# Proposed “Model-Data Home” scenarios

# for further consideration and consultation

**27 November 2020**

## 1. Purpose

The purpose of this document is meant to be a starting point for discussing and assessing various options on organizing the new Model-Data home, which is a new element in the revised WCRP structure and for socializing them across the WCRP community. The home brings the modelling and data activities closer together, sharing objectives and activities in a home similar to current WCRP core activities (e.g. CLIVAR, GEWEX, CliC and SPARC). The document addresses structural alignments of a model-data home that would combine existing data and model working groups (WGs) into one unit that would be comparable to a core project. This document does not address detailed science questions that are already addressed in the data and model WGs, and are fully defined by them. Instead, it aims at defining overarching objectives and the way to organise and govern the home. The detailed science questions would be central elements of the model-data home strategic motivation in WCRP, and thus could be the topic of a subsequent document assembled by the WGs that will become part of the model-data home. This document has received many contributions from the WCRP community, reflecting a wide diversity and complementarity of views from almost all segments of the Programme.

## 2. Initial charge

The Task Teams on respectively Modelling and Computing Infrastructure and Seamless Data and Data Management, as jointly charged by the JSC, were expected to elaborate possible scenarios for the establishment of a Model-Data Home. The resulting document, which should contain the overarching objectives, the groups integrated in the home and the governance, should be revised by representatives of both working groups and core projects, as well as by the JSC liaisons, before being submitted in the form of a set of recommendations to the JSC ahead of the JSC41b meeting. M. Kimoto and M. Visbeck serve as liaison with resp. WMAC and WDAC.

## 3. Vision

The vision of this model-data home is to serve as an overall coordination mechanism across necessary model, data and observations activities within the programme, with a number of aims:

- To foster a seamless and value-chain model-data-observation approach across Earth system components, fundamental and applied disciplines, time and spatial scales, infrastructures in

support of research, services and policy to optimise the Earth system model developments and formulate the observational requirements to better monitor, understand and predict the climate system (Goals 1-4 of the WCRP Strategic Plan)

- To bring about integrated modelling and data infrastructures, data policy, protocols and standards to serve the broader interest of the programme (Critical Infrastructures of the WCRP Strategic Plan)
- To share best practices, data, knowledge, challenges and opportunities, and ensure efficient communication across WCRP constituencies, communities, external partners and stakeholders, with a particular attention to engagement, equal access and inclusion of the 'global south' (Engagement and Partners of the WCRP Strategic Plan)
- To identify critical stakeholders, scientific ambition and resourcing needs along this model-data-observation value chain, to develop a risk mapping and mitigation measures, and to remove fragmentation, duplications and sub-optimalities in the programme on those matters

## 4. Scope

A number of initiatives that motivate the integrated data-modelling ambition of this home were identified by the task teams for data and model whose results were presented at JSC41. These initiatives could guide the implementation of the initial phases of the home. They are outlined below and clustered in three thematic science areas:

Data science:

- Enable stronger synergies between data assimilation, (re)analysis work and WIGOS and other research and operational equivalents (e.g., C3S). Foster the use of AI approaches for data mining and data assimilation developments in coordination with the use of these techniques in model development and analysis.
- Address the need for an integrated management of observations and reference data sets for process understanding, bias correction and post-processing. Observations are critically needed to understand processes leading to improved parametrizations and in support of model development, evaluation and tuning.
- Foster a stronger Earth system approach for reanalyses/assimilation, which currently are largely uncoupled (check TIRA white paper).
- Encourage efforts for data synthesis, data integration and quality control, including for the provision of long-term, accurate (= stable/comparable) time series of climate relevant data.
- Create guidelines on data quality control and curation (avoid overlap with GCOS guidelines for ECVs). Advocate publication of quality control standards and the recognition for effort spent, e.g., in Earth system science data.
- Coordinate observations, reanalyses, data science and data management issues across the programme and across WMO (with WWRP and GAW in particular), sharing knowledge/experiences and providing easy access with a free data policy. Foster the integration of available data platforms and the required data providers. Develop a seamless approach, where seamless climate data are all data required for understanding, predicting and projecting the

climate system across all Earth-System components and scales, in close collaboration with modelling groups.

- Promote continuity and effectiveness of climate observations in all Earth system components
- Establish a strong link to space agency bodies to exchange WCRP needs and space agency plans (involve GCOS and others to communicate requirements to space agencies).po
- Facilitate the inclusion of data assimilation in more modelling activities (OSEs/OSSEs in coordination with WWRP/DAOS/PDEF and WGNE) to optimize and make the best the use of available observations and inform investments on observing systems for climate research and services.
- Promote a mechanism to coordinate modelling and data activities across the programme and other research programmes (WWRP/GAW) including a mapping of all modelling activities that require observations.

Modelling:

- Promote the understanding and reduction of the many systematic errors found in Earth system models, which often have their origin in the representation of core processes and the interaction between Earth system components. Assessing and reducing systematic errors requires benchmark observations.
- Ensure the long-term evolution of modelling capabilities that lead to increased process representation and fidelity of models bringing innovation.
- Foster collaborative development of models of the Earth system (design, implementation, error diagnosis and model revision) across the full range of temporal and spatial scales.
- Continue to develop and provide guidance around best practice for model code and outputs of metadata and archiving and variable naming and archiving conventions.
- Coordination of community assessments and analysis tools with the goal of sharing code and coding practices.
- Encourage MIPs at all time and spacescales aimed at process studies for better understanding and the co-development of focussed theoretical and laboratory studies for evaluating results.
- Review and explore the use of data science and machine learning should be comprehensively explored (e.g., emulation of parametrizations of more expensive schemes). WGNE plans to continue evaluating this issue but many other possible efforts can be either identified or promoted and coordinated across the programme (e.g., deep-learning post-processing, development of parameterizations based on machine learning). Consolidating existing infrastructures and data sources under a more integrated framework could unleash the full power of deep learning.
- Define the aspects of the models that cannot be validated/improved because of missing observations and what are the observation requirements resulting from that. Observations are a key element to provide evidence of climate change.
- Create a clear path between research and operations (understood as the activities that underpin the service provision), contributing to the definition of what operations means in the provision and/or use of climate data and information. Linkages with the WMO would seem to be fundamental as a bedrock aspect of this home.
- Engage modelling centres in the cutting-edge research activities (e.g., through science questions) whilst enabling infrastructure (e.g., data dissemination, production of forcings) to support more

service-oriented research based on shared community standards for data and data documentation and using community tools and services
- Link to the WCRP data infrastructure because the success of coordinated modelling activities depends on this shared capability.

Computing and Data Infrastructures:

- Adopt a seamless climate data management as the coordination of continuous and interconnected production, acquisition, processing, archiving, transmission and dissemination of climate data across all disciplines, activities and scales
- Make observations and simulations data more interoperable (e.g., across data formats) taking advantage of the big data science and IT technology (e.g., cloud computing, heterogeneous architectures), which are evolving very rapidly. Harmonize standards for data and data documentation used across stakeholders to the extent possible (e.g. WCRP, WMO and IPCC)
- Develop a research data dissemination strategy for the archival of and access to both contemporary and historic research data for short-term, medium-term and long-term storage and data services. Identify solutions that cater for the widest sector of WCRP scientists.
- Develop information on (and easy and efficient access to) datasets via inventory for all WCRP key research. This can provide direct input for gap analyses, but would need to be adequately resourced in terms of staff time.
- Develop standards for data documentation and data access for all WCRP key research data based on community standards such as NetCDF/CF, ES-DOC or OGC WPS and complying to best practices for scholarly data like the FAIR data principles or the data citation principle.
- Promote the adaptation of codes for exascale computing architectures, data infrastructures and the necessary efficient output management. Optimizing code and increasing scalability are important to enable adaptable, efficient and high-fidelity numerical experimentations and simulations that make best use of state-of-the-art computing technology and limited resources.
- Assess the scalability of data archiving with growing complexity of models and amount of data produced and identify possible bottlenecks to data access.re
- WGNE is taking a leading role in sharing best practices but a more comprehensive view that illustrates the risks the community is facing in a very complex computer infrastructure environment is needed.
- Fully exploit data infrastructures such as ESGF across the programme.
- Promote the sustainability of the infrastructure behind ESGF, which is maintained by only a few non-NMHS institutions, yet providing a huge service to the whole community. In a more general sense, provide a focal point for national and regional infrastructures supporting WCRP projects and support their efforts through coordinating activities and recognition as WCRP data repositories.
- Specify the balance between what is feasible from an infrastructure perspective and what is desirable from a scientific point of view.
- Share best practices between model and data infrastructures.

The expected outcome is a much needed integrated view for modelling, data and observations coordination within WCRP to address the broad objectives of the Strategic Plan as a key enabler of model

and data research and infrastructures for the entire WCRP community, partners and society at large. The science areas will also need to be linked to the research actions of all the lighthouse activities (LHA) to promote synergies among them in model and data aspects and persistence of the progress achieved.

## 5. Composition and governance

The model-data home would include the current modelling and data working groups (including their panels) as well as WWRP/DAOS. Options on how to align this home with the CMIP-IPO need further discussion. Successful stories and initiatives around observations and data (e.g., Obs4MIPS, PROES, TIRA, etc.) will find a space in the new structure to keep and increase their momentum. The model-data home has some horizontal dimension across other homes and should take this characteristic into account. Links to other observational and modelling groups in the programme (e.g., CLIVAR-OMDP, CLIVAR-GSOP, SPARC-S-RIP, SPARC-LOTUS, SPARC-WAVAS, SPARC-ATC, SPARC-TUNER) should be established through a consultation with the other homes so as to identify the optimal level of engagement (e.g. leadership or representative as ex-officio member).

The governance will be ensured by an SSG representing these communities plus some members ex-officio from other homes, WWRP, GAW, GCOS and other panels. This SSG will report to the JSC. The SSG could be jump started from the representative of the groups brought in and then in the rotation (1-2-3 years terms) move to a more independent group after 2-3 years. Advantage could be taken of the excitement around AI/ML by maybe setting up a new group in this arena.

The SSG and the home activities will require some dedicated secretariat support (see below), ideally both from Geneva and from a project office.

## 6. Research partners and stakeholders

Research partners include WCRP internal constituencies (core activities and LHAs in particular) but also external partners such as the WWRP, GAW, GCOS, space agencies (via CEOS/CGMS WG Climate) and some Future Earth Project (e.g., AIMES, SOLAS PAGES) who are already associated formally to some of those activities. Engagement with data standardization initiatives like NetCDF/CF and the World Data System (WDS) seem equally important. Broader stakeholders include UNFCCC, IPCC (IPCC TG-Data and the IPCC Data Distribution Centre), GFCS (and initiatives like C3S), IOC-UNESCO, ISC Unions, SCOR, WMO operational entities such as WMO Lead Centers and Global Producing Centers, NMHSs, Regional Climate Centers, etc. There are even broader engagement opportunities with NGOs, Private industry and regional government stakeholders which ought to be considered.

**<PLACEHOLDER FOR A FIGURE SHOWING HOW THE HOME WILL OPERATE/LINK TO WCRP HOME-CMIP-GCOS-WMO-LHA-OTHERS (TBD)>**

## 7. Roadmap and timeline (starting in 2021)

The current note should be elaborated on further, after the JSC41b session. A small team of 6-8 self-nominated people is proposed to develop implementation details as outlined below:

- Year 1: Develop the home's governance, initial SSG, high level contributions to LHA and core activities and secretariat support arrangements for JSC approval in 2021 (and celebrate at the same time the accomplishments of the WCRP Data Advisory Council and Modeling Advisory Councils).
- Year 2: Develop/update/revise governance and specific research priorities with the home's constituencies and external partnership arrangements for JSC's approval in 2022
- Year 3-5: Implementation of research priorities, resource mobilization, communication and outreach
- Year 6-10: Implementation of a revised plan following a mid-term review

## 8. Secretariat / office support

There is a recognition that without necessary secretariat support, from Geneva and a project office (either associated with the CMIP-IPO or not), this overall coordination will be hard to implement. The reason is that this home has a coordination role of existing groups, with their own priorities and momentum. The ambitious objectives laid out will require a number of joint actions to create a common ground and merge communities. Not recognising this need appropriately would not only slow down progress within the home, but also put a number of the current critical activities at risk.

## 9. Implementation options

The table in Annex 2, based on extensive background analysis detailed in Annex 1, outlines the four main options proposed and developed during this consultation and summarized as follows:

- Option 1: model-data home including CMIP governance; separate offices for resp. model-data home and CMIP coordination
- Option 2: equivalent to option 1 but using CMIP branding, slightly revised CMIP framework to link to observations and data, office(s) carry the CMIP brand
- Option 3: model-data home NOT including CMIP governance; separate offices for resp. model-data home and CMIP coordination
- Option 4: merger of current Councils without dedicated office support

A poll was conducted to seek preferences from the community, representing a broad and representative scan of the WCRP family, and yielded the following results:

- Option 1: 7 (23%)
- Option 2: 18 (60%)
- Option 3: 1 (4%)
- Option 4: 4 (13%)

## 10. Useful reference information

- WCRP Strategic Plan: https://www.wcrp-climate.org/wcrp-sp
- WCRP Implementation Plan: https://www.wcrp-climate.org/wcrp-ip-overview
- Call for CMIP Project Office: https://www.wcrp-climate.org/wgcm-cmip/call-for-proposals-to-host-a-cmip-ipo
- Recommendations to JSC of two Task Teams on resp. Data and Modeling: https://www.wcrp-climate.org/jsc41-documents (see session 3)
- CMIP6 data standards and protocol: https://pcmdi.llnl.gov/CMIP6/

## Annex 1. Background and analysis of the current situation

- Both task teams recognized in their documents to the JSC-41 the need to maintain coordination elements for both modelling, data and observations issues within WCRP.
- The data task team understands seamless climate data to be all data required for understanding, predicting and projecting the climate system across all Earth-System components and scales. It understands seamless data management to be the coordination of continuous and interconnected production, acquisition, processing, archiving, transmission and dissemination of climate data across all disciplines, activities and scales.
- The data task team identified that there is a clear need for an integrated management of observations for process understanding beyond typical availability of 'operational' systems (dedicated field experiments), observational climate data records, reanalyses and data generated by climate models (need to define 'data' in general), data assimilation, data availability via open data infrastructures (e.g., ESGF, World Data Centres, IPCC Data Distribution Centre), strategy on capturing observational uncertainties/covariances, synthesis on data stability and quality control (need for guidelines within WCRP), and data science and data mining/machine learning (need for information and knowledge exchange).
- The modelling and computing infrastructure task team found out that the development, application and evaluation of models are done entirely by modelling centres and the broader research community. The role of the WCRP is to coordinate these activities and foster collaboration.
- Many systematic errors seen in Earth system models often have their origin in the representation of core processes and the interaction between Earth system components. Significant efforts are needed to understand and model these core processes and interactions within an Earth system model framework.
- The WCRP co-sponsors' review recommended a simplification of the programme's structure.
- A further advice from both WDAC and WMAC over the last two years has been to bring the coordination of modelling, data and observations closer together, possibly under a joint umbrella or governance, with project office support.
- A weakness found in the current construct of Councils was the limited support, definition and therefore recognition of their advisory role within the programme. A model-data coordination shall ideally rely on substance, concrete and exciting scientific work as for other WCRP entities. However, moving this coordination function into a "Model-data" home at a similar level as other core activities could further reduce the potential for such higher level and horizontal coordination.
- Both Councils have linkages/representations to external entities (Research Board/WWRP/GAW, SOLAS, AIMES, CEOS/CGMS WG Climate, etc.). The evolution of the structure should consider maintaining, enhancing or evolving those in some way within the programme where appropriate. SOLAS linkage could be managed under CLIVAR, and AIMES through WGCM for example.
- There are many modelling, data and observations activities in WCRP, spread within and sometimes shared across constituencies. There is a recognition that some of those activities are well contained and managed within groups and do not require broader coordination, whilst others require significant infrastructures, careful experimental designs, protocols standards, etc. However, it is obvious that all would benefit from a better and more updated knowledge of their

objectives and progress. It is also clear that these groups should have a critical role in identifying areas where change is needed and, equally importantly, where not.

- CMIP represents WCRP's single biggest model-data effort within the programme, involving many entities. This successful framework could be expanded in the future (e.g. for sub-seasonal to decadal predictions Intercomparison Projects, reanalysis and climate data record Intercomparison Projects) and for other core activities to use as they see fit. This is consistent with the WIP plan to deal initially with WGCM/projections and gradually also manage broader data management issues. The overall organization of CMIP requires a close governance with its main modelling (WGCM) and infrastructure (WIP) components, as there is a risk of implementing a solution which would coordinate those via separate offices. It becomes also increasingly obvious that the way ahead for the model-data-home and CMIP are intrinsically linked.
- Areas of research on the cutting edge of CMIP activities (such as several CliC activities) often feed into CMIP through indirect means and related data collections are often not appropriately curated for these big model-data activities. The question of aggregating under a single CMIP umbrella is that process-based studies (often small and focussed) could be marginalised and find difficulty getting WCRP focus which often times is actually the critical point of progressing high fidelity climate projections and activities.
- Funding support to the CMIP ESGF Infrastructure e.g. via DOE and EU (IS-ENESx), is currently at risk which could be somewhat compensated via resources from the CMIP Office(s). Without such infrastructure, there is no CMIP.
- The CMIP acronym itself has already a strong brand, although its sub-definition could be revisited slightly (e.g. "CMIP: observing, modelling, our climate, our future", "CMIP: Coordinate Modelling and analysis Intercomparison Project", etc) to make explicit reference to observations for example (this approach has been used by other Core Projects in the recent past). Placing CMIP as a sub-structure of a model-data home may not leverage its full potential. The same point holds for other similar activities such as CORDEX and S2S, and generally, what constitutes a 'Core Activity/Project'.
- CMIP, if slightly redefined, could de facto represent those MIPs requiring broader coordination, everything else staying within respective entities. However, this CMIP evolution might put the essence of CMIP at risk if not appropriately supported. The current main features of CMIP should hence be retained and be addressed as a non-negotiable priority.
- The call for the CMIP Project Office has resulted in several solid offers and could oversee the broader model-data issues at the same time. This is for the JSC and those responsible for CMIP to decide.
- When referring to a "model-data home", it is assumed that it covers observations, possibly in the form of a new observation panel charged with the evaluation and evolution of observing systems for climate data records and process understanding (in collaboration with or via GCOS). This needs to be coordinated with the institutions that provide data and happens a.o. with the data portals and development of appropriate metadata to facilitate interrogation and use. Innovation is needed in observations, thus it would be interesting to define what aspects of the models cannot be validated/improved because of missing observations and what are the observation requirements resulting from that. The development of theory can also proceed with observations. Overall though it is the combination of theory, models, observations from field,

laboratory experiments that are all contributing to better understanding. They just need to be efficient and targeted.

- Another role for the observations is that whilst Obs4MIPS is rather a model performance measurement activity, observations are critically needed to understand processes leading to improved parametrizations in support of model development. In addition, reducing or first assessing the systematic errors of climate models requires benchmark observations. Some satellite measurements are suitable for that, e.g., altimetry, radio occultation, etc.
- CORDEX has been both the regional modelling counterpart of CMIP but has been also involved in downstream applications. CORDEX is also part of the CMIP Experimental Design and has a dedicated office. It is not clear whether CORDEX's links will preferentially be to the also new regional climate information home. Expanding the CMIP framework for use in the developing world comes with some capacity building challenges (e.g. know-how on publishing data on ESGF).
- For CMIP standards, data documentation and data dissemination have been developed over decades. The infrastructure development is coordinated by the WIP which was established initially to support CMIP but with also the long-term vision to serve other WCRP modeling efforrtso. The infrastructure around ESGF includes state-of-the-art features such as Data Replication, CMOR, ES-DOC, Errata, , and Citation Services. Some of the standards and tools have been applied by further projects like CORDEX or input4MIPs. The CMIP standards can provide a blueprint for other MIPs, a broader usage for other WCRP research should be investigated. This infrastructure is currently funded for individual projects. Providing this infrastructure for WCRP research in general requires a change in the funding streams.
- There is a huge need for work on developing standards which give sufficient detail, and on harmonising and mapping standards which have developed independently in different areas of Earth System Science. Issues of scalability, interoperability and data quality cannot be tackled without systematic improvements in the range and quality of the standards which we rely on.
- S2S is a joint activity between WCRP and WWRP, on the shorter time scales of WGSIP and is supported by a dedicated project office. The S2S project maintains a database of forecasts and reforecasts and could benefit from a linkage to observational data for verification, and to longer-timescale predictions for development of seamless forecasts. S2S links with WMO services development through the WMO's Standing Committee on Data Processing for Applied Earth System Modelling and Prediction & Projection (SC-ESMP).
- WGSIP indicated their interest in leveraging CMIP protocols and ESGF data access for climate prediction experiments, using DCPP protocols as a starting point (see slide 11 at https://www.wcrp-climate.org/JSC41/presentations/JSC41-WGSIP-DCPP-c.pdf).
- CORA has been established to coordinate regional activities within WCRP and is naturally closely associated to CORDEX, although CORDEX has its own project office. CORA is offering support to the regional climate information home.
- There is some general agreement that the modelling Working Groups (WGCM, WGSIP, WGNE) and probably S2S should fit into the Model-Data home with dedicated secretariat support. WGNE represents a special case in the sense that it reports to the WMO Research Board, as opposed to WGCM and WGSIP, which are WCRP-only groups. WGNE will of course still fully engage in the WCRP activities.
- Earth System model development, notably via WGNE, as well as WGCM and WGSIP, plays a critical role in bringing innovation and ensuring long-term evolution of modelling capability (exascale

computing, reduction of systematic errors, increased process representation and fidelity of models, AI approaches to parameterization, etc.).

- WGNE's aim is to foster collaborative development of models of the Earth system (design, implementation, error diagnosis and model revision) across the full range of temporal and spatial scales. WGCM complements WGNE's model development efforts, in particular on slow processes and feedback mechanisms (interactive ice sheets, carbon cycle, etc.).
- Coupled data assimilation and Earth system reanalysis are crucial tools that require simultaneous evolution along Earth system model development and shall be an integral part of such home. AI approaches should be explored within data assimilation developments. One should note that AI approaches are in general more attractive to improve parameterizations than data assimilation systems wrt CPU time.
- There is no group currently that addresses infrastructure-related problems like scalability, portability to new architectures (e.g. GPUs), efficient model output handling, etc. across the board (except WGNE for a number of aspects) and attention to this topic should be expanded.
- Linkages to Lighthouse activities, core projects, and smaller scale science activities need to be established, in particular for the "Explaining and Predicting Earth System Change" and "Digital Earths".
- Financial pressure within WMO and the WCRP Secretariat will most likely limit very soon the staffing support to both CMIP and model-data coordination. As a matter of fact, both will have to be organized externally if the financial situation does not improve. This organization cannot solely reside on the goodwill and dedication of the co-chairs of the current groups and require adequate secretariat support. Resource requirements have to be clearly identified and conveyed.
- Whatever the new home looks like, successful stories and initiatives around observations and data (e.g. Obs4MIPS, PROES, TIRA, etc.) should find their way into the new structure to keep and increase the momentum from these communities.
- Big data science and IT technology (e.g., cloud computing, heterogeneous architectures) are evolving very rapidly and there is a need to make observations and simulations data more interoperable to enable new approaches such as AI and deep learning, in particular for data assimilation, emulation, hybrid modelling and post-processing. Consolidating existing infrastructures and data sources under a more integrated framework could unleash the full power of deep learning.
- A number of current modelling efforts have gained substantial maturity of the last decade and there is an interest from WMO to bring them closer to operations (S2S, CORDEX, CMIP). A useful framework to do so is the WMO seamless Global Data Processing and Forecasting System (GDPFS), which is currently explored as a way to institutionalize parts of CMIP following WMO Congress Resolution 67. This holds also for observations and reanalyses.
- Irrespective of the option considered, the model-data home has some horizontal dimension across other core activities (homes in the future) and should probably be depicted that way in the new organigram.

## Annex 2 Proposed options

| **Option** | **1** | **2** | **3** | **4** | **5** |
|---|---|---|---|---|---|
| Governance | Dedicated Model-Data SSG | CMIP SSG** | Model-Data SSG separate from CMIP SSG | Model-data Council | ... |
| Composition | Co-chairs of constituencies; Ex-offs: all other core activities (and their directors), Ex-offs for WWRP, GAW GCOS & panels, WG Climate | Co-chairs of constituencies; Ex-offs: all other core activities (and their directors). Ex-offs for WWRP, GAW, GCOS & panels, WG Climate | Co-chairs of all constituencies; Ex-offs: all other core activities (and their directors)<br>Ex-offs for WWRP, GAW, GCOS & panels, WG Climate | Co-chairs of all constituencies; Ex-offs of all other core activities (and their directors)<br>Ex-offs for WWRP, GAW, GCOS & panels, WG Climate | ... |
| Reporting to | JSC | JSC | JSC | JSC | ... |
| Secretariat | Dedicated office* | CMIP Office(s)*** | Dedicated office* | No office | ... |
| Constituencies | WGCM (and CMIP, including associated groups WIP, reanalysis/ana4MIPs/TIRA and obs4MIPs), WGSIP (including S2S), WGNE, DAOS | WGCM, CMIP constituencies (including WIP, reanalysis/ana4MIPs/TIRA and obs4MIPs), WGSIP (including S2S), WGNE, DAOS | WGCM (but not CMIP and associated groups), WGSIP, WGNE, DAOS | WGCM, WGSIP, WGNE, DAOS | ... |
| Pros/ opportunity | -Secretariat support<br>-Inclusive | -Full leverage of CMIP brand and appeal and current office call<br>-Simplification of WCRP structure by removing a layer<br>-Secretariat support<br>-Inclusive | -Secretariat support | -Light structure, could be as simple as a mailing list use by JSC and all WCRP bodies when in need of advice | ... |
| Cons/ challenge | -Difficulty to manage WGCM from one office, whilst CMIP would be managed by another<br>-Difficulty to justify 2 separate offices whilst overlap, resourcing question<br>-Limited use of CMIP branding<br>-International appeal for such office could be limited | -Need to plan for slight expansion of CMIP realm<br>-Buy-in from other WCRP activities traditionally outside the current CMIP umbrella<br>-Visibility of observation related activities on the margin of CMIP focus (data assimilation, reprocessing, etc.) | -Difficult to justify parallel office to CMIP, resourcing question<br>-Separate model-data and CMIP governance and risk of misalignment of WGCM and CMIP<br>-International appeal for such office could be limited<br>-Fragmentation | -Lack of secretariat support | ... |

*These configurations assume the CMIP Project Office is separate

**Note CMIP acronym as a form of framework for model-data coordination could use a slightly revised definition

***Depending on critical mass and hosting offers, offices could be distributed (this is the case e.g. for CLIVAR offices in Qing Dao/China and Pune/India resp.; CORA Project Offices are distributed as well)