user requirements

for ESA's aerosol climate change initiative (CCI)

we seek your opinion !

are we asking the right things to do ?

what is ESA doing ?

- **ESA is seeking to intensify the use of their sensor data for climate applications**
  - **(ca. 50 Million Euro over 2-times 3-year-periods)**

- **11 ECVs (Essential Climate Variables) were picked for the initial 3 years (... based on where available but poorly mined ESA polar-orbit sensor data right may make a difference)**
  - **atmosphere: OZONE, CLOUD and AEROSOL**
    - **other important ones to be considered later**

project structure

- **12 subgroups**
  - **11 ECV climate change initiatives**
    - **(1) sea surface temperature, (2) ocean color, (3) sea level, (4) sea-ice, (5) clouds, (6) ozone, (7) greenhouse gases, (8) aerosol, (9) glaciers and ice caps, (10) land cover, (11) fire**
    - **aerosol: co-lead by T. Holzer-Popp and G. de Leeuw**
    - **cloud: lead by R.Hollmann**
  - **1 CMUG (Climate Modeling User Group) super-group (of major climate center members) is tasked to assure consistency among the initiatives and to help define & express user needs … YOUR NEEDS**

common user needs

- **error estimates**
  - **uncertainty ranges rather than averages**
  - **uncertainty to be traceable to individual sample and retrieval aspects for each derived properties**
- **different data needs in climate modeling**
  - **global trends**
  - **process studies (e.g. needed links to other CCI)**
- **accuracy and spatial resolution depend on app**

desired products

- **aerosol optical depths (AOD) at 550nm**
  - **if possible AOD as function of altitude**
    - **PBL, low mid hi cloud regime, stratsophere**
    - **frequency of aerosol above clouds**
- **(3+) more AODs at other solar wavelengths**
  - **size info (Angstrom / fine mode fraction)**
- **aerosol single scattering albedo**
  - **absorption info**
  - **via aerosol compositional information ?**

aerosol app 1 - global trends

- **establish long-term time-series for global maps on aerosol optical properties with associated uncertainties**
  - **allow sensor combinations by unifying aerosol model choices, surface reflectance & cloud screen**
- **seek context to products of other CCIs**
  - **assure the use of consistent ancillary data and procedures (e.g. cloud screen)**
  - **special aerosol CCI links to cloud CCI**
    - **properties as a function of distance to clouds**
    - **properties of near-by clouds**

aerosol app 2 - processes

- **establish observational capabilities for high temporal and spatial resolution data to address process understanding in global modeling involving short term processes**
  - **wild-fires, cloud, ….**
  - **polar-orbitors will have difficulties to address temporal detail**
  - **needs to be fine-tuned with activities by other CCIs**

coverage

- **for ESA's polar orb. sensors (AATSR/MERIS/OMI)**
- **spatial req: global and with sufficient coverage**
  - **>70% of cloud-free … as modeling requires globally and complete maps to compare**
- **temporal requirements**
  - **10 years are a start to address trends and variability**
    - **suggested period 2002 to 2011, to allow coincidences with NASA-EOS AQUA and TERRA data**
  - **5 priority years for links to other ECVs, esp. clouds**
    - **minimum period 2007 to 2011… to allow connections to active remote sensing by CALIOPE and CloudSat**

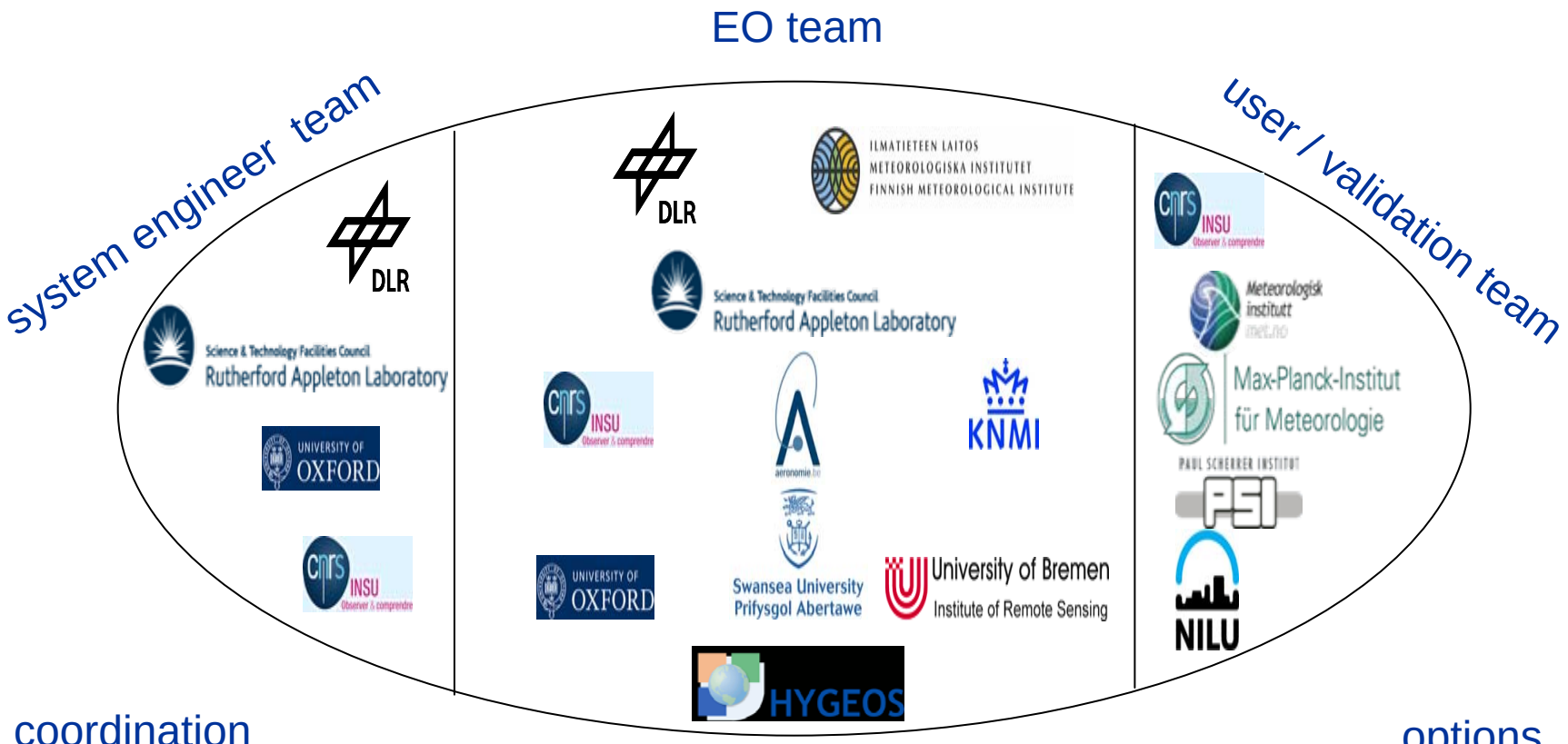
uncertainties

- distinguish: accuracy, precision and stability
- quantify instrumental and level_1 errors
  - give confidence levels
- illustrate error sources by harmonizing
  - aerosol model
  - surface characterization
  - and cloud mask

validation

- **provide overall errors (all error sources)**
  - **global uncertainty maps for all aerosol products**
  - **define / average errors to user resolution**
- **demonstrate capabilities**
  - **versus sun-photometry (e.g. AERONET) accurate?**
  - **versus clear-sky fluxes (e.g. BSRN) consistent?**
- **make recommendations on data use**
  - **location and times of preferred application**

the aerosol CCI-team



coordination

DLR

ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE

options

Freie Universität Berlin

building on the past

- **pre-cursor algorithms**
  - **ORAC (Ral/Oxfor), ADV / ASV (FMI), dual view (Swansea) .... all ATSR**
  - **BAER, ESA standard MERIS, PARASOL (LOA), SYNAER (DLR)**
  - **AAI (KNMI), AERGOM (BIRA)**
- **datasets to be produced and validated**
  - **reference: 2008 (current sensors)**
  - **additional: 1997 (ATSR, GOME, POLDER-1)**
  - **optional: 2003, 2006, 2011**

… and now

- **what do you have to add?**
- **what is missing ?**

- **if YOU later want to use the data …**
- **…become involved and help shaping the usefulness of products to YOU**