



Dynamical downscaling of seasonal forecast products

CCLM and SEAS5



SEAS5

- SEASonal forecast System 5 (SEAS5) from the ECMWF
- Part of the
 - Copernicus Climate Change Service (C3S)
 - WMO Subseasonal-to-Seasonal Prediction Project (S2S)
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SEAS5 - Uses

- NEMO ocean model with
 - 0.25° ORCA grid
 - 75 vertical levels
 - LIM2 sea ice model
- ECMWF IFS atmospheric model with
 - Reduced 0320 gaussian grid (grid spacing of appr. 36 km)
 - 91 vertical levels
 - 20 minute time-step

SEAS5 - Uses

- Extended settings to improve representation of processes that affect seasonal skill, such as
 - Reduced non-orographic gravity wave drag
 - Tropospheric sulphate aerosol that follows decadal varying CMIP5 climatology
- Coupling
 - Gaussian method for interpolation in both directions
 - Interval of 1 hr allows resolution of diurnal cycle

SEAS5 - Specifications

- 51-member ensemble, created using a combination of
 - SST and atmospheric initial condition perturbations
 - Activations of stochastic physics (same as in medium-range ENS – SPPT3 scheme and stochastic backscatter)
- Seasonal forecast produced each month
- Initial date of the 1st of each month
- Run for 7 months



SEAS5 - Specifications

- Forecast data and products released at 12Z UTC on every 5th of each month



Data streams in MARS retrievals

- MMSF (IFS direct output)
- MSMM (IFS monthly output)
- WASF (Wave model direct output)
- SWMM (Wave model monthly output)
- MMSA (Real-time forecast anomalies)

For all the data streams ECMWF “system” is “5”



MMSF - Multi-model seasonal forecast

- IFS direct output
- Atmosphere model output fields at 6-, 12- or 24-hour intervals
- Accumulated fields contain accumulated value of field from the start of the forecast

MSMM - Multi-model seasonal forecast atmospheric monthly means

- IFS monthly output
- Monthly means of all output fields for forecasts and re-forecasts
- For accumulated fields, the monthly mean rate of accumulation is calculated
- For each monthly mean field, climate mean of corresponding 1993-2016 re-forecast is calculated → archived as HCMEAN in MSMM stream



Wave Models

- **WASF:** Direct output from wave model at 24 hr intervals
- **SWMM:** Monthly mean wave model output



MMSA - Real-time forecast anomalies

- Forecast monthly means are calculated relative to a climate mean formed from the appropriate 1993-2016 re-forecasts
- Calculated for each ensemble member and for all monthly mean fields
- Archived as FCMEAN in MMSA stream