Task Team on Modelling and Computing Infrastructure

41st Session of the WCRP Joint Scientific Committee

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May 2020
Online

Mechanisms and structures recommended to achieve integrated modelling activities across WCRP

- Lessons learned:
  - Organizing scientifically compelling activities requires engaging the broad modelling and analysis community, mobilizing a very large voluntary international capability
  - Need to maintain a good dialogue between model development and science delivery (e.g. between WGNE and WGCM)
  - ESM systematic errors often originate in representation of core process and interactions between ES components; understanding and modelling of these processes needed in an ESM framework
- Opportunities:
  - A seamless prediction approach will help address common problems across timescales
  - ML offers a tremendous opportunity for code speed-up, ESM emulators, post-processing, etc.
  - Clear need to explore data assimilation (DA) strategies for different ES components and coupled DA out to decadal timescales

Mechanisms and structures recommended to achieve integrated modelling activities across WCRP

- Recommendations:
    - Put in place a mechanism (e.g., on-line map) to coordinate modelling activities across WCRP/WWRP/GAW
    - Adequately source coordination of all modelling activities to leverage fundamental process understanding
    - Financially support WCRP modelling activities that are relied upon as service-oriented products (e.g., CMIP for IPCC); including support for data infrastructure
    - Better coordinate analysis tools (PCMDI metrics package, ESMValTool, JWGFVR) across WCRP/WWRP/GAW
    - Encourage and prioritize MIPs across timescales for *understanding and process studies*
    - Explore data science and machine learning (beyond WGNE initial efforts)
    - Illustrate best practices and risks from exascale computing
    - See Modelling Positional Paper describing unique and complementary roles of the modeling groups in addressing and navigating evolving (seamless) nature of the science