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**************************
* Burn7 7.0 (burn7)  *
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```

New feature: The postprocessor can process all filetypes of previous versions (packed or unpacked raw data) and the new SERVICE-compatible format of PUMA-16 in 32-bit and 64-bit precision.

New feature: variable selection by name
variables are selected by name or code
CODE=130,131,132 is equivalent to:
CODE=ta,ua,va
"burn7 -c" shows a list of codes and names

New feature: Grads Control file
Option -g creates a Grads Control file for display of service files in GrADS.
burn7 <burn.nl >burn.out -g MOST.001 mydata
writes the files mydata.srv and mydata.ctl.
After calling grads do an "open mydata.ctl" and "q file" for a list of file properties.

Usage: burn7 [-c|-d|-g|-h|-n] <namelist >printout modelfile resultfile
-c : Print list of codes - don't run
-d : Debug mode - print additional info
-g : Write Grads control file (ctl)
-h : Show this file
-n : Set output format to NetCDF

Namelist: VTYPE = , HTYPE = , CODE = , MODLEV= , hPa = , MEAN = , LONS = , LATS = , NETCDF= , HEAD7 = , MARS = , MULTI =

VTYPE = Sigma or S: Sigma (Model) level
VTYPE = Pressure or P: Pressure level

HTYPE = Spherical Harmonics or S
HTYPE = Fourier Coefficients or F
HTYPE = Zonal Means or Z
HTYPE = Gauss Grids or G

LATS = Dimension (number of latitudes)
LONS = Dimension (number of longitudes)

The burn7 defaults to the dimension of the model run, e.g. Lats=32 and Lons=64 for a T21 resolution. Note however, that this results in Gaussian grids with non equidistant latitudes. Selecting for Lats and Lons values, that are different from the internal resolution, produces equidistant lat-lon grids.
Lats sets the number of latitudes from North to South, with the northpole at index 1 and the southpole at index Lats.
Delta Phi is therefore 180 degrees / (Lats - 1).
Lons sets the number of gridpoints on every latitude circle.
Delta Lambda is 360 degrees / Lons.
Index 1 is on Greewich (0 degrees), while the last index denotes the point (360 degrees - Delta Lambda).

CODE = list of ECMWF field code (see table)
or Id (following AMIP II convention)

Code	Id	Name	Units
110	mld	Mixed Layer Depth	m
129	sg	Surf. Geopotential Orography	m2/s2
130	ta	Temperature	K
131	ua	Zonal Wind	m/s
132	va	Meridional Wind	m/s
133	hus	Specific Humidity	kg/kg
134	ps	Surface Pressure	hPa
135	wap	Vertical Velocity	Pa/s
137	wa	Vertical Wind	m/s
138	zeta	Vorticity	1/s
139	ts	Surface Temperature	K
140	mrso	Soil Wetness	m
141	snd	Snow Depth	m
142	prl	Large Scale Precipitation	m/s
143	prc	Convective Precipitation	m/s
144	prsn	Snow Fall	m/s
145	bld	Boundary Layer Dissipation	W/m**2
146	hfss	Surface Sensible Heat Flux	W/m**2
147	hfls	Surface Latent Heat Flux	W/m**2
148	stf	Streamfunction	m**2/s
149	psi	Velocity Potential	m**2/s
151	psl	Mean Sea Level Pressure	hPa
152	pl	Log Surface Pressure	
155	d	Divergence	1/s
156	zg	Geopotential Height	gpm
157	hur	Relative Humidity	%
158	tps	Tendency of Surface Pressure	Pa/s
159	u3	ustar **3	m**3/s**3
160	mrro	Surface Runoff	m/s
161	clw	Liquid Water Content	kg/kg
162	cl	Cloud Cover	0-1
163	tcc	Total Cloud Cover	0-1
164	clt	Total Cloud Cover (Mean)	0-1
165	uas	Eastward Wind 10m	m/s
166	vas	Northward Wind 10m	m/s
167	tas	2m Temperature	K
168	td2m	2m Dew Point Temperature	K
169	tsa	Surface Temperature Accumulated	K
170	tsod	Deep Soil Temperature	K
172	lsm	Land Sea Mask	
173	z0	Surface Roughness	m
174	alb	Surface Albedo	
176	ssr	Surface Solar Radiation	W/m2
177	rss	Surface Thermal Radiation	W/m2
178	rst	Top Solar Radiation	W/m2
179	rlut	Top Thermal Radiation	W/m2
180	tauu	U-Stress	Pa
181	tauv	V-Stress	Pa
182	evap	Evaporation	m/s
183	tso	Soil Temperature	K
184	wsoi	Soil Wetness	
199	vegc	Vegetation Cover	
203	rsdt	Top Solar Radiation Upward	W/m2
204	ssru	Surface Solar Radiation Upward	W/m2
205	stru	Surface Therm Radiation Upward	W/m2
207	tso2	Soil Temperature Level 2	K
208	tso3	Soil Temperature Level 3	K
209	tso4	Soil Temperature Level 4	K
210	sic	Sea Ice Cover	
211	sit	Sea Ice Thickness	m
212	vegf	Forest Cover	
218	snm	Snow Melt	m/s
221	sndc	Snow Depth Change	m/s
230	prw	Vert. Integrated Spec. Hum.	kg/m2
232	glac	Glacier Cover	
259	spd	Wind Speed	m/s
260	pr	Total Precipitation	m/s
261	ntr	Net Top Radiation	W/m2
262	nbr	Net Bottom Radiation	W/m2
263	hfns	Net Heat Flux	W/m2
264	wfn	Net Water Flux	m/s

Warning: The availability of codes depends on the model version
Only internal model variables are available on model levels (VTYPE=Sigma), derived variables, e.g. Geopotential height are only available at pressure levels.

MODLEV = integer array of model levels to extract (1 = top level) for VTYPE=Sigma
If not set MODLEV defaults to all available levels.

hPa = real array of pressure levels in [hPa] (mbar) for VTYPE=Pressure
If not set hPa defaults to 10 levels from 100 - 1000 hPa.

MEAN = 0 : Do no averaging

MEAN = 1 : Compute and write monthly means
Not for spherical harmonics, Fourier coefficients or zonal means on sigma levels

MEAN = 2 : Compute monthly standard deviations.
Not for spherical harmonics, Fourier coefficients or zonal means on sigma levels

MEAN = 3 : Combination of MEAN=1 and MEAN=2.

NETCDF = 1 : The result is written in NetCDF.
The extension "**.nc**" is added to the filename.

NETCDF = 0 : The resul is written in SERVICE.
The extension "**.srv**" is added to the filename.

The SERVICE format uses the following structure:
The whole file consists of pairs of
header records and data records.
The header record is an integer array of 8 elements.

head(1) = ECMWF field code
head(2) = modellevel or pressure in [Pa]
head(3) = date [yymmdd] (dd=00 monthly means)
head(4) = time [hhmm]
head(5) = 1. dimension of data array
head(6) = 2. dimension of data array
head(7) = may be set with the parameter HEAD7
head(8) = free

Example for reading the SERVICE format (NETCDF=0)

```
INTEGER HEAD(8)
REAL    FIELD(64,32)  ! dimensions for T21 grids
READ (10,ERR=888,END=999) HEAD
READ (10,ERR=888,END=999) FIELD
....
888 STOP 'I/O ERR'
999 STOP 'EOF'
```

....

HEAD7 = 0 : This parameter is for your use.
All header records take this value to their 7th. element.

MARS = 0 : All constants set for earth
MARS = 1 : Use gravity, gas constant and radius for Mars.

MULTI = 0 : Process only one input file
MULTI = n : Process "n" input files,
each containing one year or month.
Put only the name of the first input file on the command line. All subsequent files are expected to be in the same directory.
The filenames must be organised in one of the following patterns (Y=Year, M=Month):

```
EXP.YYY       1 file/year  ( 000   - 999   )
EXP_YYYY      1 file/year  (0000   - 9999  )
EXP_YYYYMM    1 file/month (000001 - 999912)
EXPYYYMM      1 file/month ( 00001 -  99912)
EXPYYMM       1 file/month (  0001 -   9912)
```

Example of namelist:

```
# This is a comment
# -----------------
VTYPE  = Pressure
HTYPE  = Grid
CODE   = ta,ua,va
hPa    = 200,500,700,850,1000
Lats   = 19
Lons   = 36
MEAN   = 0
NETCDF = 0
```

This namelist will write Temperature(130), u(130) and v(131) on pressure levels 200hPa, 500hPa, 700hPa, 850hPa and 1000hPa.
The output interval is the same as found on the model data, e.g. every 12 or every 6 hours (MEAN=0). The output format is SERVICE format on a regular grid (36 x 19) with a 10 degree spacing between grid points.

7. Troubleshooting:

Check your namelist, especially for invalid codes, types and levels.

Rerun the burn7 with the option -d
You get lots of additional information for debugging purposes.

e.g: burn7 <my_namelist >myoutput -d modelfile resultfile