Introduction

LRFTIP is an initiative of WCRP’s Working Group on Subseasonal to Interdecadal Prediction (WGSIP). Its purpose is to enable multi-model intercomparison studies of the transient behavior of coupled long-range forecast models evolving from observation-based initial conditions. (WMO defines long-range forecasting as from 30 days up to years.)

LRFTIP Objectives

1) Developing a multi-model online archive of hindcast climatologies and related diagnostics including systems contributing to S2S, CHFP, DCPP
2) Developing standard set of diagnostics characterizing forecast shock/drift
3) Addressing science questions, including
   - influence of different initialization methods on transient behavior of climate model components
   - identification of any impacts (likely negative) on climate forecast quality
4) Of particular interest: hindcast initialization experiments (same model, different initialization methods) that contribute to (1)-(2) and inform (3)

Approach

• For a particular model and start date, hindcasts are averaged over available years and ensemble members to form a hindcast climatology
• When available, climatologies for the same model are also constructed for
  ➢ Freely running model (ideally CMIP historical simulations, averaging over multiple ensemble members)
  ➢ Hindcast initial conditions represented by assimilating model run, analysis used for initialization, or other observation-based reference
• These represent “endpoints” of hindcast drifts, characterizing evolution of hindcast climatology away from initial conditions, toward model’s own climate:
  - hindcast climatology
  - model climatology (historical simulation)
• Community input is welcome (and indeed sought), including
  ➢ Suggestions for shock/drift diagnostics
  ➢ Data contributions for models and/or initialization methods not in archive

Sample diagnostics

Subseasonal: Total cloud cover in first days of hindcasts initialized near 1 Nov → UKMO model shows large transient relative to other models due to initialization from ECMWF reanalysis

Seasonal: SST biases developing in forecasts initialized 1 May in two models having same ocean, different atmospheric components

Decadal:
(a) Evolution of SST drift across equatorial Pacific in 10 decadal prediction models, showing El Niño and La Niña-like transients
(b) As in (a), except for a single model CanCM4 using two different ocean initialization methods: i1, including subsurface data, and i2, with surface initialization only
(c) As in (b), except differences (i1–i2) in SST (right) and 20°C isotherm depth (left), showing La Niña-like transient excited by anomalous upwelling Kelvin waves

Data Archive

Time scales represented for different forecast types
- Subseasonal: daily to 30/60 days
- Seasonal: daily to 30/60 days + monthly through forecast range
- Decadal: daily to 30/60 days + monthly/annual through forecast range

Data format
- CF-compliant NetCDF4
- Time variable=leadtime
- File names, directory tree guided by CMIP/ESGF conventions


Current Status

Models: The LRFTIP archive currently includes 6 subseasonal forecast models (S2S), 19 seasonal forecast models (CHFP, ENSEMBLES), and 15 decadal models (CMIP5, ENSEMBLES)

Tables show numbers of variables for each model, climate system component, and averaging interval, for analysis (observation based), forecasts, and historical simulations as available

Project contact for enquiries, interest to contribute, etc: ec.pitple-lrftip.ec@canada.ca