METADATA

for files [1711]-[1741] - output of high-resolution (400 m grid spacing) simulations with COSMO 5.3

The data has been used in the phd thesis 'Atmospheric Downscaling using Mulit-Objective Genetic Programming' by T. Zerenner (http://nbn-resolving.de/urn:nbn:de:hbz:5n-48408). A brief description of the COSMO model can be found in Section 3.4 (pp.25-30). A description of the model domain and the actual model set up for the simulations is provided in Section 6.1 (pp.50-57).

A comprehensive documentation of the COSMO model is available from www.cosmo-model.org.

1. Spatial/Temporal Extent and Resolution

The simulations cover a 168x168m²-large domain (50.0671° – 51.4917° lat; 5.3912 – 7.6450° lon) with the TR32-area in the center and have a horizontal grid spacing of 400 m, which corresponds to 420x420 grid boxes. To exclude boundary effects only the inner 280x280 grid points should be used. The simulations are driven by COSMO-DE analyses (with 2.8 km grid spacing), initialized at 0:00 UTC. The data contains hourly output of various meteorological parameters. Each simulation spans a time period of 48 hours.

2. Related Data

2.1 Constant Parameter Fields (including geographic coordinates) are available at http://www.tr32db.uni-koeln.de/data.php?dataID=1794. The descriptive PDF includes a table of the constant parameters provided..

2.2 Related simulations -This data is part of a set of simulations for 30 different 2-day-long periods:
[1741] - COSMO model output for 17-18 July 2014
[1740] - COSMO model output for 04-05 August 2015
[1739] - COSMO model output for 01-02 August 2015
[1738] - COSMO model output for 17-18 July 2015
[1737] - COSMO model output for 25-26 July 2015
[1736] - COSMO model output for 12-13 July 2015
[1735] - COSMO model output for 01-02 July 2015
[1734] - COSMO model output for 10-11 July 2015
[1733] - COSMO model output for 12-13 June 2015
[1732] - COSMO model output for 04-05 June 2015
[1731] - COSMO model output for 22-23 May 2015
[1730] - COSMO model output for 09-10 April 2015
[1729] - COSMO model output for 29-30 March 2015
[1728] - COSMO model output for 08-09 March 2015
[1726] - COSMO model output for 01-02 March 2015
[1725] - COSMO model output for 30-31 January 2015
[1724] - COSMO model output for 19-20 February 2015
[1723] - COSMO model output for 12-13 February 2015
[1722] - COSMO model output for 09-10 January 2015
[1721] - COSMO model output for 01-02 January 2015
[1720] - COSMO model output for 03-04 November 2014
[1719] - COSMO model output for 18-19 October 2014
[1718] - COSMO model output for 28-29 September 2014
[1717] - COSMO model output for 17-18 September 2014
[1716] - COSMO model output for 11-12 May 2014
[1715] - COSMO model output for 06-07 May 2014
[1714] - COSMO model output for 01-02 May 2014
[1713] - COSMO model output for 11-12 March 2013
[1712] - COSMO model output for 01-02 January 2014
[1711] - COSMO model output for 26-27 January 2014

3. List of Variables

Not all variables are standard COSMO output: From the 3D fields only the lowest 15 layers are provided. For layer boundary heights (Arakawa-C grid) see http://www.tr32db.uni-koeln.de/data.php?dataID=1794. Variables with '_AVG' are averages over the output interval (i.e., here the last 1 hour).

Further note that (s) means the corresponding variable is a sum since the beginning of the simulation. This is standard COSMO output for some variables.

TOA = top of the atmosphere
CAPE = convective available potential energy

Name	**Description**	**unit**	**ee**	**tab**	**lvtyp**
T_G	ground temperature	K	11	2	1
T_2M	temperature in 2m	K	11	2	105
T_SO	soil temperature	K	197	201	111
T15	temperature of lowest 15 model layers	K	242	203	110
T_AVG	temperature of lowest layer averaged over output interval	K	224	203	1
TG_AVG	ground temperature averaged over output interval	K	232	203	1
U_10M	u-component of 10m wind	m/s	33	2	105
V_10M	v-component of 10m wind	m/s	34	2	105
U15	u-wind of lowest 15 model layers	m/s	244	203	110
V15	v-wind of lowest 15 model layers	m/s	245	203	110
W15	w-wind of lowest 15 model layers	m/s	246	203	109
U_AVG	u-wind of lowest model layer averaged over output interval	m/s	219	203	1
V_AVG	v-wind of lowest model layer averaged over output intervall	m/s	220	203	1
UV_AVG	horizontal windspeed of lowest model layer averaged over output interval	m/s	218	203	1
Z0	surface roughness length	m	83	2	1
PS_AVG	surface pressure averaged over output interval	Pa	234	203	1
PS	surface pressure	Pa	1	2	1
PP15	pressure deviation (from P0) of lowest 15 model layers	hPa	211	203	110
P015	reference pressure	Pa	210	203	110
PP_AVG	PP of lowest layer averaged over output interval	hPa	202	203	1
P0_AVG	P0 of lowest layer averaged over output interval	Pa	205	203	1
W_SO	soil water content	m	198	201	111
TD_2M	dewpoint temperature in 2m	K	17	2	105
QV_S	surface specific humidity	kg/kg	51	2	1
TDIV_HUM	vertically integrated divergence of specific humidity	kg/m²	42	201	1
AEVAP_S	moisture flux at the surface	kg/m²	57	2	1
RELHUM_2M	relative humidity in 2m	%	52	2	105
QV15	specific humidity of lowest 15 model layers	kg/kg	243	203	110
QV_AVG	specific humidity of lowest layer averaged over output intervall	kg/kg	221	203	1
QV_S_AVG	surface specific humidity averaged over output interval	kg/kg	241	203	1
PRR_GSP	instantaneous rainfall	kg m-2 s-1	100	201	1
PRS_GSP	instantaneous snowfall	kg m-2 s-1	101	201	1
PRG_GSP	instantaneous graupel	kg m-2 s-1	131	201	1
TWATER	vertically integrated total water	kg/m²	41	201	1
TQV	vertically intergated water vapour	kg/m²	54	2	1
TQI	vertically intergated cloud ice	kg/m²	58	2	1
TQR	vertically integrated rain water content	kg/m²	37	201	1
TQS	vertically integrated snow	kg/m²	38	201	1
TQG	vertically integrated graupel	kg/m²	40	201	1
RAIN_GSP	rain (s)	kg/m2	102	201	1
SNOW_GSP	snow (s)	kg/m2	79	2	1
GRAU_GSP	graupel (s)	kg/m2	132	201	1
TOT_PREC	total precipitation (s)	kg/m2	61	2	1

T_SNOW	snow temperature	K	203	201	1
W_SNOW	water content of snow cover	kg/m2	65	2	1
RHO_SNOW	density of snow	kg/m3	133	201	1
H_SNOW	height of snow cover	m	66	2	1
SNOWLMT	height of snow line above normal	m	85	201	4
FR_SNOW	snow cover	1	207	203	1
CLCT	total cloud cover	%	71	2	1
CLCL	low cloud cover	%	73	2	1
CLCM	medium cloud cover	%	74	2	1
CLCH	high cloud cover	%	75	2	1
TQC	vertical integrated cloud water	kg/m²	76	2	1
CLCT_AVG	total cloud cover averaged over output interval	%	233	203	1
CAPE_MU	CAPE of most unstable parcel	J/kg	143	201	1
CIN_MU	convective inhibition of most unstable parcel	J/kg	144	201	1
CAPE_ML	CAPE of mean surface layer parcel	J/kg	145	201	1
CIN_ML	convective inhibition of mean surface layer parcel	J/kg	146	201	1
TKE15	turbulent kinetic energy of 15 lowest model layers	m²/s²	208	203	109
TKVM15	momentum diffusion coefficient of 15 lowest model layers	m²/s	212	203	109
TKVH15	heat diffusion coefficient of 15 lowest model layers	m²/s	213	203	109
SOBS_RAD	surface net downward flux shortwave	W/m²	111	2	1
THBS_RAD	surface net downward flux longwave	W/m²	112	2	1
PABS_RAD	surface photosynthetic active radiation (downwelling)	W/m²	5	201	1
SOBT_RAD	TOA net downward shortwave radiation	W/m²	113	2	8
THBT_RAD	TOA net downward longwave radiation	W/m²	114	2	8
SWDIR_S	direct shortwave downwelling radiation flux at the surface	W/m²	22	201	1
SWDIFD_S	diffuse shortwave downwelling radiation flux at the surface	W/m²	23	201	1
SWDIFU_S	diffuse shortwave upwelling radiation flux at the surface	W/m²	24	201	1
ALB_RAD	albedo of the ground	%	84	2	1
SZA0	cosine of solar zenith angle	1	217	203	1
ALB_AVG	surface albedo averaged over output interval	%	201	203	1
TCH	drag coefficient of heat at the surface	1	171	201	1
TCM	drag coefficient of momentum at the surface	1	170	201	1
SHFL_S	sensible heat flux at the surface	W/m²	122	2	1
LHFL_S	latent heat flux at the surface	W/m²	121	2	1
UMFL_S	downward u-momentum flux at the surface	N/m²	124	2	1
VMFL_S	downward v-momentum flux at the surface	N/m²	125	2	1
ASOB_S_AVG	SOBS_RAD averaged over output interval	W/m²	225	203	1
ATHB_S_AVG	THBS_RAD averaged over output interval	W/m²	226	203	1
APAB_S_ABG	PABS_RAD averaged over output interval	W/m²	235	203	1
SWDIR_S_AVG	SWDIR_S averaged over output interval	W/m²	236	203	1
SWDIFD_S_AVG	SWDIFD_S averaged over output interval	W/m²	237	203	1
SWDIFU_s_AVG	SWDIFU_S averaged over output interval	W/m²	238	203	1
ASOB_T_AVG	SOBT_RAD averaged over output interval	W/m²	239	203	1
ATHB_T_AVG	THBT_RAD averaged over output interval	W/m²	240	203	1
SHFL_S_AVG	SHFL_S averaged over output interval	W/m²	222	203	1
LHFL_S_AVG	LHFL_S averaged over output interval	W/m²	223	203	1
LWD_S	longwave downwelling radiation flux at surface	W/m²	25	201	1
LWU_S	longwave upwelling radiation flux at surface	W/m²	26	201	1
LWD_S_AVG	LWD_S averaged over output interval	W/m²	55	203	1
LWU_S_AVG	LWU_S averaged over output interval	W/m²	56	203	1

4. COSMO Namelist

```
 &LMGRID
  startlat_tot=0.08925, startlon_tot=-2.96073,
  dlon=0.00357143, dlat=0.00357143,
  pollat       = 40.0,          pollon = -170.0,
  ie_tot       = 420, je_tot = 420,     ke_tot = 50,
 /
 &RUNCTL
  hstart = 0.0,   hstop = 48.0,    dt      = 4.0,    ydate_ini='2014050600',
  nprocx = 14,  nprocy = 14,   nprocio = 0,
  lphys      = .TRUE.,   luse_rttov    = .FALSE.,  luseobs = .FALSE., leps = .FALSE.,
  lreorder   = .FALSE.,  lreproduce    = .TRUE.,   itype_timing = 4,
  ldatatypes = .TRUE.,   ltime_barrier = .TRUE.,  ncomm_type=1,
  nboundlines= 3, idbg_level=1, ldump_ascii=.TRUE., lartif_data=.FALSE,
  ldiagnos   = .TRUE.,
 /
 &TUNING
  clc_diag  =   0.5,
  pat_len   = 500.0,
  tur_len   = 150.0,
  rlam_heat =   1.0,
  rlam_mom  =   0.0,
  rat_lam   =   1.0,
  rat_can   =   1.0,
  rat_sea   =  20.0,
  c_lnd     =   2.0,
  c_soil    =   1.0,
  c_sea     =   1.5,
  z0m_dia   =   0.2,
  crsmin    = 150.0,
  wichfakt  =   0.0,
  qc0       =   0.0002,
  q_crit    =   1.6,
  mu_rain   =   0.5,
  rain_n0_factor = 0.1,
  v0snow    =    20,
  tkhmin    =   0.4,
  tkmmin    =   0.4,
 /
end_input_org

cat > INPUT_SAT  << end_input_sat
 &SATCTL
 /
end_input_sat

cat > INPUT_IO  << end_input_io
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  lasync_io=.FALSE., ngribout=3,
  yform_read='grb1',
 /
 &DATABASE
 /
 &GRIBIN
  lan_t_so0=.TRUE., lan_t_cl=.TRUE., lan_w_cl=.TRUE., lan_vio3=.TRUE.,
  lan_hmo3=.TRUE., lan_plcov=.TRUE., lan_lai=.TRUE., lan_rootdp=.TRUE.,
  lan_t_snow=.TRUE., lan_w_i=.TRUE., lan_w_snow=.TRUE., lan_rho_snow=.TRUE.,
  lan_w_so=.TRUE.,
  hincbound=1.0,
  lchkini    = .TRUE.,  lchkbd    = .TRUE.,  lbdana=.FALSE.,
  lana_qi    = .TRUE.,  llb_qi    = .TRUE.,  lana_rho_snow=.TRUE.,
  lana_qr_qs = .TRUE.,  llb_qr_qs = .TRUE.,
  lana_qg    = .FALSE.,  llb_qg    = .FALSE.,
  ydirini='',
  ydirbd='',
 /
 &GRIBOUT
    hcomb=0.0,48.0,1.0
    lanalysis=.FALSE.,
```

```
   lcheck=.TRUE.,
   lwrite_const=.TRUE.,
   l_fi_filter=.TRUE.,
   nunit_of_time=13,
   ydir='',
   yvarml='T_G      ','T_SO     ','T_2M     ',
        'T15      ','T_AVG    ','T_G_AVG  ',
        'U_10M    ','V_10M    ','U15      ','V15      ',
        'W15      ','U_AVG    ','V_AVG    ','UV_AVG   ',
        'Z0       ',
        'PS_AVG   ','PS       ','P015     ','PP15     ',
        'PP_AVG   ','P0_AVG   ',
        'W_SO     ','QV_S     ','TD_2M    ','RELHUM_2M ',
        'TDIV_HUM ','AEVAP_S  ','QV15     ','QV_AVG   ',
        'QV_S_AVG' ,
        'PRR_GSP  ','PRS_GSP  ','PRG_GSP  ','TWATER   ',
        'TQV      ','TQI      ','TQR      ','TQS      ',
        'TQG      ','RAIN_GSP ','SNOW_GSP ','GRAU_GSP ',
        'TOT_PREC ','T_SNOW   ','W_SNOW   ','RHO_SNOW ',
        'FR_SNOW  ','H_SNOW   ','SNOWLMT  ',
        'CLCT     ','CLCL     ','CLCM     ','CLCH     ',
        'TQC      ',
        'CLCT_AVG ',
        'CAPE_MU  ','CIN_MU   ','CAPE_ML  ','CIN_ML   ',
        'TKE15    ','TKVM15   ','TKVH15   ',
        'ASOB_S_AVG','ATHB_S_AVG','APAB_S_AVG',
        'ASOB_T_AVG','ATHB_T_AVG',
        'SOBS_RAD ','THBS_RAD ','PABS_RAD ',
        'SOBT_RAD ','THBT_RAD  ',
        'SWDIR_S_AVG ','SWDIFD_S_AVG ','SWDIFU_S_AVG ',
        'SWDIR_S  ','SWDIFD_S ','SWDIFU_S ',
        'ALB_RAD  ','ALB_AVG',
        'SZA0     ','TCH      ','TCM      ',
        'CLCT     ','CLCL     ','CLCM     ','CLCH     ',
        'UMFL_S   ','VMFL_S   ','SHFL_S   ','LHFL_S   ',
        'SHFL_S_AVG','LHFL_S_AVG',
        'LWD_S    ','LWU_S    ','LWD_S_AVG ','LWU_S_AVG ',
      /
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cat > INPUT_DYN << end_input_dyn
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   l2tls=.TRUE., lcond=.TRUE., ldyn_bbc=.FALSE., ldiabf_lh=.TRUE.,
   l_diff_Smag=.TRUE., y_scalar_advect='BOTT2_STRANG',
   lspubc=.TRUE.,
   betasw=0.4, epsass=0.15,
   itype_hdiff=2, hd_dhmax=250.,
   hd_corr_trcr_bd=0.0, hd_corr_t_bd=0.75, hd_corr_u_bd=0.75, hd_corr_p_bd=0.75,
   hd_corr_trcr_in=0.0, hd_corr_t_in=0.0,  hd_corr_u_in=0.1,  hd_corr_p_in=0.0,
   irunge_kutta=1, irk_order=3, iadv_order=5, itype_fast_waves=2,
   itype_bbc_w=114,
   nrdtau=5, xkd=0.1,
   rlwidth=20000.0, itype_outflow_qrsg=2,
 /
end_input_dyn

cat > INPUT_PHY << end_input_phy
 &PHYCTL
   lgsp=.TRUE.,
     itype_gscp=4,
   lrad=.TRUE.,
     nradcoarse=1,
     lradf_avg=.FALSE.
     hincrad=0.05,
     lforest=.FALSE.,
     itype_albedo=1,
     lradtopo=.FALSE.,
   ltur=.TRUE.,
     ninctura=1,
     lexpcor=.FALSE.,
```

```
      ltmpcor=.FALSE.,
      lprfcor=.FALSE.,
      lnonloc=.FALSE.,
      lcpfluc=.FALSE.,
      limpltkediff=.TRUE.,
      itype_turb=7,!DE default is 3
      imode_turb=1,
      itype_tran=2,!DE default is 2
      imode_tran=1,
      itype_wcld=2,
      icldm_rad =4,
      icldm_turb=2,
      icldm_tran=0,
      itype_synd=2,
      lprog_tke=.TRUE.
    lsoil=.TRUE.,
      itype_evsl=2,
      itype_trvg=2,
      lmulti_layer=.TRUE.,
      lmelt=.TRUE.,
      lmelt_var=.TRUE.,
      ke_soil = 7,
      czml_soil = 0.005, 0.02, 0.06, 0.18, 0.54, 1.62, 4.86, 14.58,
    lconv=.TRUE.,
      lcape=.FALSE.,
      lconf_avg=.TRUE.,
      lconv_inst=.TRUE.,
      itype_conv=3,
      nincconv=10,
    llake=.FALSE.,
    lseaice=.FALSE.,
    lsso=.FALSE.,
      ltkesso=.TRUE.,
 /
end_input_phy

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 &DIACTL
  itype_diag_gusts=4,
  n0meanval=0, nincmeanval=1,
  lgplong=.TRUE., lgpshort=.FALSE., lgpspec=.FALSE.,
  n0gp=0,      hincgp=0.25,
 /
end_input_dia


cat > INPUT_EPS << end_input_eps
 &EPSCTL
  iepsmem=0, iepstyp=55, iepstot=15,
 /
end_input_eps

cat > INPUT_ASS << end_input_ass
 &NUDGING
  lnudge  =.false.,
 /
end_input_ass
```