

# EOSPEC-LIB: a model library complementary to MODTRAN5.3

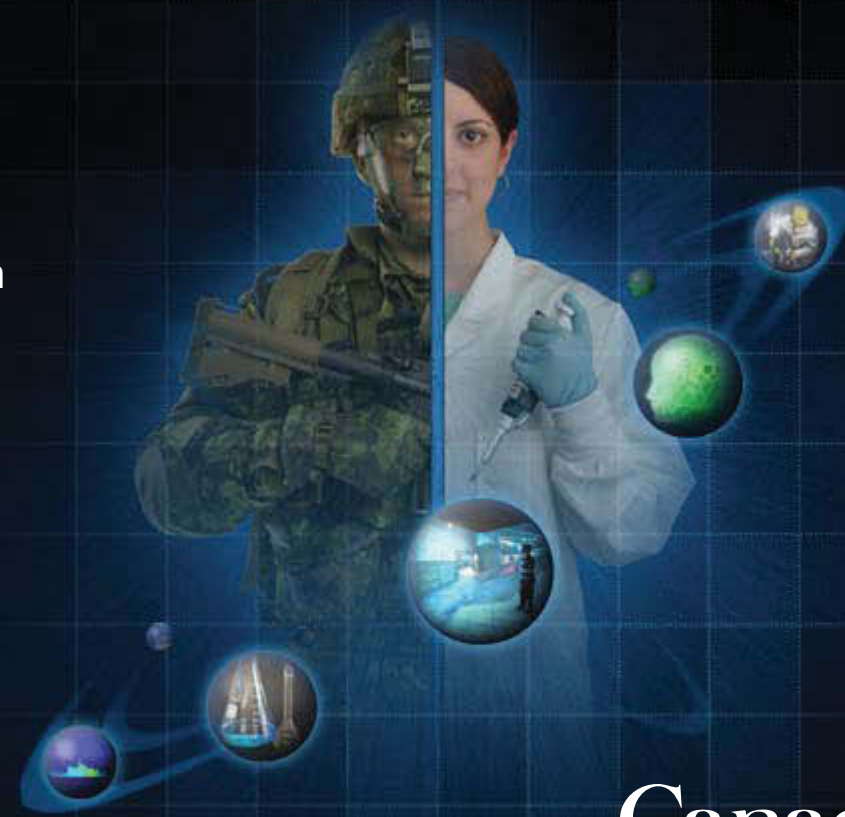
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\* with AEREX Avionic Inc

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33rd Review of Atmospheric Transmission  
Models Meeting

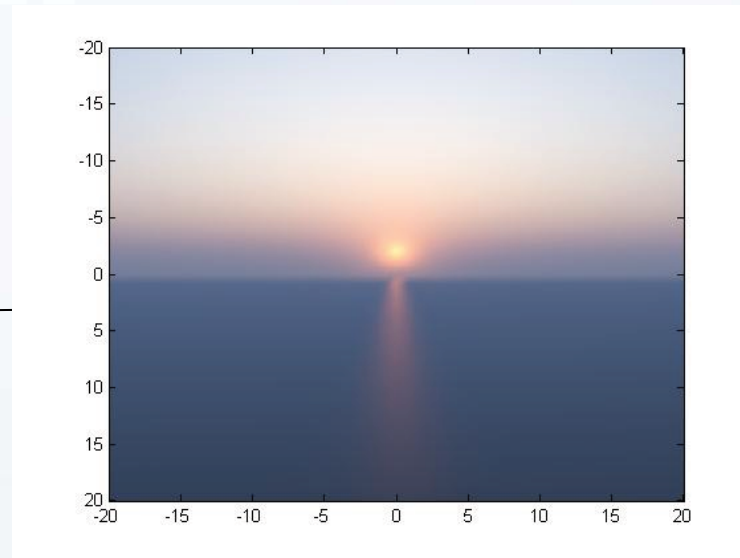
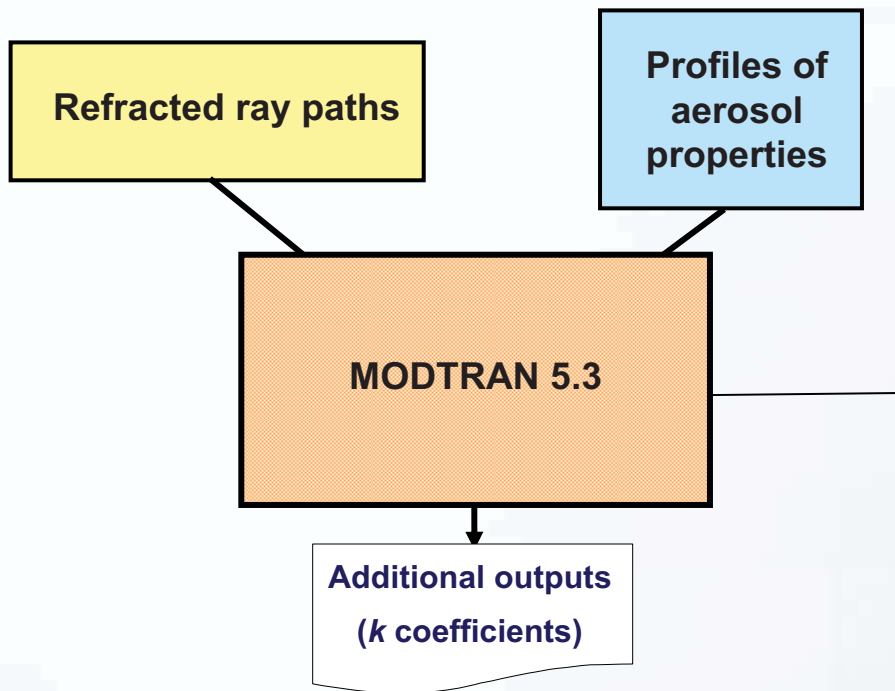
June 2011



# Outline

- MODTRAN 5.3 new capability
- EOSPEC-LIB: purpose & structure
- Modules description
- Demo

# MODTRAN 5.1 → MODTRAN 5.3



# EOSPEC Library of functions

## Environmental characterization


















- Surface Layer Micro-Meteorology
- Thermodynamic Profiles
- Refractivity Profiles
- Aerosol Profiles
- $C_n^2$  Profiles



## Propagation

- Ray-tracing / refraction effects
- MODTRAN Driver
- Wideband-CK RT library: **SMART(I)**
- Turbulence effects (statistical quantities)

# EOSPEC Library of functions

- [-]  EOSPECS\_Nov2010
  - [+]  .svn
  -  bin
  - [+]  build
  - [+]  data
  - [+]  demos
  - [+]  doc
  - [-]  examples
    - [+]  .svn
    - [+]  module
    - [+]  utilities
  -  external
  - [+]  include
  -  lib
  - [+]  src
  - [+]  tmp
  - [+]  WandV

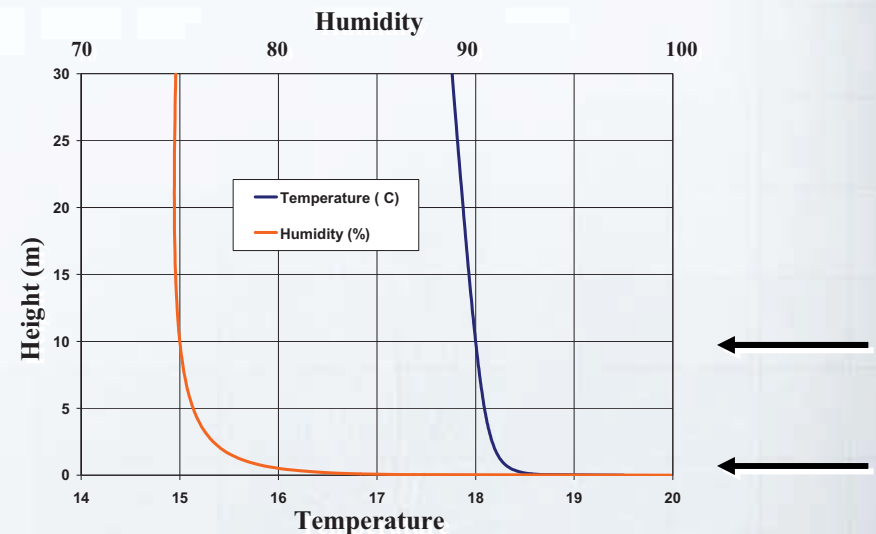
## Features

- **C++ Library**
- **Presented as *.h* files, *.dll* and driver program examples**
- **Obeys standards of development and programming**
- **Technical documentation and user-guides**
- **High-language portability (Java, python, ...)**

# Atmospheric profiles

## 1- Surface layer modeling

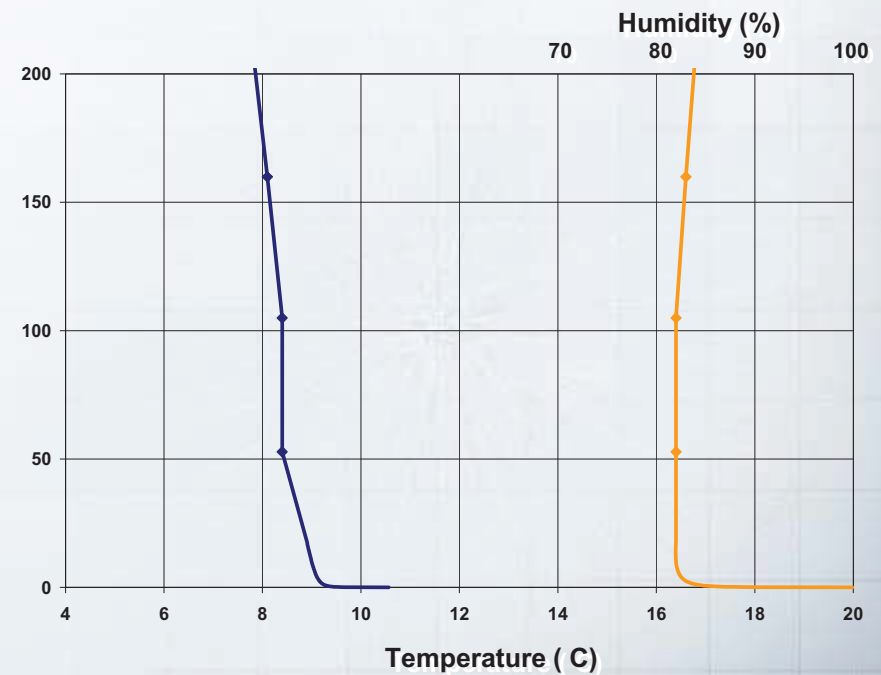
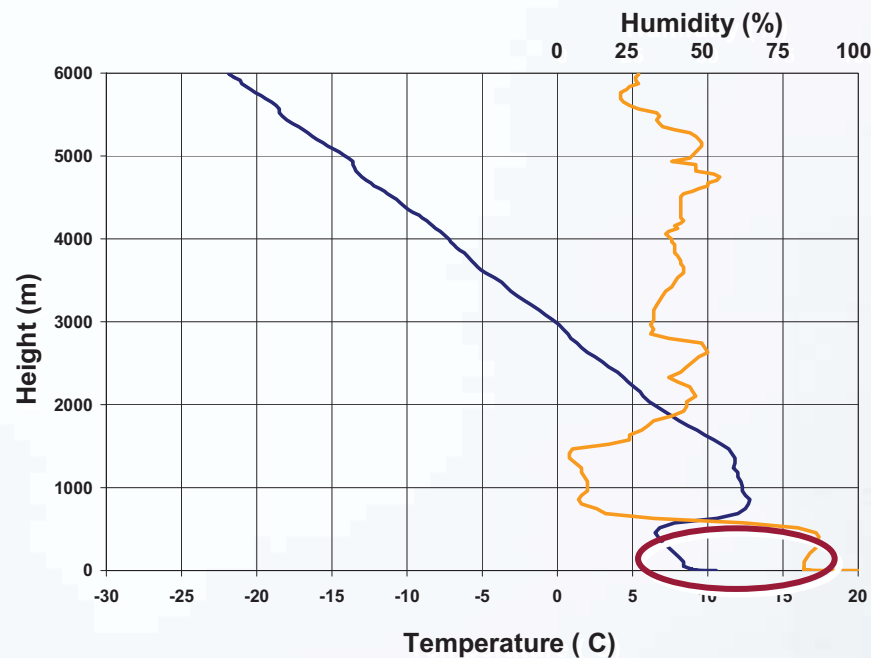
- ❖ Monin-Obukhov similarity theory
- ❖ Marine and land
- ❖ Valid up to 30 m roughly



# Atmospheric profiles

## 2- Surface + upper-layer modeling

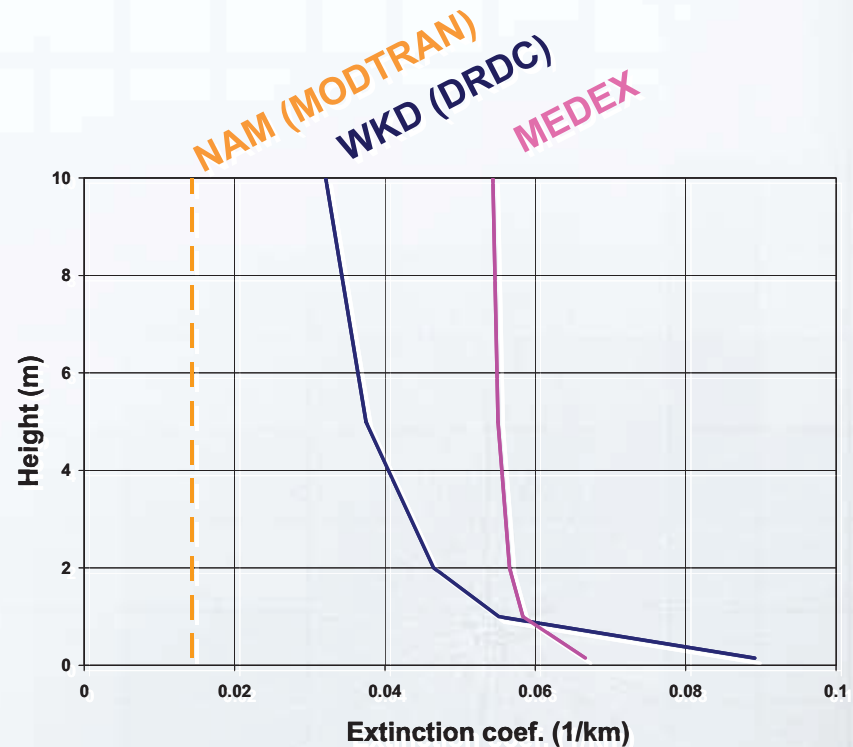
- ❖ MODTRAN standard profiles
- ❖ Radio-sonde profiles (incl. TEMP)
- ❖ Modeled profiles (GEM)



# Aerosol profiles (maritime)

## 1- Surface layer modeling

- ❖ Surface to 10 m
- ❖ Selection of models:
  - NAM
  - WKD (DRDC)
  - MEDEX
  - ...

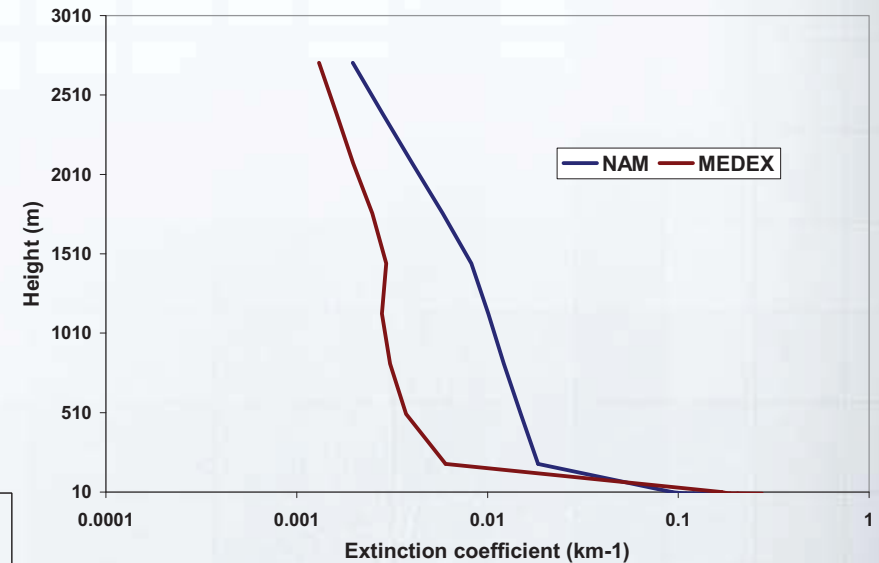
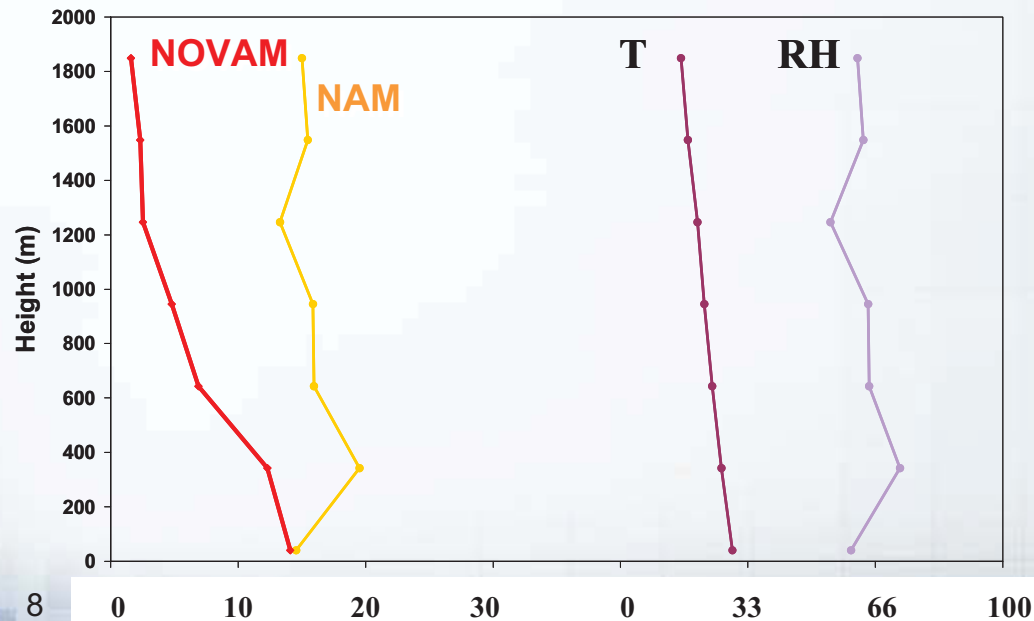




# Aerosol profiles (maritime)

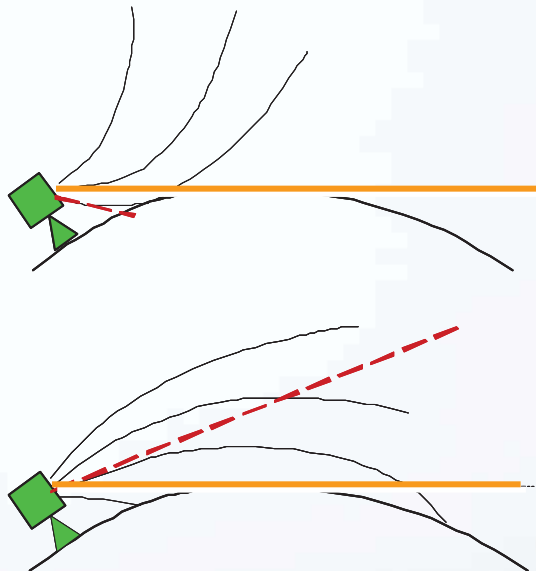
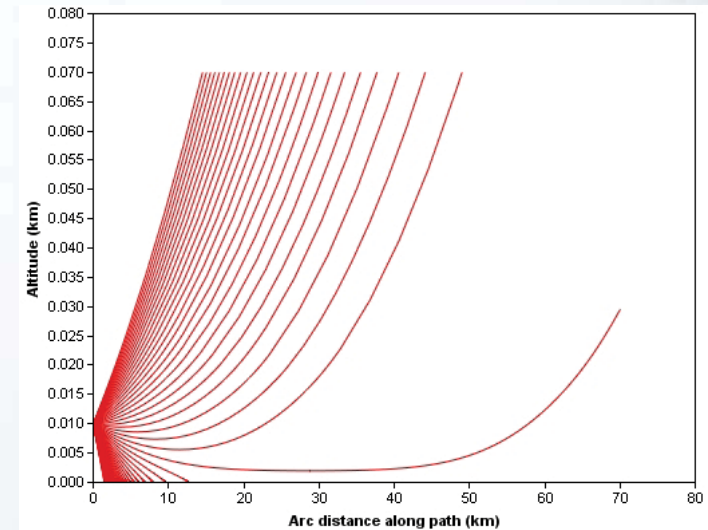
## 2- Surface + upper-layer modeling

- ❖ In-depth revision of NOVAM
- ❖ Provide Phase functions
- ❖ Coupled with surface aerosol model



# Refracted raypaths

- ❖ Fast ray-tracing
- ❖ To account for sub- and super-refraction
- ❖ Provide the elevation-viewing angle distortion function (refraction gain or *refractance*)



Neutral condition



Unstable condition

# DEMO ...

**DEFENCE**



**DÉFENSE**