by a source. Based on emissions and meteorological inputs, a dispersion model can be used to predict concentrations at selected downwind receptor locations. These air quality models are used to determine compliance with National Ambient Air Quality Standards (NAAQS), and other regulatory requirements such as New Source Review (NSR) and Prevention of Significant Deterioration (PSD) regulations. These models are addressed in Appendix A of EPA's *Guideline on Air Quality Models* (also published as Appendix W of 40 CFR Part 51), which was originally published in April 1978 to provide consistency and equity in the use of modeling within the U.S. air quality management system. These guidelines are perodically revised to ensure that new model developments or expanded regulatory requirements are incorporated. This site provides links for dispersion models and other related tools and information as follows:

Preferred/Recommended Models - Refined air quality models that are currently listed in Appendix W and are required to be used for State Implementation Plan (SIP) revisions for existing sources and NSR and PSD programs.

Alternative Models - Models, not listed in Appendix W, that can be used in regulatory applications with case-by-case justification to the Reviewing Authority as noted in Section 3.2, "*Use of Alternative Models*", in Appendix W.

Screening Tools - Models that are often applied before applying a refined air quality model to determine if refined modeling is needed.

Related Programs - Programs and utilities that are used in support of some of the dispersion models listed here. Note that utilities designed for use with particular models will be found with those models.

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Preferred/Recommended Models

You will need Adobe Acrobat Reader to view the Adobe PDF files on this page. See EPA's PDF page for more information about getting and using the free Acrobat Reader.

These refined dispersion models are listed in Appendix W and are required to be used for State Implementation Plan (SIP) revisions for existing sources and for New Source Review (NSR) and Prevention of Significant Deterioration (PSD) programs. The models in this section include the following:

AERMOD Modeling System - A steady-state plume model that incorporates air dispersion based on planetary boundary layer turbulence structure and scaling concepts, including treatment of both surface and elevated sources, and both simple and complex terrain.

CALPUFF Modeling System - A non-steady-state puff dispersion model that simulates the effects of time- and space-varying meteorological conditions on pollution transport, transformation, and removal. CALPUFF can be applied for long-range transport and for complex terrain.

Other Models - Other dispersion models including BLP, CALINE3, CAL3QHC/CAL3QHCR, CTDMPLUS, and OCD.

AERMOD Modeling System

The American Meteorological Society/Environmental Protection Agency Regulatory Model Improvement Committee (AERMIC) was formed to introduce state-of-the-art modeling concepts into the EPA's air quality models. Through AERMIC, a modeling system, AERMOD, was introduced that incorporated air dispersion based on planetary boundary layer turbulence structure and scaling concepts, including treatment of both surface and elevated sources, and both simple and complex terrain.

There are two input data processors that are regulatory components of the AERMOD modeling system: AERMET, a meteorological data preprocessor that incorporates air dispersion based on planetary boundary layer turbulence structure and scaling concepts, and AERMAP, a terrain data preprocessor that incorporates complex terrain using USGS Digital Elevation Data. Other non-regulatory components of this system include: AERSCREEN, a screening version of AERMOD; AERSURFACE, a surface characteristics preprocessor, and BPIPPRIME, a multi-building dimensions program incorporating the GEP technical procedures for PRIME applications.

Below is the model code and documentation for AERMOD Version 09292. The model code and supporting documents are not static but evolve to accommodate the best available science. Please check this website often for updates to model code and associated documents. As of December 9, 2006, AERMOD is fully promulgated as a replacement to ISC3, in accordance with Appendix W.

AERMOD Implementation Guide

AERMOD Implementation Guide (PDF) - Provides information on the recommended use of AERMOD for particular applications and is an evolving document. (Updated March 19, 2009.)

Model Code

Related Links

About AQMG

AERMOD Modeling System

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At this time, AERMOD does not calculate design values for the lead NAAQS (rolling 3-month averages). A post-processing tool, LEADPOST, is available to calculate design values from monthly AERMOD output. This tool calculates and outputs the rolling cumulative (all sources) 3-month average concentration at each modeled receptor with source group contributions and the maximum cumulative (all sources) rolling 3-month average concentration by receptor.

Below is the model code and documentation for AERMOD Version 12345. The model code and supporting documents are not static but evolve to accommodate the best available science. Please check this website often for updates to model code and associated documents. As of December 9, 2006, AERMOD is fully promulgated as a replacement to ISC3, in accordance with Appendix W.

AERMOD Implementation Guide

AERMOD Implementation Guide (PDF, 188KB) - Provides information on the recommended use of AERMOD for particular applications and is an evolving document. (Updated March 19, 2009.)

Model Code

README (TXT, 1KB)
Executable (ZIP, 1.0MB)
Source Code (ZIP, 425KB)

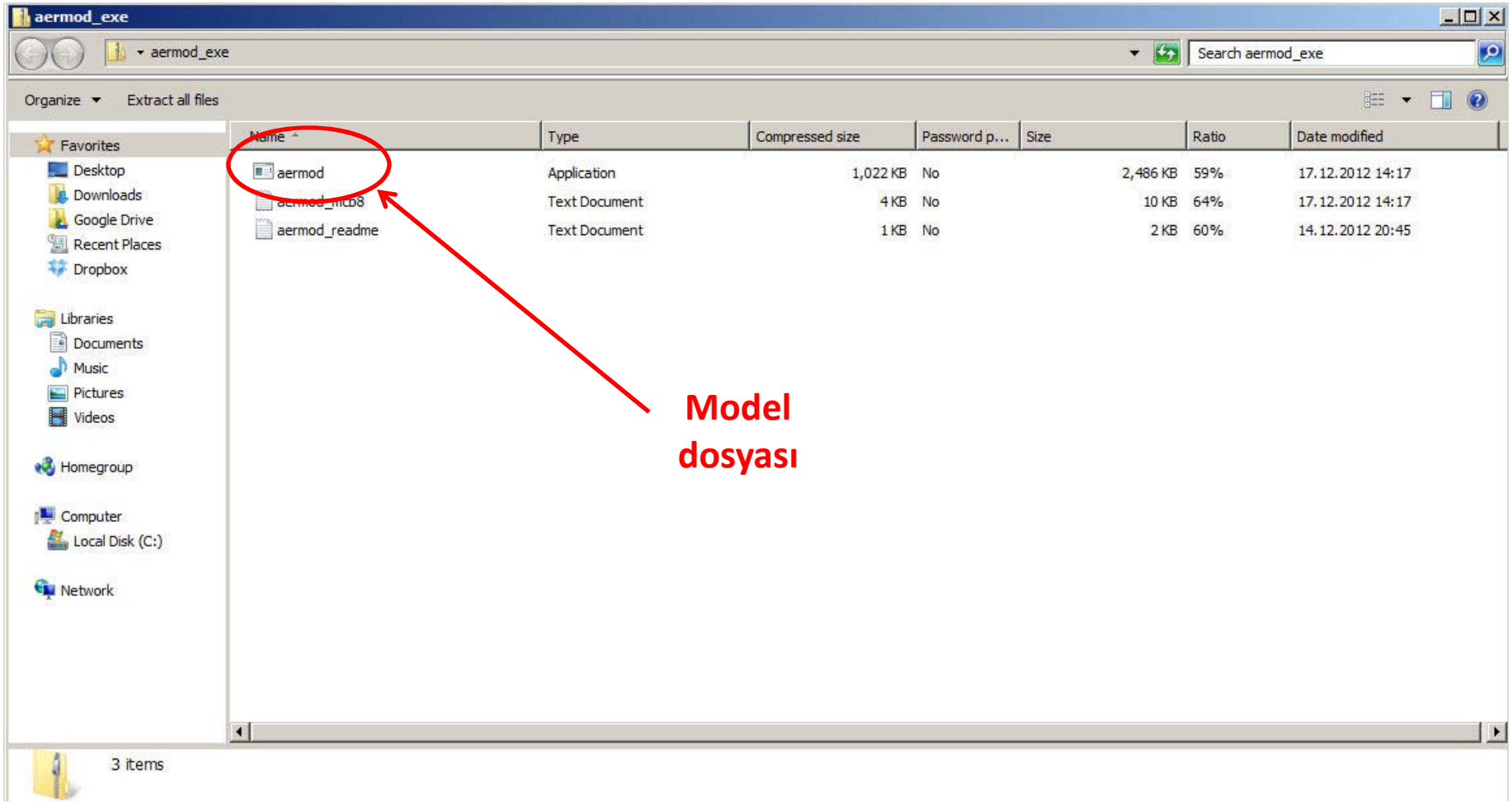
AERMOD modeli

Model Documentation

README (TXT, 1KB)
Model Change Bulletin #1 - Version Date 06341 (TXT, 10KB)
Model Change Bulletin #2 - Version Date 07026 (TXT, 4KB)
Model Change Bulletin #3 - Version Date 09292 (TXT, 33KB)
Model Change Bulletin #4 - Version Date 11059 (TXT, 13KB)
Model Change Bulletin #5 - Version Date 11103 (TXT, 3KB)
Model Change Bulletin #6 - Version Date 11353 (TXT, 3KB)
Model Change Bulletin #7 - Version Date 12060 (TXT, 6KB)
Model Change Bulletin #8 - Version Date 12345 (TXT, 9KB)
User's Guide Addendum (ZIP, 1.3MB)
Model Formulation Document (PDF, 441KB)
Addendum to the AERMOD Model Formulation Document (PDF, 31KB) - PVMRM technical description
PVMRM and OLM Sensitivity Analysis (PDF, 522KB)
Development and Evaluation of the PRIME Plume Rise and Building Downwash Model (PDF, 31KB)
Project PRIME: Evaluation of Building Downwash Models Using Field and Wind Tunnel Data (PDF, 18KB)

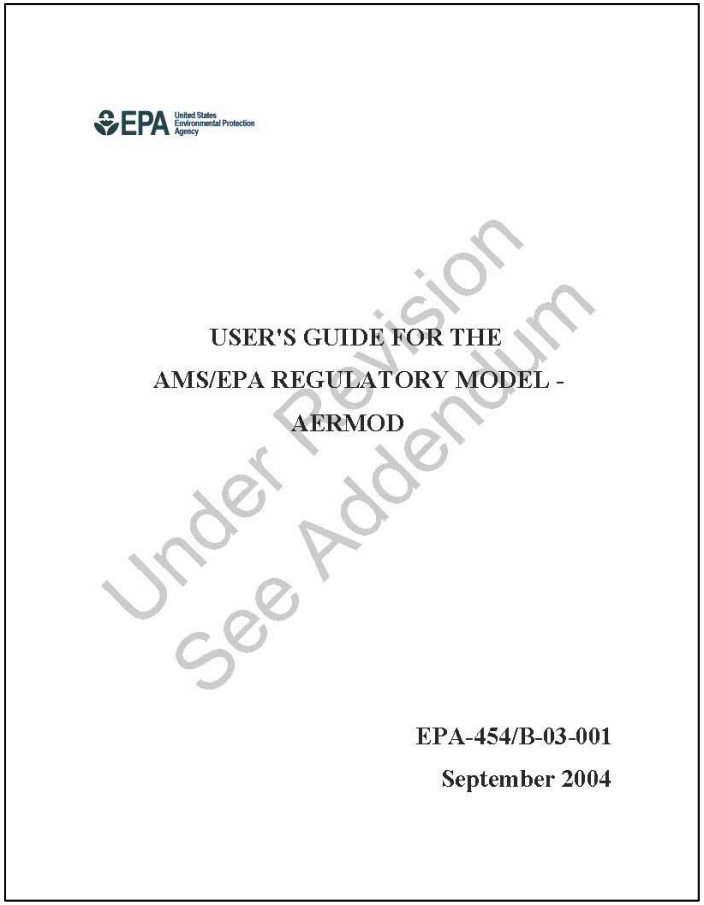
Kullanma klavuzları

İnternetten İndirilen Dosya İçeriği



Kullanma Klavuzları

- Modeli kullanma talimatları

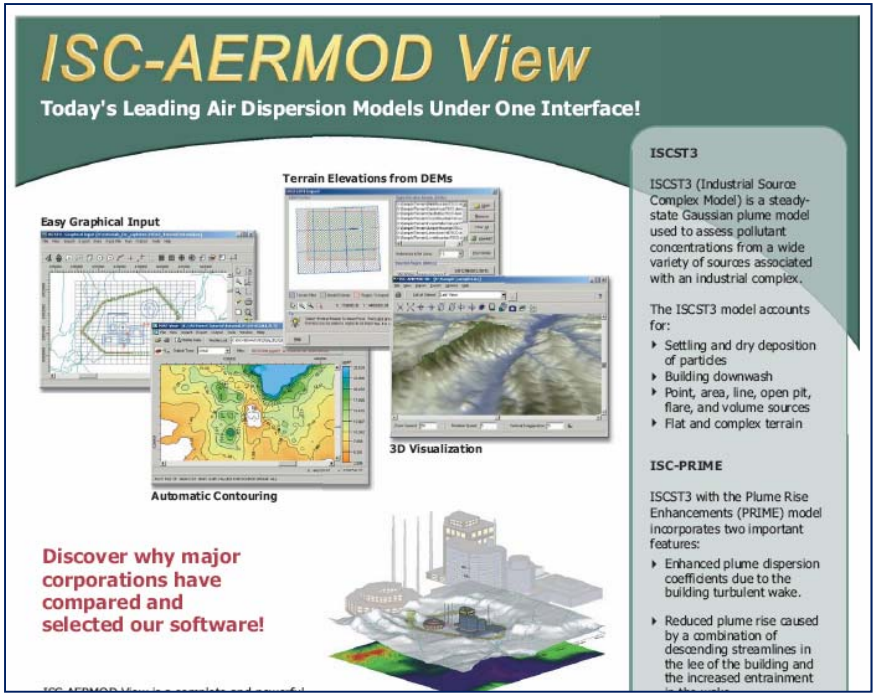


Ticari Versiyonları

ISC-AERMOD View

- http://www.weblakes.com
- http://www.air-dispersion-model.com
- http://www.scisoftware.com
- Diğer siteler

Yaklaşık Fiyatı : 1600 USD

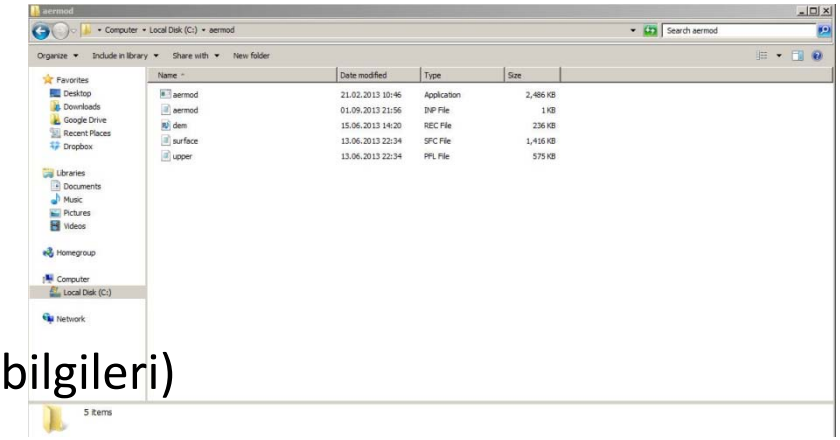


AERMOD ’un Bilgisayar Konfigürasyonu İhtiyacı

- MS-DOS
- 80386 ve üstü işlemci
- 2 MB RAM

AERMOD modelinin bilgisayarda çalıştırılabilmesi için 5 ayrı bilgisayar dosyasına ihtiyaç vardır.

- Modelin kendisi (uygulama dosyası)
  - aermod.exe



- Veri dosyası (Ascii text)
  - *.inp, …

- Meteoroloji dosyası - 1 (Yer seviyesi met. bilgileri)
  - *.sfc

- Meteoroloji dosyası - 2 (Düşey met. bilgileri)
  - *.pfl

- Topoğrafya dosyası
  - *.rec

Veri dosyasında

- ISCST3 modeli ile aynı veri formatını kullanılmaktadır.
- Toplam 61 komut kullanılabilmektedir.
- Komutların çoğu ISCST3 ile ortaktır. ISCST3'deki komutların bir kısmı kullanımdan kaldırılmış, bazı yeni komutlar ilave edilmiştir.
- ISCST3'de kullanılan bölümler aynı bölüm kodları ile kullanılır. Opsiyonel ilave bir bölüm daha ilave edilmiştir.

Modelin Çalıştırılması

- Veri dosyasının adı aermod.inp olmak zorundadır.

- DOS ortamında;

- C:\model\aermod yazmak yeterlidir.

Meteoroloji verileri AERMET ile, topoğrafya verileri AERMAP ile hazırlanır.

AERMET

- AERMOD modelinin meteoroloji ön işlemcisidir.
- Saatlik meteoroloji verisi ile çalışır.
- Çalışma 3 farklı aşamada gerçekleştirilir. Her aşamanın çıktı dosyası bir sonraki aşamanın girdi dosyasıdır.
- 2 farklı girdi dosyasına ihtiyaç duyar ve 2 farklı çıktı dosyası oluşturur.

AERMET Girdi Dosyaları

CD144 için;

- Sıcaklık
- Yağış
- Basınç
- Bulut taban yüksekliği
- Bulut kapalılığı
- Ortalama nem
- Rüzgar hızı ve yönü

verileri **Meteoroloji Genel Müdürlüğü'nden** saatlik olarak temin edilir.

FSL Dosyası

http://www.esrl.noaa.gov/raobs/

web sitesinden hazır olarak ***istenilen yıl ve bölgeye uygun olarak*** temin edilir.

CD144 Dosyası
(Yer seviyesi meteoroloji verileri)

17112 - Not Defteri

Dosya Düzen Biçim Görünüm Yardım

```
1711213010100---          05093016047   0684          4
1711213010101---          05103016046   0674          4
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```

FSL Dosyası (üst katman meteoroloji verileri)

17062 - Not Defteri

Dosya Düzen Biçim Görünüm Yardım

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     4  10000    187     64     30     15       7
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     5   9420    671     22     10  99999   99999
     4   9250    819     14      3     55       8
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     6   7770   2218  99999  99999    170       3
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     6   6200   3971  99999  99999    220       2
     6   6030   4180  99999  99999     65       3
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     6   5870   4381  99999  99999     70       2
     6   5730   4562  99999  99999    135       4
     5   5720   4589   -175   -198  99999   99999
     6   5430   4976  99999  99999    165       7
     4   5000   5590   -249   -287    140      10
     6   4860   5791  99999  99999    135      11
     6   4610   6164  99999  99999    165       9
     6   4480   6366  99999  99999    135      10
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     6   3650   7776  99999  99999    110       6
     6   3370   8306  99999  99999     75      16
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     4   3000   9080   -531   -574     85      30
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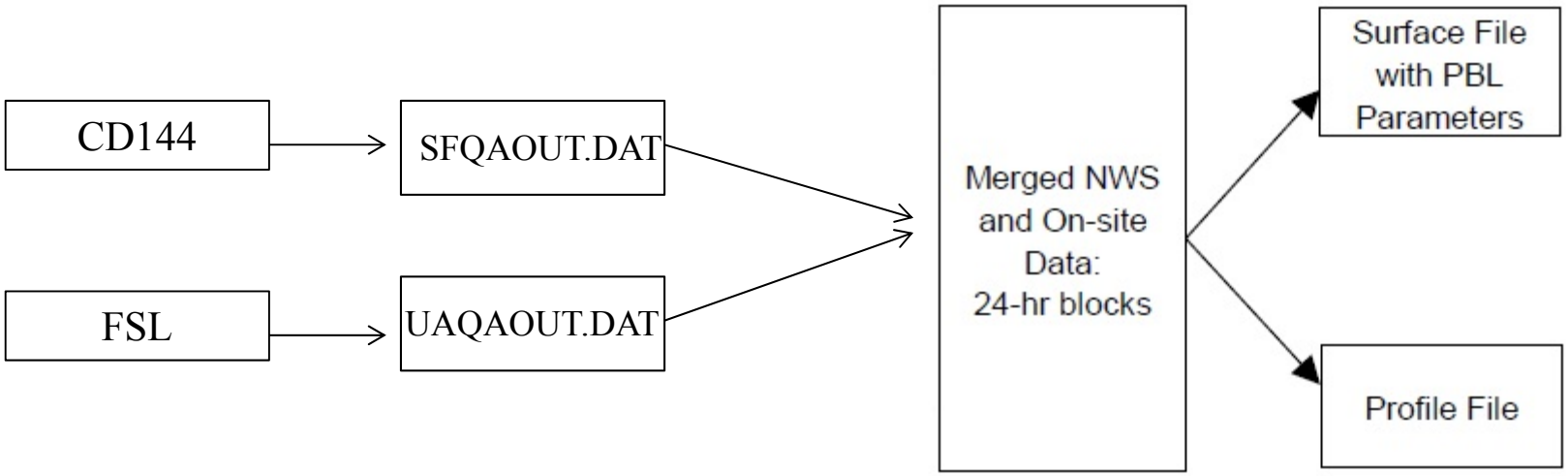
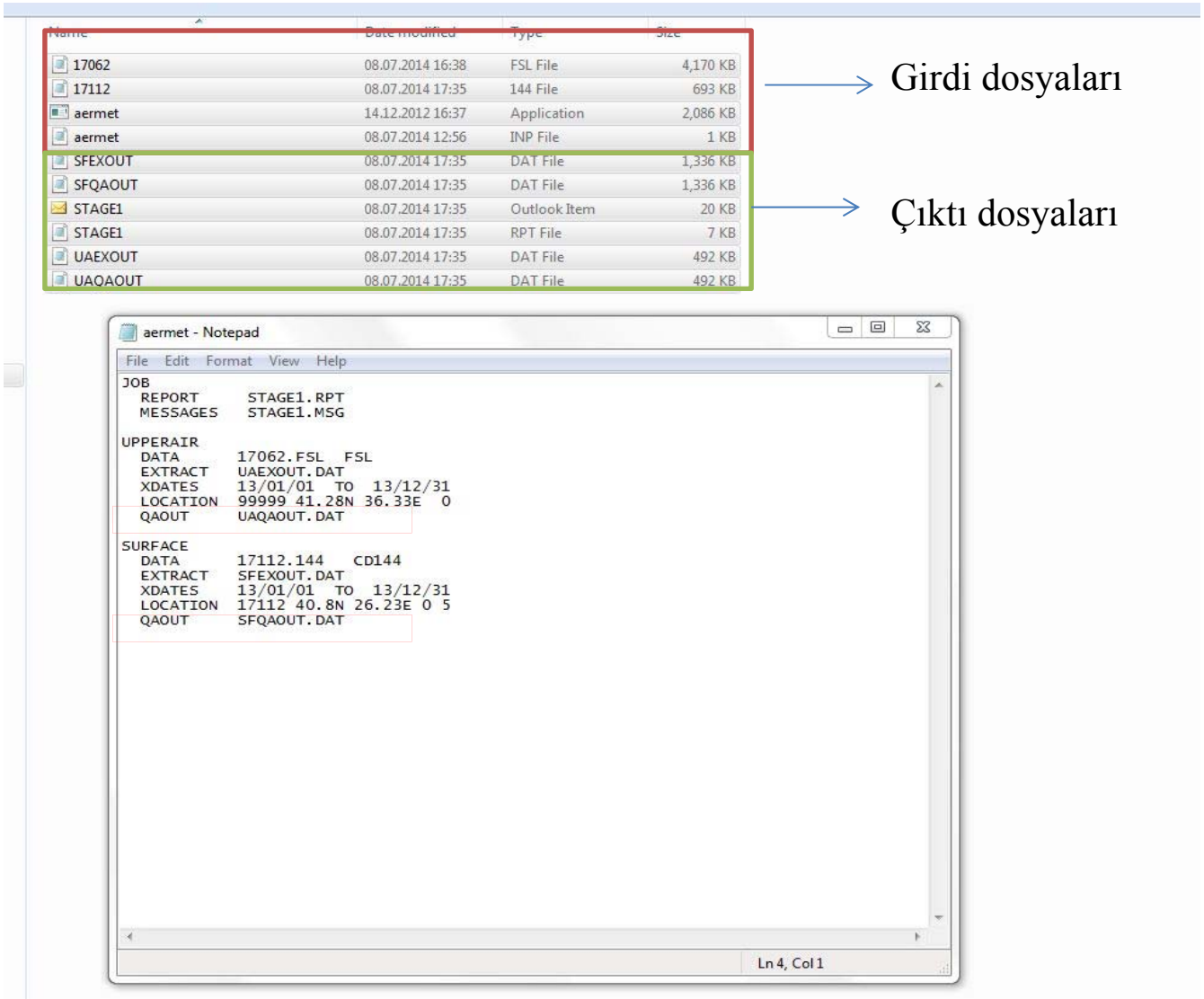
```

AERMET
METEOROLOJİ VERİSİ İŞLEME BASAMAKLARI

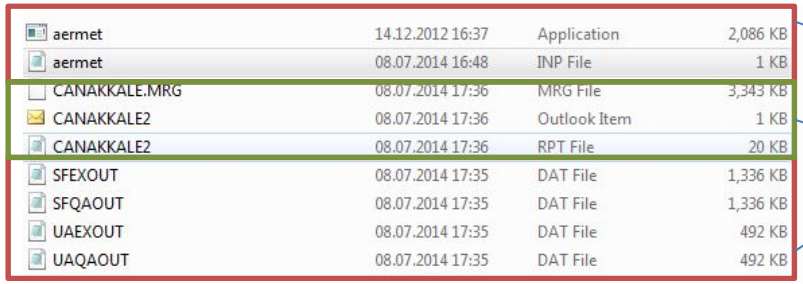


STAGE 1 → **STAGE 2** → **STAGE 3**

Stage-1: Verilerin kalite kontrolünün gerçekleştirildiği adımdır.



Stage-2: Kalite kontrolden geçen yer seviyesi ve üst katman meteoroloji verileri 24 saatlik blok şeklinde birleştirilir.



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aermet	08.07.2014 16:48	INP File	1 KB
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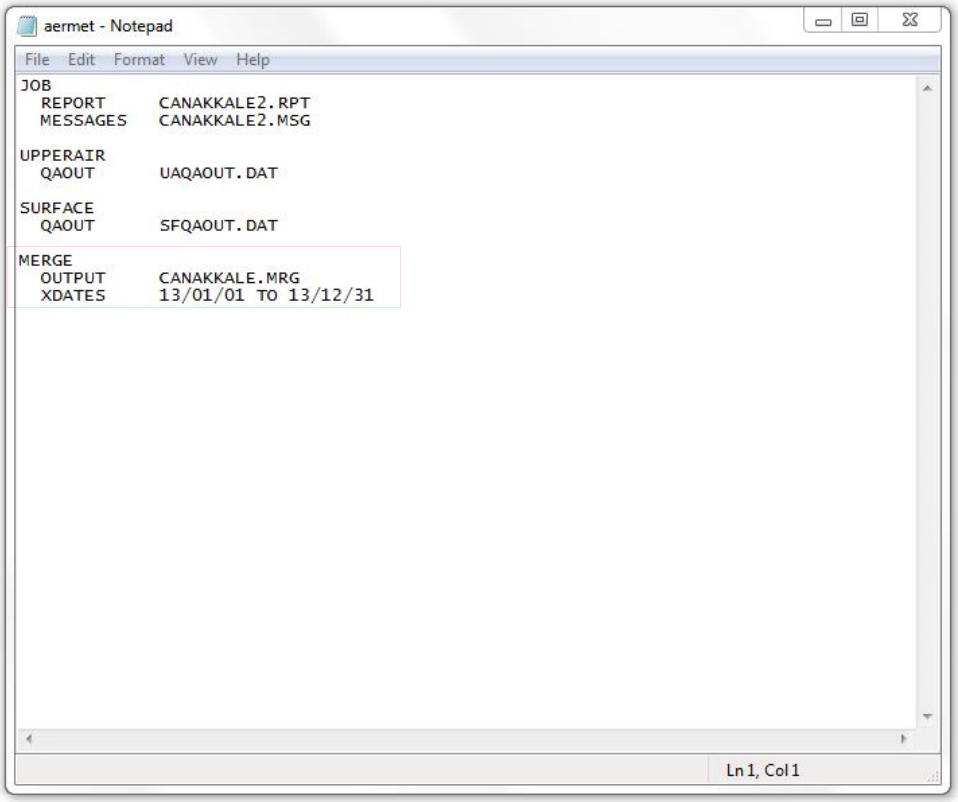
CANAKKALE2	08.07.2014 17:36	Outlook Item	1 KB
CANAKKALE2	08.07.2014 17:36	RPT File	20 KB
SFEXOUT	08.07.2014 17:35	DAT File	1,336 KB
SFQAOUT	08.07.2014 17:35	DAT File	1,336 KB
UAEXOUT	08.07.2014 17:35	DAT File	492 KB
UAQAOUT	08.07.2014 17:35	DAT File	492 KB

Girdi dosyaları

Çıktı dosyaları



aermet - Notepad

File Edit Format View Help

```
JOB
  REPORT      CANAKKALE2.RPT
  MESSAGES    CANAKKALE2.MSG

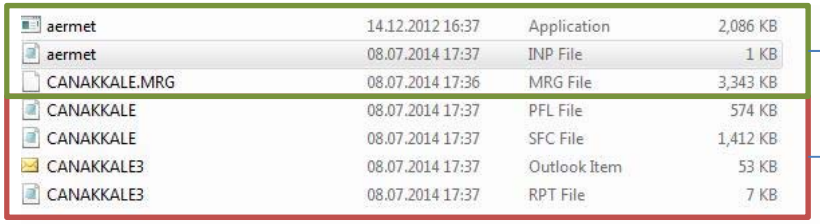
UPPERAIR
  QAOUT       UAQAOUT.DAT

SURFACE
  QAOUT       SFQAOUT.DAT

MERGE
  OUTPUT      CANAKKALE.MRG
  XDATES      13/01/01 TO 13/12/31
```

Ln 1, Col 1

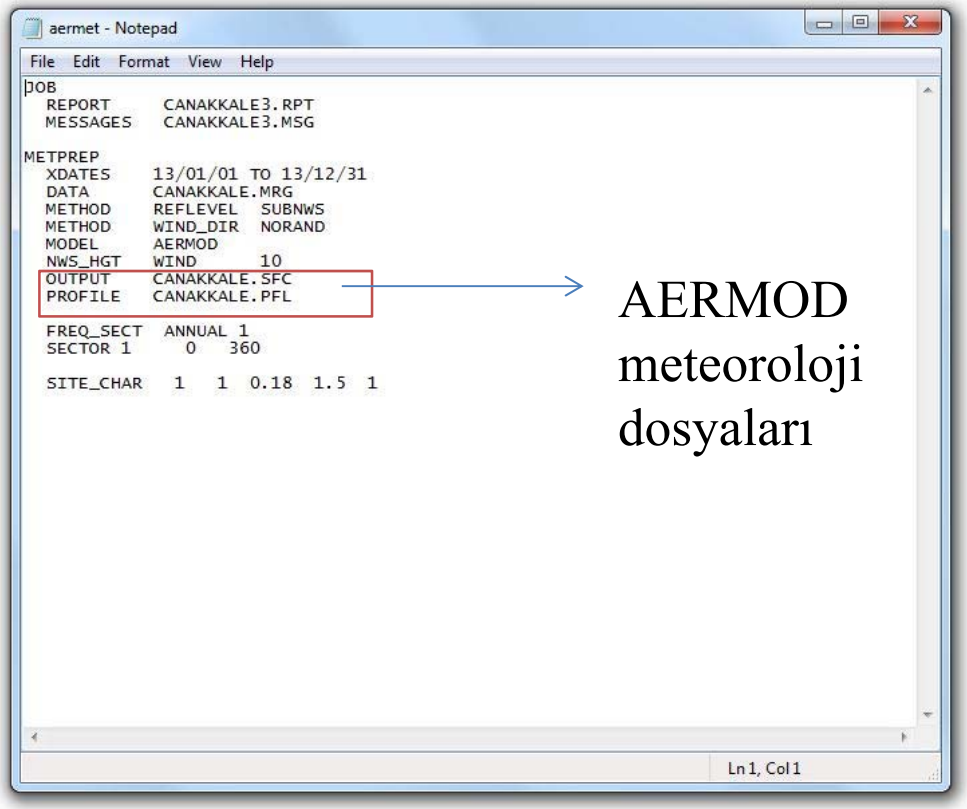
Stage-3: Birleştirilen meteoroloji verileri AERMOD için iki ayrı veri dosyasına dönüştürülür.



aermet	14.12.2012 16:37	Application	2,086 KB
aermet	08.07.2014 17:37	INP File	1 KB
CANAKKALE.MRG	08.07.2014 17:36	MRG File	3,343 KB
CANAKKALE	08.07.2014 17:37	PFL File	574 KB
CANAKKALE	08.07.2014 17:37	SFC File	1,412 KB
CANAKKALE3	08.07.2014 17:37	Outlook Item	53 KB
CANAKKALE3	08.07.2014 17:37	RPT File	7 KB

Girdi dosyaları

Çıktı dosyaları



AERMOD meteoroloji dosyaları

AERMAP

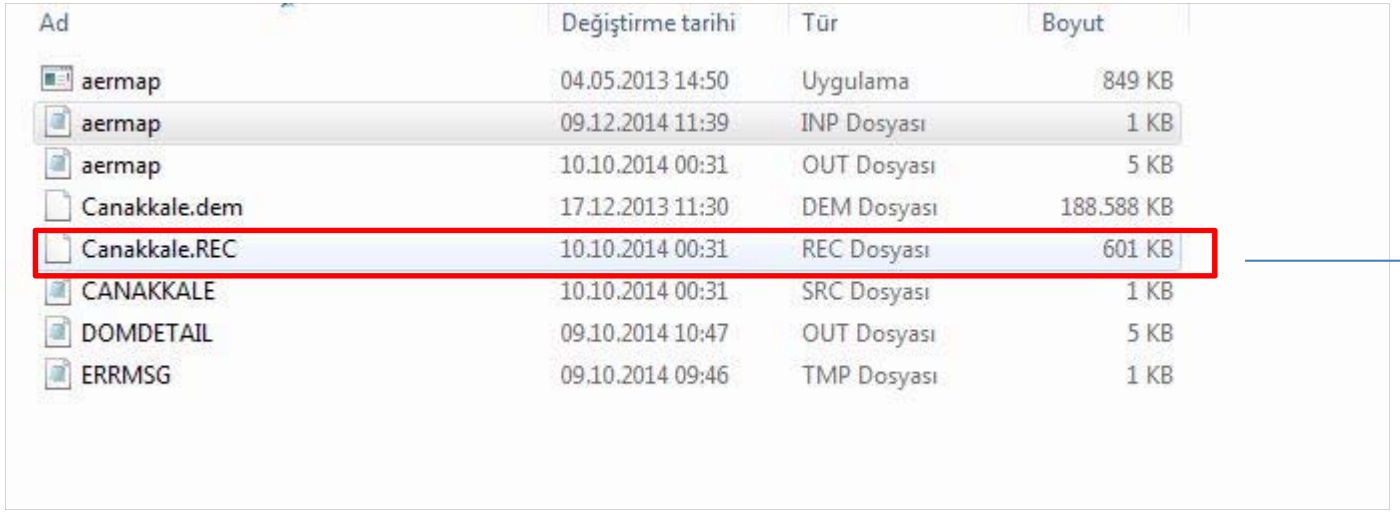
- AERMOD modelinin topoğrafik ön işlemcisidir.

- Gridlere böldüğümüz çalışma alanımızın her bir grid noktasındaki yükselti değerlerini hesaplamak için kullanılır.

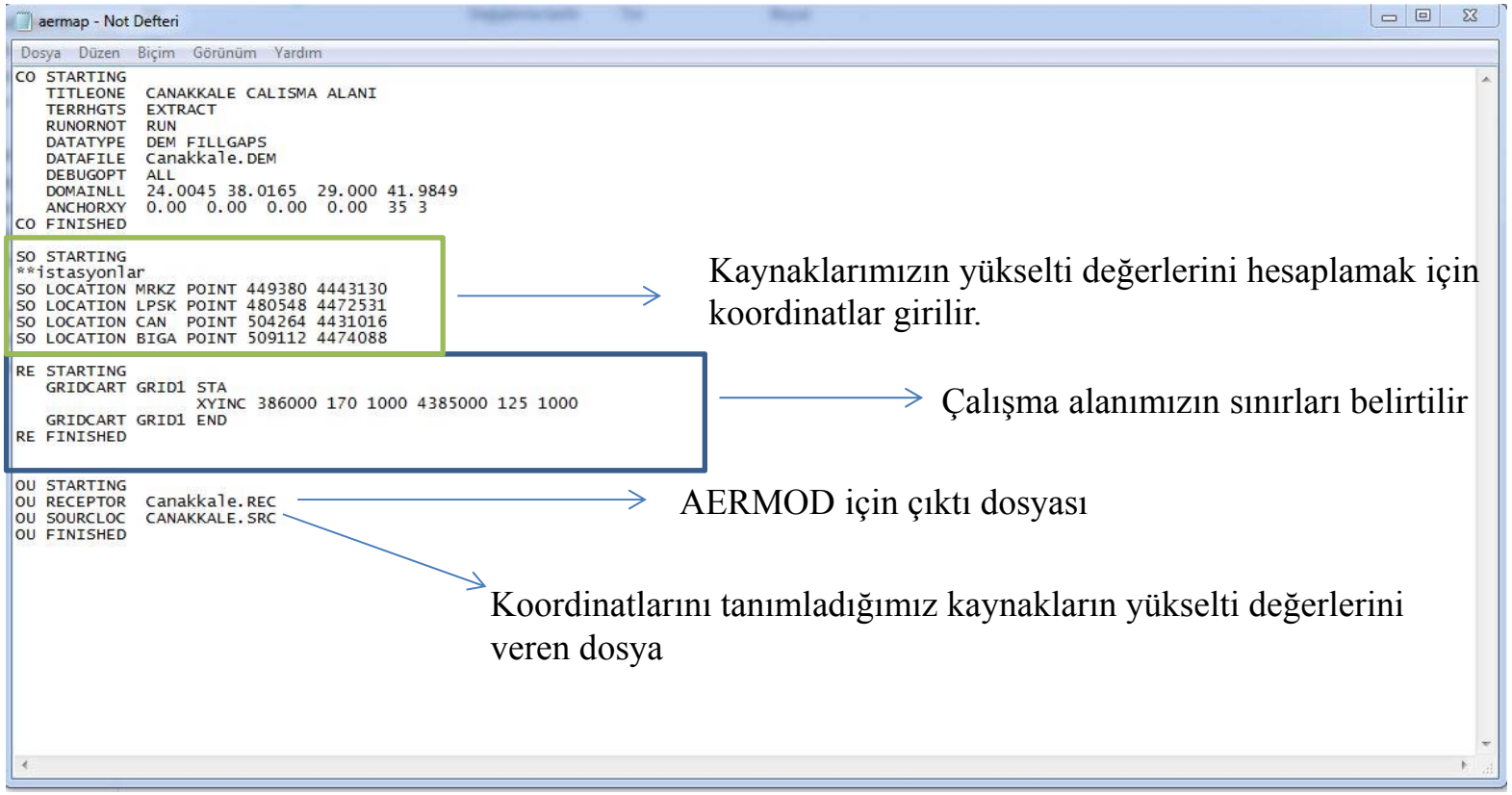
- AERMAP ön işlemcisinin çalıştırılması için 3 farklı temel dosyaya ihtiyaç duyulur:
  - Aermap uygulama programı (aermap.exe)
  - AERMAP için hazırlanmış bir adet veri dosyası (aermap.inp)
  - Çalışma alanımızın topografyasını içeren bir adet DEM (Digital Elevation Model) dosyası

AERMAP için veri dosyası hazırlarken veri dosyamız 3 temel bölümden oluşur. Kaynak bilgileri bölümü opsiyoneldir:

- CO Bölümü (Kontrol Seçenekleri)
- **SO Bölümü (Kaynak Bilgileri) (Opsiyonel)**
- RE Bölümü (Çalışma alanı Bilgileri)
- OU Bölümü (Çıktı Seçenekleri)



AERMOD topoğrafya dosyası

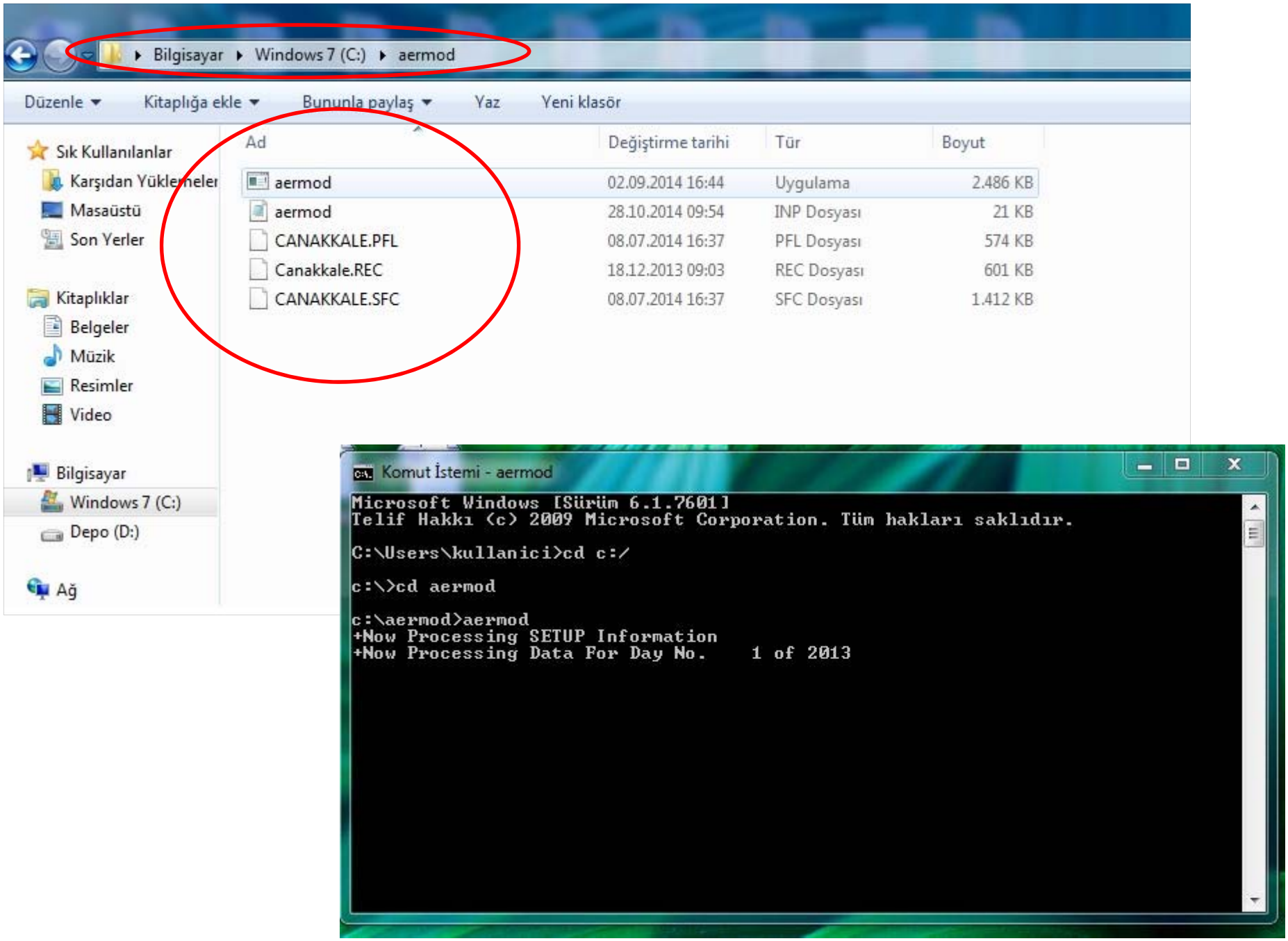


Kaynaklarımızın yükselti değerlerini hesaplamak için koordinatlar girilir.

Çalışma alanımızın sınırları belirtilir

AERMOD için çıktı dosyası

Koordinatlarını tanımladığımız kaynakların yükselti değerlerini veren dosya


Bilgisayar ▸ Windows 7 (C:) ▸ aermod
Düzenle
Kitaplığa ekle
Bununla paylaş
Yaz
Yeni klasör
Sık Kullanılanlar
Karşıdan Yüklemeler
Masaüstü
Son Yerler
Kitaplıklar
Belgeler
Müzik
Resimler
Video
Bilgisayar
Windows 7 (C:)
Depo (D:)
Ağ
Ad
Değiştirme tarihi
Tür
Boyut
aermod 02.09.2014 16:44 Uygulama 2.486 KB
aermod 28.10.2014 09:54 INP Dosyası 21 KB
CANAKKALE.PFL 08.07.2014 16:37 PFL Dosyası 574 KB
Canakkale.REC 18.12.2013 09:03 REC Dosyası 601 KB
CANAKKALE.SFC 08.07.2014 16:37 SFC Dosyası 1.412 KB
Komut İstemi - aermod
Microsoft Windows [Sürüm 6.1.7601]
Telif Hakkı (c) 2009 Microsoft Corporation. Tüm hakları saklıdır.
C:\Users\kullanici>cd c:/
c:\>cd aermod
c:\aermod>aermod
+Now Processing SETUP Information
+Now Processing Data For Day No. 1 of 2013