

Vertical distribution of clouds and aerosols over the eastern Mediterranean basin based on CALIPSO data



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1. Introduction

Clouds and aerosols are among the primary determinants of the Earth-atmosphere system through their radiative effects.

Aerosols scatter and absorb sunlight (**direct effect**). This induces changes to temperature profile, which can cause changes to microphysical structure of clouds (**semi-direct effect**). Furthermore, aerosols work as cloud condensation nuclei (CCN), hence any significant change of their number could alter the cloud droplet number concentration, cloud droplet size and eventually cloud precipitation efficiency (**indirect effect**).

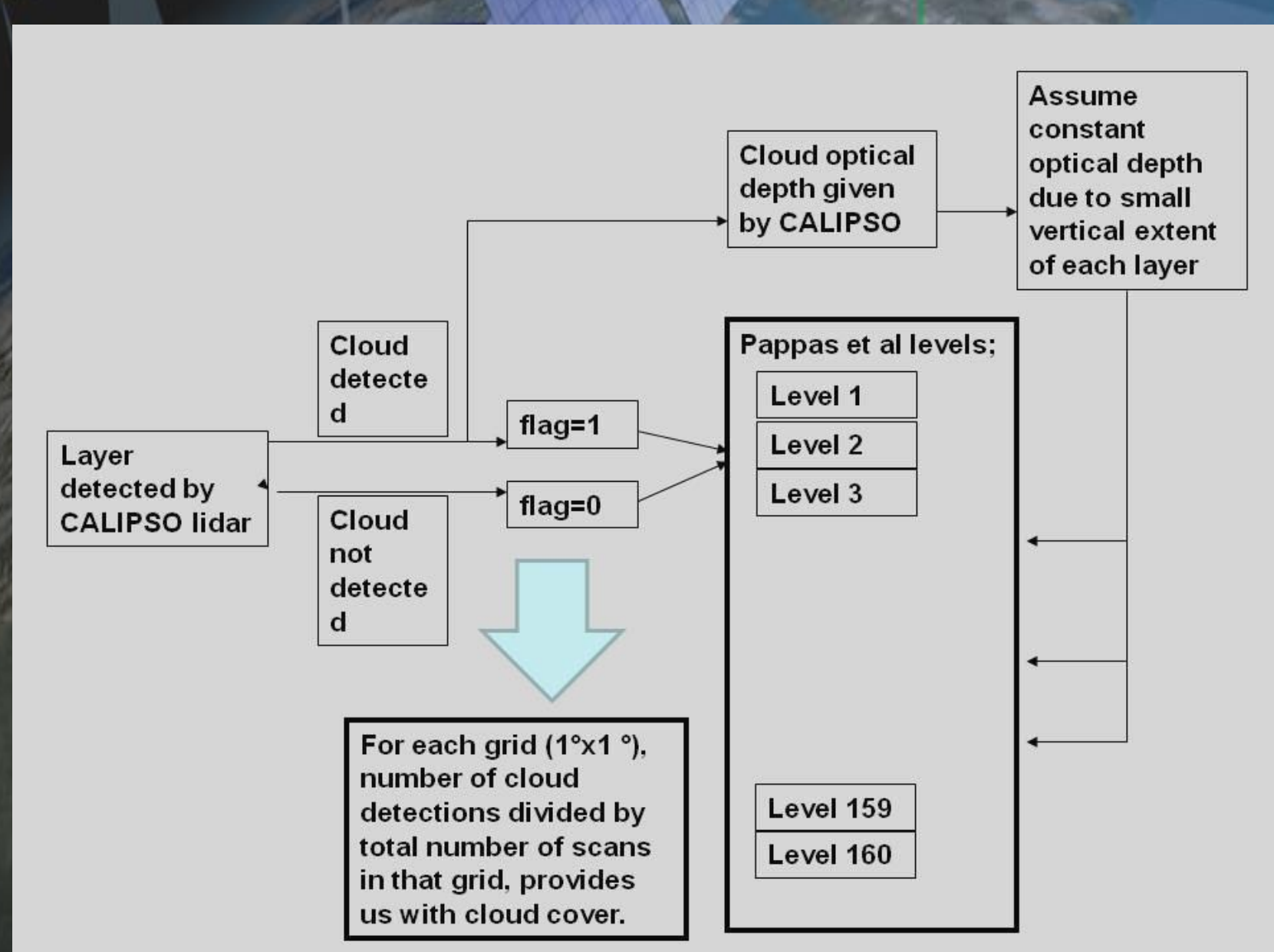
Clouds also absorb, scatter and reflect radiation. These effects are highly dependent on the altitude (low, middle, high, deep convective) and type of clouds (cloud optical depth).

2. Area of study (30 -41 N, 19 -37 E)

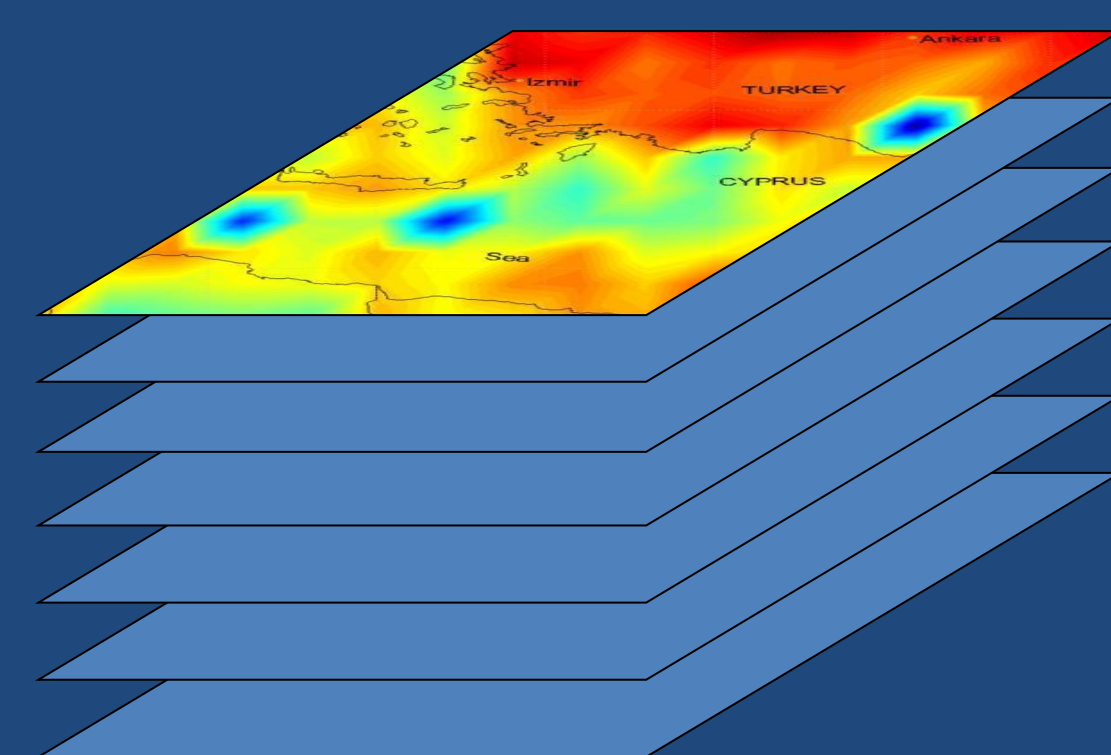
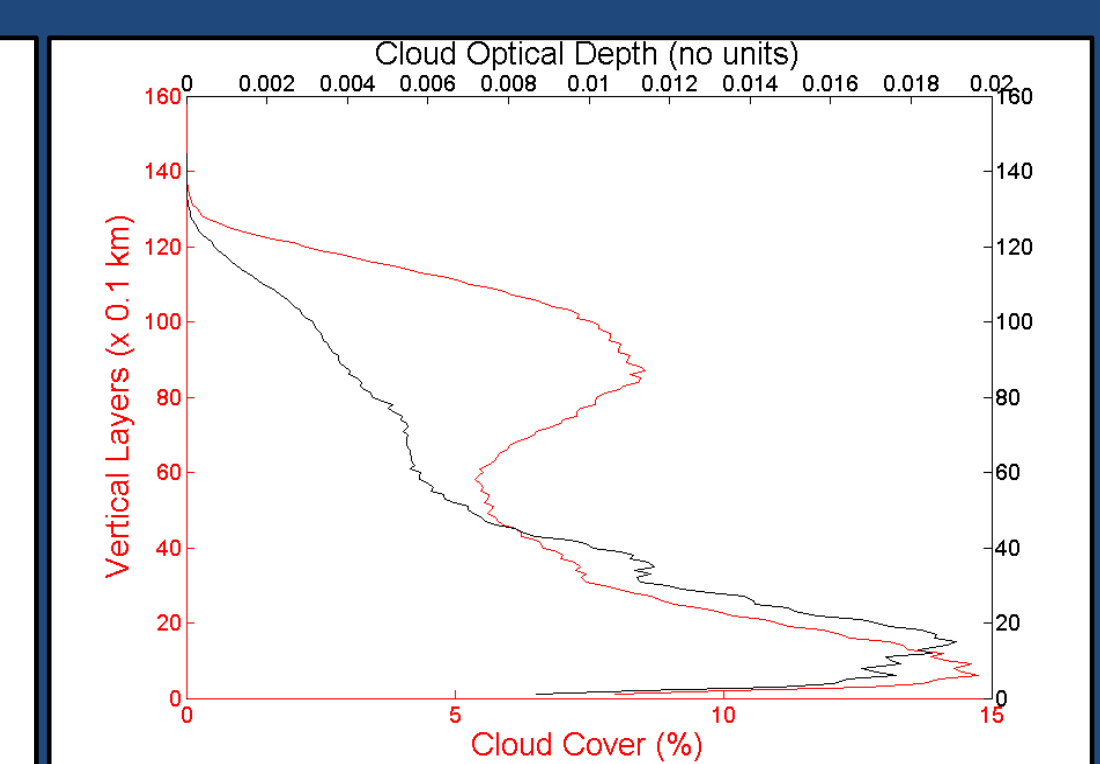
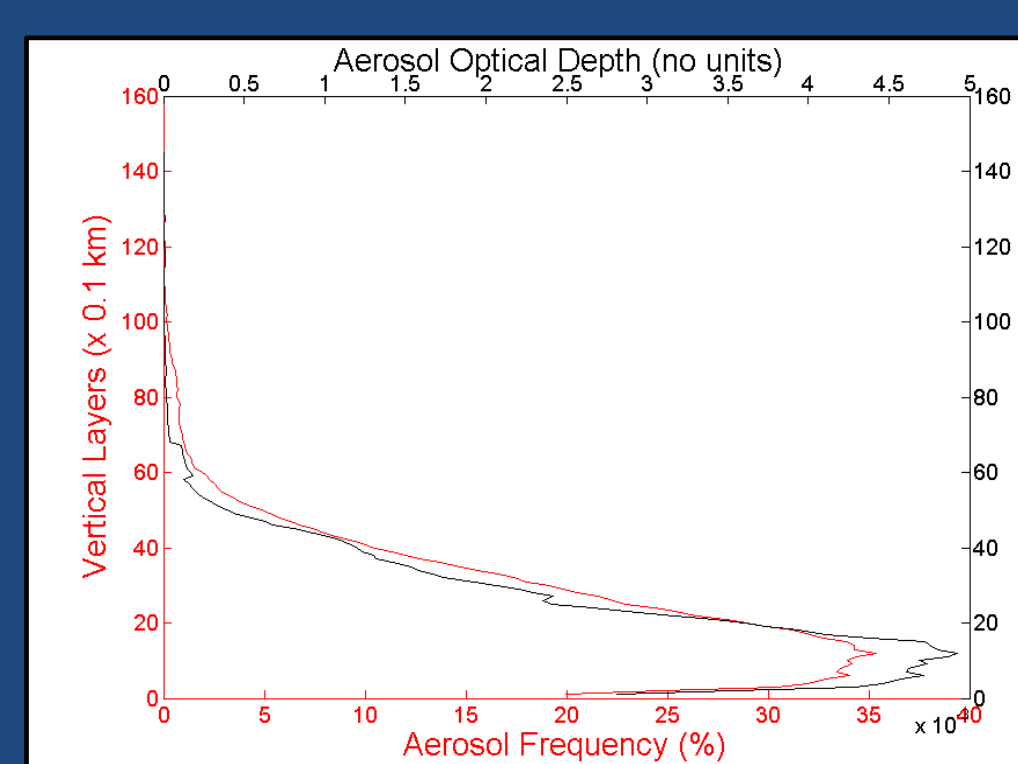
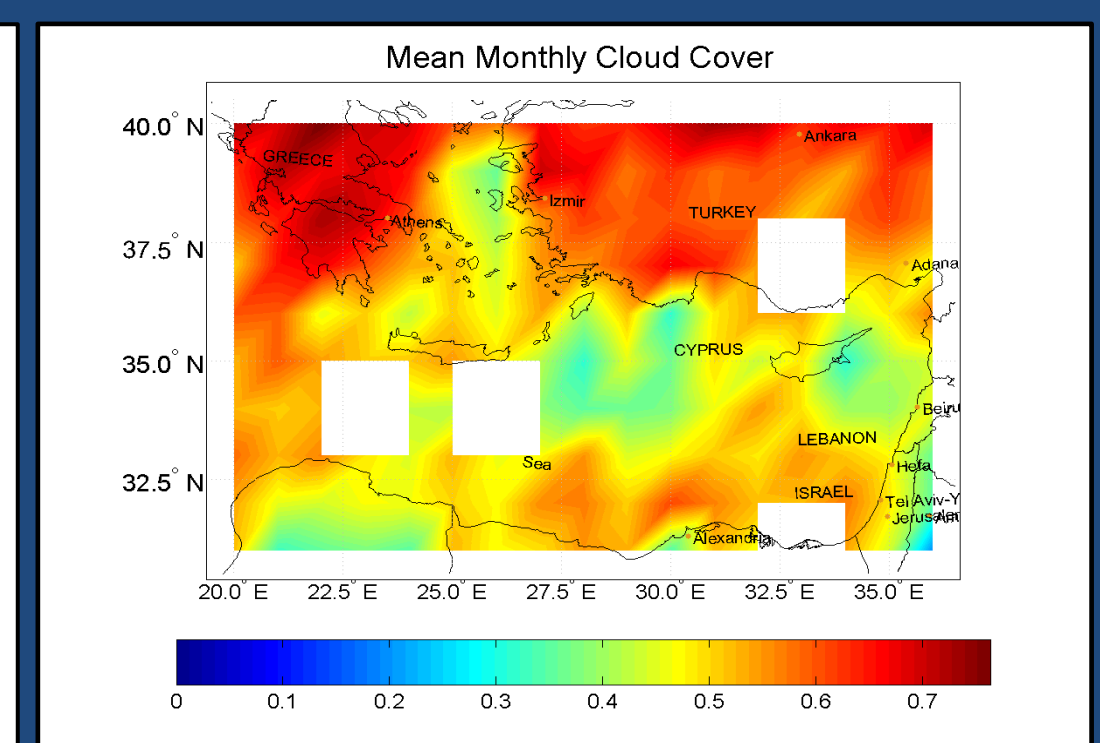
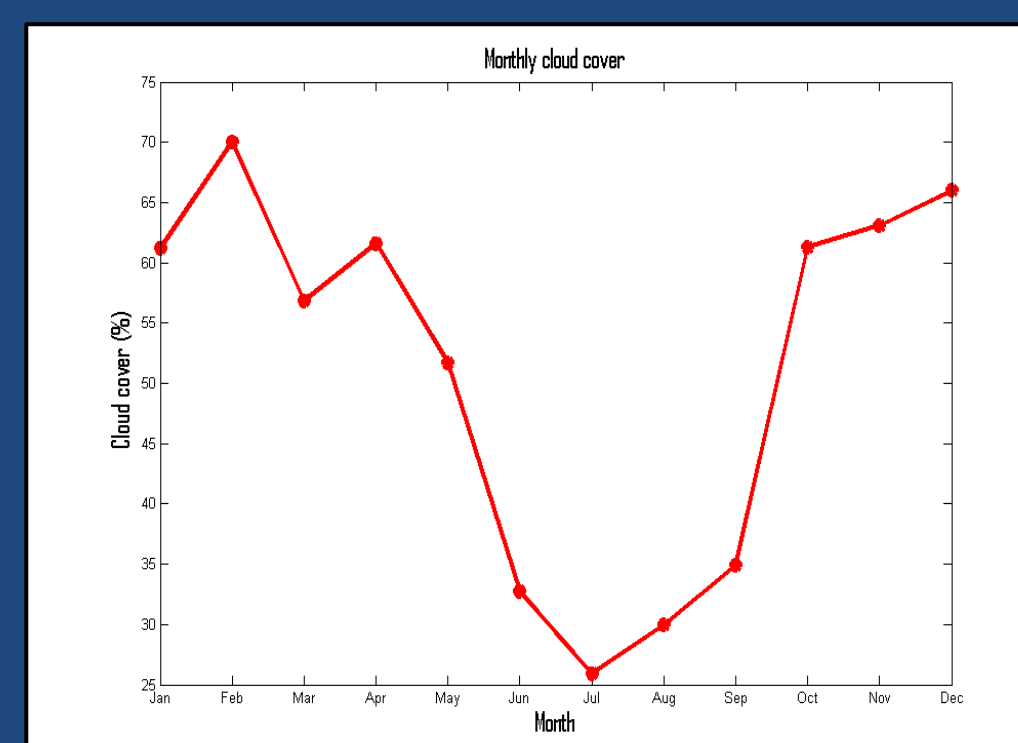


3. Data processing

This study uses cloud and aerosol altitude and optical depth data from CALIPSO Level 2-V2 to investigate their vertical distribution over the eastern Mediterranean basin. All information has been classified into 160 vertical layers of 100 m thickness each. The great advantage of using satellite data is that aerosols above and within clouds are detected more accurately.



4. Initial results



5. Things to be done in the future

- Cloud cover, cloud optical depth, aerosol optical depth will be implemented in a spectral radiation transfer model.
- Surface maps of Direct Radiation Effect will be produced for different layers. Their inter-comparison will be an indication of the interaction of clouds, aerosols and radiation at any height within the atmosphere.
- Comparison with other datasets providing vertical information on cloud and aerosol, such as ISCCP and AEROCOM.
- It is expected that the improved estimation of the above parameters will further improve calculations of the radiation field.
- The implementation and use of larger datasets will hopefully improve even more our understanding of the interaction between clouds, aerosols and radiation.

Acknowledgements

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