Many WDAC activities (current and future) are highly relevant to the 2019-2028 strategic plan

- Observations: infrastructure – reference datasets – OSEs – links to modelling
- Data Science and Data management: AI, data mining, data services
- Earth System: reanalyses, fluxes at the interfaces
- Liaisons and partnerships
Emerging issues

How to map the current “Data” portfolio into the new structure, in particular the lighthouse activities?

Points to consider:

• Interface with data providers (CEOS/CGMS, GCOS, national infra): coordinated voice for WCRP?
• Connection with “cousin” communities: WWRP, GAW, … (importance of identifying cross cutting themes – e.g. data assimilation – and build relevant efficient WGs)
• Need for closer links between modeling and data (obs4mips, reanalyses, AI → obvious for Digital Earth!)
• Data (and modeling) infrastructure required to deliver Research 2 Services /Research 2 Operations

Let’s make sure we don't lose any limb during the envisaged surgery!
Focal point for all observational and data matters across the programme

- Promote **open data policies**, protocols and standards across the programme
- Recommend best practices for **ECV data set** development and assessments
- Coordinate **reanalysis inter-comparison** efforts
- Promote **observational and reanalysis data** sets to support climate modelling
- Coordinate **flux research** and promote development of associated data sets
- Review **adequacy of observations** and data assimilation techniques
- Sponsor International **Data Prize**
WDAC - Progress and achievements

obs4MIPS
- Documented and organized 100+ observational products according to CMIP output requirements. Strengthened liaison with ESA-CCI
- Summary of achievements and current state: Waliser at al., 2020 - Observations for Model Intercomparison Project (Obs4MIPs): Status for CMIP6, accepted

TIRA (Task Team for Inter-comparison of Reanalyses)
- Concept for a WCRP Earth System Reanalysis Inter-comparison and Evaluation group, proposal submitted to JSC in 2019 – vibrant community going ahead
- Planning for a joint event with WWRP-DAOS/WCRP/WIGOS in 2021 and 6th International Conference on Reanalysis, Japan 2023

Surface Flux Task Team: White Paper finalised (submitted last year to JSC)

Annual Data Prize: https://www.wcrp-climate.org/wdac-activities (awarded during a ceremony at the WCRP Climate Science Week @AGU)

Liaison with GCOS: on observations requirements via joint panels AOPC, OOPC and TOPC
obs4MIPS - Observations for Model Intercomparisons Project

Observational products documented and organized according to CMIP output requirements

- Available on ESGF via a searchable distributed system
- Specifications = technical link with the modelling community
- Positioned to have substantial impact on CMIP6

Strong interest to facilitate ESM evaluation

- Plea for better connections across the modelling and observational communities.

Increased interest in liaison with other initiatives

- ECV inventory (WGClimate), EAS-CCI and Copernicus

obs4MIPS task team reorganisation

- Suggestion for two separate smaller teams, one addressing scientific стратегic considerations and another to tackle technical aspects associated with preparing and publishing data

Need to assess scientific user uptake to dimension resources accordingly
Task Team for Intercomparison of Reanalyses (TIRA)
• Asked to develop a reanalysis intercomparison group for WCRP
• Develop a document that highlights best practices and terms of reference
• Develop Pilot Intercomparison Projects

Proposal to establish a WCRP Earth System Reanalysis Intercomparison and Evaluation group (proposed to JSC in 2019)
• TIRA has continued – Telecons to organize collaborative efforts
• AGU FM2019 (oral and poster) sessions
• Update and status from developing centers (ECMWF, JMA, GMAO, NOAA, CMA as well as regional reanalyses & integrating Earth System reanalyses)
• Developing a water and energy intercomparison (collaborative)
• Collaborating with DAOS on a new intercomparison project
• Planning for the next reanalyses conferences and workshops
• If ESRIE is accepted by JSC for implementation in WCRP, as a broad collaborative project, it will supersede TIRA

Need to find a home for reanalyses in new WCRP infrastructure
WCRP Surface Flux Task Team

1. Provide a single point-of-contact for **surface flux observations and analysis** in WCRP

2. Establish publication and use of **data, metadata, and documentation standards** for global surface flux datasets (consistent with standards in CMIP)

3. Establish **conventions for inter-comparisons and assessment** of global flux datasets

4. **Report to the WDAC and Core Projects** on activities overseen by the Task Team.

**White Paper topics include:**

Radiative and turbulent fluxes:
- **Air-sea fluxes.**
- **Land-air fluxes.**
- **Ice-air/ocean fluxes.**

Measurement/modeling techniques and uncertainties:
- **In situ measurements**
- **Satellite-derived measurements**
- **NWP analyses and re-analyses**
WCRP Surface Flux Task Team latest developments

- **White Paper, 2019:** Outlining need for a coordinated high-level approach to improve our understanding of surface-atmosphere fluxes

- **Following the white paper, the task team has worked on:**
  - Coordinated with the air-sea flux paper for OceanObs
  - Currently working on the possibility of a GOOS/SCOR/IOOC air-sea flux observation push
  - Implemented a combined group of radiative satellite/in situ land/ocean scientists to improve surface measurements, best practices
  - Working with GOOS and others on possible ideas for UN Decade of the Ocean project
  - Task team members coordinated, proposed, and are now serving as Guest Editors for a special issue on land, ice, and ocean/air fluxes (a shortened version of white paper expected in this issue)
  - Several members of task team working on air-sea flux satellite proposal; satellite focused on planetary boundary layer team also

- **Coordination concerning surface fluxes important, and the visibility of their importance is rapidly growing**

Fluxes will be increasingly important for Earth System approach (coupling, seamless,..)
Latest on SOLAS: Highlights and some recent foci

**SOLAS Climate Intervention**
Position statement on the need for research on efficacy & side effects
- Workshop in Japan, 2019
- Session planned for SRI 2020, shifted to a virtual workshop in summer

**Global network of time series stations for studying air-sea interactions**
Cape Verde, UK, Korea, Italy, Canada, Bermuda, Sweden, Finland, Ireland, Iceland, Svalbard
- Discussion session at SOLAS Open Science Conference, 2019
- Formalized endorsement process in development

**SOLAS-endorsed projects on ship plumes**
- SEANA - Shipping Emissions in the Arctic and North Atlantic Atmosphere
- ACRUISE - Atmospheric Composition and Radiative forcing changes due to UN International Ship Emissions regulations.
- ShipTRASE - Pathways toward a sustainable and equitable use of the oceans.

Fluxes will be increasingly important for coupled and seamless approach

Boyd & Vivian, 2019
WDAC is currently …

**What**

- Open data policies
- Best practices for ECVs
- Reanalysis inter-comparisons
- Observations to support CMIP
- Coordinate flux research
- Review adequacy of observations
- Collect requirements for climate observations

**How**

- Cross cutting (across core projects)
- Connecting to other climate research activities e.g., SOLAS
- Connecting to other data products e.g., GLODAP/SOCAT
- Connecting to international projects e.g., GCOS, CEOS/CGMS WGClimate, Future Earth
- Linking to research and operations and exploit synergies on infrastructures, protocols, standards

What is missing to serve the (new) WCRP structure?
Future plans

1. Observations
   - Observations for process understanding
   - Sustained reference data sets

2. Earth System Reanalyses and data assimilation

3. Data science and data management
   - Data science and data mining
   - Data infrastructure and management

Integration?
Whole system approach?

Topics such as mitigation, adaptation, geoengineering?

Identify vulnerabilities?
1. Observations

- **Stronger connection between observations and modelling**

- **Observations for process understanding**
  - Official WCRP document on observations required for key research?
  - Characterization of bias and uncertainties

- **Sustained reference data sets**
  - Synergies/consistencies between observing systems – GCOS
  - Products for model evaluation and cross cutting research projects
  - Benefits of new sensors/micro-satellites, citizen science?
  - Observational needs, data rescue

- **Information on (and access to) datasets via inventory?**
  - Across WCRP activities (partnership: GCOS, core projects, challenges)
2. Reanalyses and data assimilation

- Earth System Reanalyses
  - Common framework, umbrella for Reanalysis Intercomparison Projects (RIPs)
  - Highlighting scientific research topics such as cycles

- Data assimilation
  - Oversight of OSEs/OSSEs
  - Earth system approach
  - Opportunities for coordination with WWRP/DAOS/PDEF and WGNE
3. Data science and data management

- **Data science and data mining**
  - Information and knowledge exchange across WCRP entities
  - Promote transfer of knowledge from other disciplines
  - Identify areas for international collaboration on big data, AI

- **Data infrastructure and management**
  - Open data access policy
  - Common data formats, metadata requirements, and citation standards (observations, reanalyses, simulations)
  - Research-operations synergies
  - Training and education