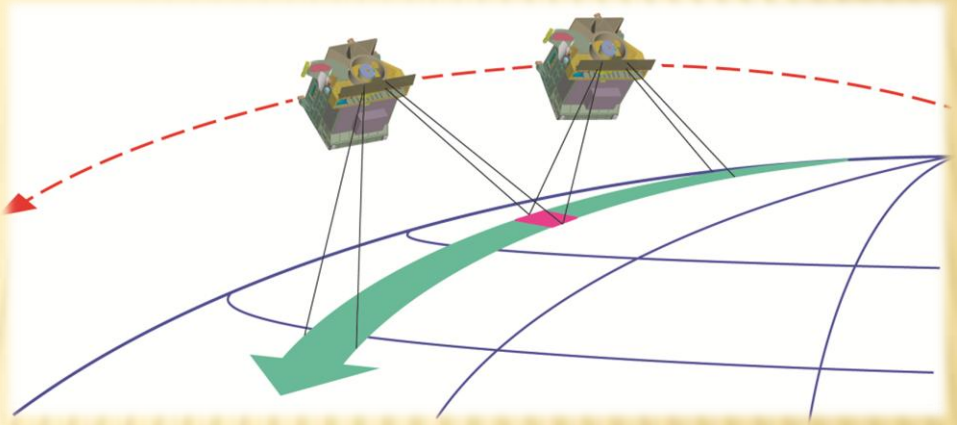
Satellite remote sensing of aerosols in the Earth atmosphere



IAA Study Group 1.9, of 3 March 2014

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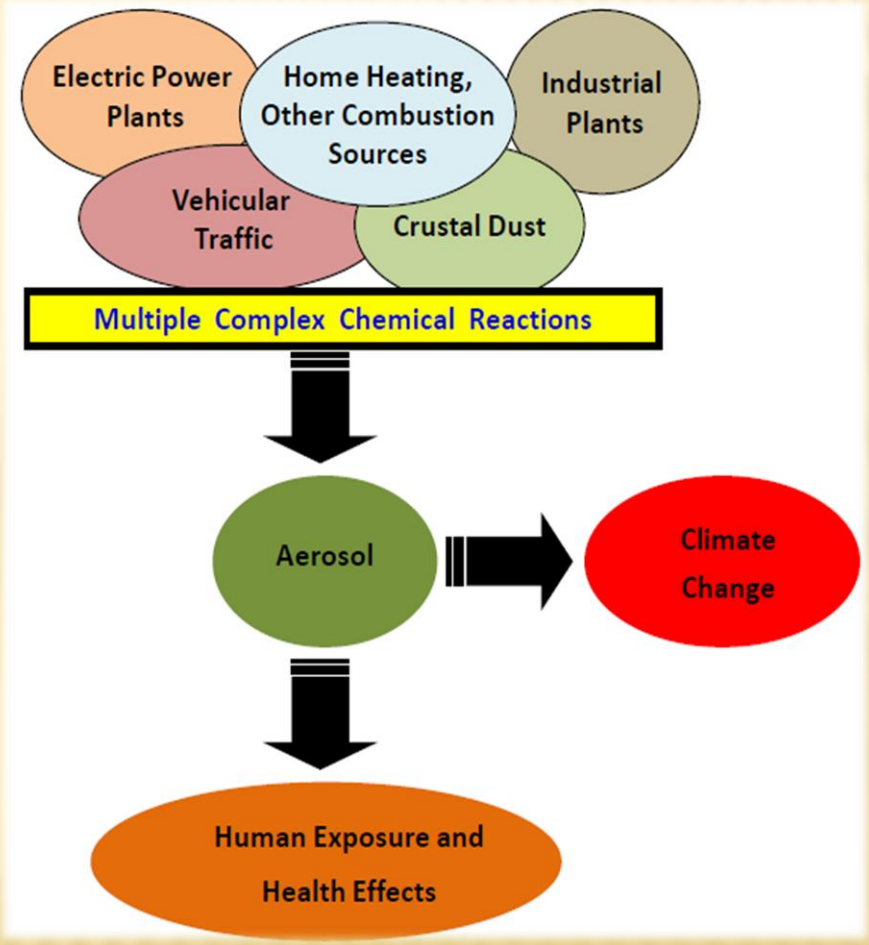
GOALS OF INVESTIGATION

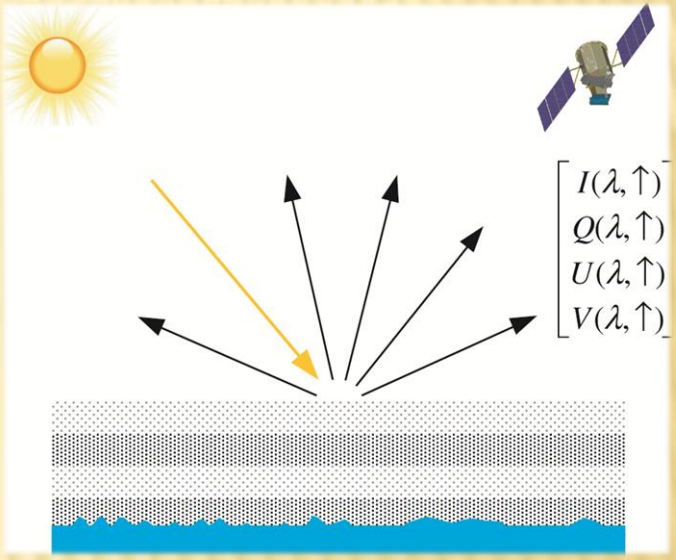
- The polarymetry satellite remote sensing purpose and place in the investigation of temporal and spatial distribution of physical parameters of troposphere and stratosphere aerosol and cloud particles in the Earth atmosphere.
- Precise quantitative determination of aerosol input to the Earth climate system energy balance.
- Determination of antropogeneous aerosol impact on Earth climate change and ecology.



CONCEPT OF MEASUREMENTS

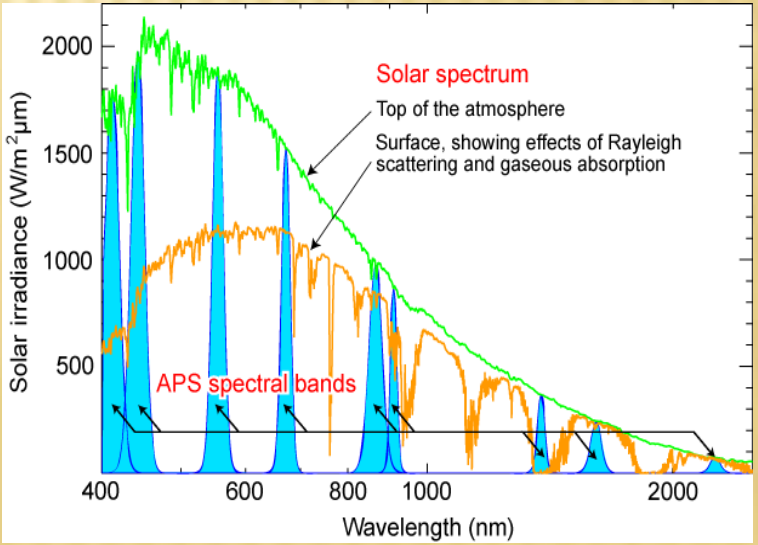
- The aerosol remote sensing concept is based on precise orbital measurements of the intensity and polarization of sunlight scattered by the atmosphere and the surface.
- Capabilities of passive aerosol remote sensing techniques can be classified by:

1. Spectral range: 370, 410, 555, 865, 1378, 1610 nm
2. Scattering geometry range (±60° limb)
3. Number of Stokes parameters (*I, Q, U*)



The measurement approach is to use multi-angle multi-spectral polarimetric measurements because:

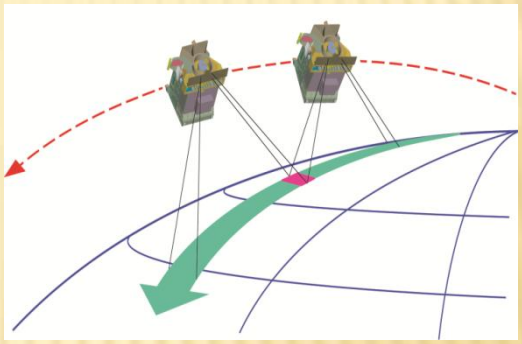
- Polarization is a relative measurement that can be made extremely accurately.
- The variation of polarization with scattering angle and wavelength allows aerosol particle size, refractive index and shape to be determined.

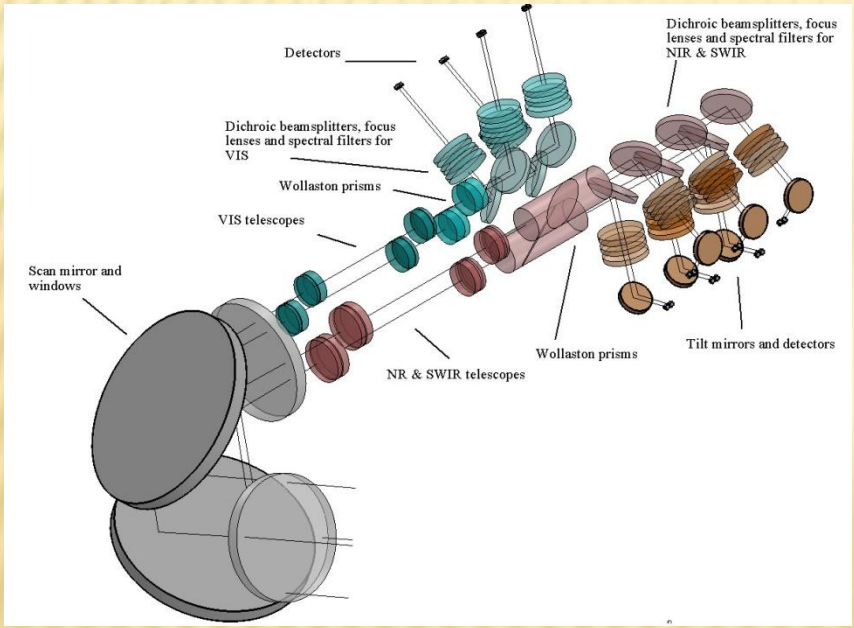


- Methodological development and new generation algorithms are now available to fully take advantage of more constraining observations (Mishchenko et al. 2011, Kokhanovsky et al., 2010; Dubovik et al., 2011; Hasekamp et al., 2011)

Main instrument for mission –Scanning polarimeter “ScanPol”

Quasi-continuous scanning along the ground track will yield >100 different angular views of each terrestrial scene





End to end optical path of optical and detectors unit

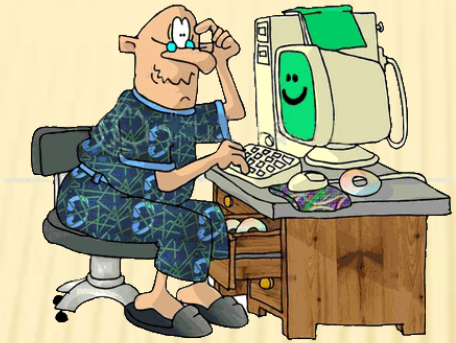
Current status of the instrument development

Laboratory sample of the scanning mirrors unit

PROCESSING AND STORING DATA CENTER CONCEPT

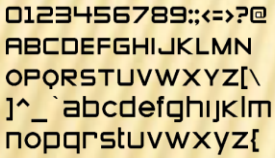
Scientific measurements

http://aerosol-ua.mao.kiev.ua/index.php/en/



Web-service

A user got the scientific information in a friendly format



Data

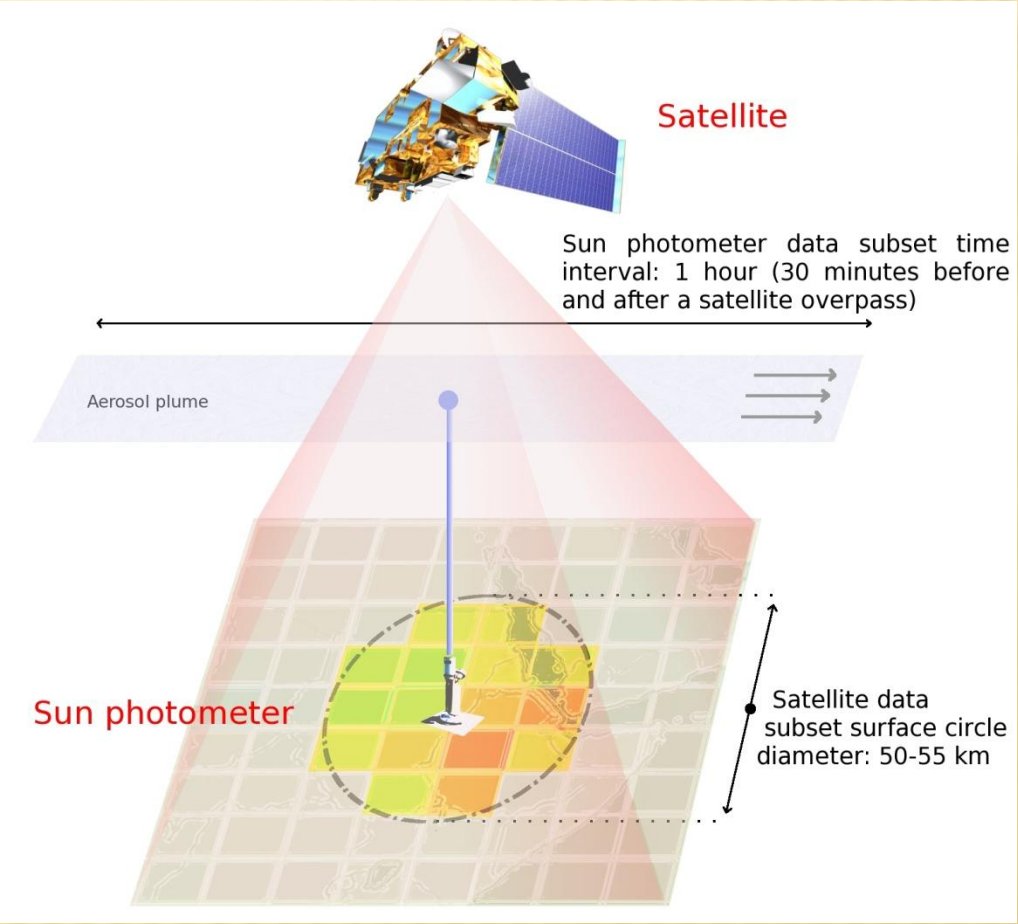
Storage

Instrumentation

GROUND-BASED VALIDATION

Data analysis of ground-based and satellite measurements allows to obtain estimation of aerosol physical parameters, perform validation and calibration the parameters obtained by satellite instrument

Concept of technique: the simultaneous or quasi-simultaneous comparison of aerosol parameters obtained by satellite instrument and ground-based sunphotometers from AERONET network (Holben et al., 1998).



WEBSITE ON DEVELOPMENT

http://aerosol-ua.mao.kiev.ua/index.php/en/