Appendix III – Collected Questionnaire replies

1. Information about stations and data

1. Basic information				
	Country	**Who operates the network**	**Network density (n^o/10 000 km^2)**	
			Meteorological	**Hydrological**
1.	Austria	- Environment Agency Austria - Central Institute for Meteorology and Geodynamics Austria - Hydrographic Service - Kalkalpen National Park	12 / 625 km^2	-
2.	Bulgaria	National Institute of Meteorology and Hydrology	33 only conventional synoptic, climatological and precipitation stations)	-
3.	Croatia	DHMZ	7 – main 21 – climatological 60 – precipitation 6 – automated	56 – hydrological recording stations 37 – hydrological non-recording stations 18 – automated hydrological stations
4.	Greece	- Hellenic National Meteorological Service - Ministry of Rural Developement & Food - Ministry of Environment Energy & Climate Change	-	-
5.	Hungary	OMSZ	59 – precipitation 13 – automatic weather station with	-

			or without observer and climatological stations	
6.	Italy – CMCC	- ARPA PUGLIA (AP) - UCEA-CRA (UC) - Areonautica Militare (AM) - Servizio Protezione Civile Ex-SIMN (SPC) - Rete Agrometeorologica Regionale (RAR)	- AP: 2.58 - UC: 1.55 - AM: 7.23 - RAR: 49.58	-
			SPC Ex-SIMN: 85.21	
7.	Italy – Trento	Autonomous Province of Trento Civil Protection Department	330	-
8.	FRY of Macedonia	HMS of Macedonia	8 - main 6 - climatological 46 - precipitation 4 – automated weather stations	44 hydrological 7 automated hydrological stations
9.	Republic of Srpska	National Hydrometeorological Service	10	-
10.	Romania	- Romanian National Meteorological Administration - National Company Romanian Waters	6,7	-
11.	Serbia	Republic Hydrometeorological Service of Serbia	3.5 - main 6.8 - climatological 54 - precipitation 3.4 - automated	21.5
12.	Ukraine	Hydrometeorological center Black and Azov sees	3	-

2.A Number of stations - Total number of stations (per country / pilot area)									
	Country		**Main met. stations**	**Clim. stations**	**Prec. stations**	**Mountain stations**	**Automatic met. stations**	**Hyd. stations**	**Other**
1.	Austria		7	2	5	6	9	7	-
2.	Bulgaria		36 Partly automated with observer; NIMH uses data from additional 6 met stations belonging to a Danube agency (all 6 are located at the Danube river	89 mainly manual obs.	244 only manual obs.	31 - 5 main met. stations; - 4 clim stations; - 22 precipitation stations	36 Located at the main station areas	21 automatic stations	- -
3.	Croatia		20 Partly automated with observer	117 only manual observations	336 including 15 current automatic stations	1 Zavizan on Velebit mountain (Northern Adriatic coast)	32 Coolocated with main met. stations	522 313 are recording gauges while 209 are non-gauges and 100 is automated.	60 Some of them are coolocated with meteorological stations
4.	Greece		-	-	-	-	-	-	-
5.	Hungary		22 automatic with observer	1 only manual observations	472 including 8 automatic stations (from 2010)	1 Kékestető (main station with automatic and manual observations)	118 -	- -	12 4 atmospheric background stations, 8 wind stations at Balaton
6.	Italy – CMCC	AP UC AM SPC RAR	5 3 9+5 145 96	Some of the SPC Ex-SIMN stations are also climatological, no indication on the number	5 3 9+5 145 96	none none none 1 none	5 3 9+5 85 96	SPC - 22	-
7.	Italy - Trento		208	-	208	109	208	-	-

		Stations include precipitation and climatological stations: ONLY STATIONS NOW OPERATING AND AUTOMATIC	-	-	-	-	-	-
8.	FRY of Macedonia	15	14	116	4	10	110	24
		partly automated with professional observers	only manual observations	Precipitation measurements and phenomena observation	Mountain main stations	Colocated with main met. Stations or set aside	18 authomatic station	Some of them are coolocated with meteorological stations
9.	Republic of Srpska	1	24	-	1	7	19	7 – phenol from 2012
10.	Romania	159	159	66	21	122	-	-
		Our national meteorological network is not divided in main meteorological stations and climatological stations	All meteorological stations are performing climatological programs (of first and of second order)	only precipitation measurements all seasons	-	-	-	-
11.	Serbia	31	60	476	30	30	190	92- pheno
		Stations include measurement program of climatological and precipitation stations	Stations include measurement program of precipitation stations	-	-	29 stations operating as main stations	-	Long series of data are relatively rare and number of missing data is considerable
12.	Ukraine	11	1	11	-	3	2	6 - pheno
		Stations include measurement program of precipitation stations.	Stations include measurement program of climatological and precipitation stations	-	-	-	-	Long series of data are relatively rare and number of missing data is considerable

2.B Number of stations - Number of stations with measurements in the last 10 years									
	Country		**Main met. stations**	**Clim. stations**	**Prec. stations**	**Mountain stations**	**Automatic met. stations**	**Hyd. stations**	**Other**
1.	Austria		-	-	-	-	-	-	-
2.	Bulgaria		36	87	244	31	10	210	28
3.	Croatia		40	117	336	2	32	522	(and operational in present) 60- pheno
4.	Greece		-	-	-	-	-	-	-
5.	Hungary		22	1	450	1	81	-	(and operational in present) Rime - 7 Wind - 6 Aerological - 1 Atm. background - 4
6.	Italy – CMCC	AP UC RAR	5 1 70	-	5 1 70	none	5 1 70	-	-
7.	Italy - Trento		52	-	52	32	52	-	-
8.	FRY of Macedonia		20	14	116	4	10	110	(and operational in present) 19 - pheno
9.	Republic of Srpska		1	15	-	-	-	-	-
10.	Romania		159	159	66	21	122	-	(and operational in present) 55
11.	Serbia		31	59	453	33	1	187	50 - pheno
12.	Ukraine		-	-	-	-	3	-	-

2.B Number of stations - Number of stations with measurements in the last 20 years									
	Country		**Main met. stations**	**Clim. stations**	**Prec. stations**	**Mountain stations**	**Automatic met. stations**	**Hyd. stations**	**Other**
1.	Austria		6	-	2	6	6	1	-
2.	Bulgaria		36	85	240	31	-	190	28
3.	Croatia		40	117	336	2	-	522	(and operational in present) 50-pheno
4.	Greece		-	-	-	-	-	-	-
5.	Hungary		15	1	229	1	-	-	(and operational in present) Rime - 3 Aerological - 1 Atm. background - 1
6.	Italy – CMCC	UC RAR	2 26	-	2 26	none	2 26	-	-
7.	Italy - Trento		16	-	16	12	16	-	-
8.	FRY of Macedonia		20	14	116	4	-	110	(and operational in present) 9 - pheno
9.	Republic of Srpska		1	-	-	-	-	-	-
10.	Romania		159	159		21	0		(and operational in present) 55
11.	Serbia		31	55	435	33	-	183	30-pheno
12.	Ukraine		-	-	-	-	-	-	-

2.B Number of stations - Number of stations with measurements in the last 30 years								
	Country	**Main met. stations**	**Clim. stations**	**Prec. stations**	**Mountain stations**	**Automatic met. stations**	**Hyd. stations**	**Other**
1.	Austria	-	-	-	-	-	-	-
2.	Bulgaria	34	85	240	30	-	190	28
3.	Croatia	40	117	336	2	-	522	(and operational in present) 45-pheno
4.	Greece	-	-	-	-	-	-	-
5.	Hungary	15	1	177	1	-	-	(and operational in present) Rime - 3 Aerological - 1
6.	Italy – CMCC	-	-	-	-	-	-	-
7.	Italy - Trento	7	-	7	6	7	-	-
8.	FRY of Macedonia	20	14	116	4	-	110	(and operational in present) 9 - pheno
9.	Republic of Srpska	1	-	-	-	-	-	-
10.	Romania	142	142	-	18	0	-	(and operational in present) 55
11.	Serbia	30	52	434	31	-	178	29-pheno
12.	Ukraine	-	-	-	-	-	-	-

2.B Number of stations - Number of stations with measurements in the last > 30 years									
	Country		**Main met. stations**	**Clim. stations**	**Prec. stations**	**Mountain stations**	**Automatic met. stations**	**Hyd. stations**	**Other**
1.	Austria		1	2	3	-	3	2	-
2.	Bulgaria		33	85	240	30	-	190	28
3.	Croatia		35	110	330	2	-	510	(and operational in present) 40-pheno
4.	Greece		-	-	-	-	-	-	-
5.	Hungary		15	1	33	1	-	-	-
6.	Italy – CMCC	AM	9+5	-	9+5	none	9+5	SPC – 22?	-
7.	Italy - Trento		54	-	54	18	54	-	-
8.	FRY of Macedonia		13	14	116	3	-	110	(and operational in present) 5 - pheno
9.	Republic of Srpska		1	-	-	-	-	-	-
10.	Romania		129	129	-	14	0	-	(and operational in present) 45
11.	Serbia		29	43	434	30	-	164	25-pheno
12.	Ukraine		11	1	11	-	-	2	6 - pheno

2.B Number of stations - Number of stations with measurements since 1971 till 2000 with less then 10% of missing data								
	Country	**Main met. stations**	**Clim. stations**	**Prec. stations**	**Mountain stations**	**Automatic met. stations**	**Hyd. stations**	**Other**
1.	Austria	1	2	3	-	3	2	-
2.	Bulgaria	33	78	220	30	-	190	28
3.	Croatia	35	110	330	2	-	510	40 - pheno
4.	Greece	-	-	-	-	-	-	-
5.	Hungary	15	4	177	1	-	-	-
6.	Italy – CMCC	-	-	-	-	-	SPC – 22?	-
7.	Italy - Trento	45/62 (NOW OPERATING/ACTIVE IN 1971-2000)	-	45/62 (NOW OPERATING/ACTIVE IN 1971-2000)	14/22 (NOW OPERATING/ACTIVE IN 1971-2000)	45/62 (NOW OPERATING/ACTIVE IN 1971-2000)	-	-
8.	FRY of Macedonia	13	14	120	4	-	110	9 - pheno
9.	Republic of Srpska	1	5	-	-	-	3	-
10.	Romania	126	126	-	14	0	-	(and operational in present) 45
11.	Serbia	29	43	434	30	-	200	33 - pheno
12.	Ukraine	11	1	11	-	3	2	6 - pheno

4.A Measurements of temperature and precipitation										
	Country		Temperature				Precipitation			
			n° of stations	Beg.	Access.	Comm.	n° of stations	Beg.	Access.	Comm.
1.	Austria		9	1900/ 1990	2 (5)	-	9	1900/ 1990	2 (5)	-
2.	Bulgaria		112	1892	4; 5	These concern only up today working station - not all available data	332	1892	4; 5	These concern only up today working station - not all available data
3.	Croatia		117	1961	3, 5	-	336	1961	3, 5	-
4.	Greece		-	-	-	-	-	-	-	-
5.	Hungary		101	1996	3, 5	-	177	1961	3, 5	-
6.	Italy – CMCC	AP UC AM SPC RAR	5 3 9+5 85 99	2010 1991/ 2011 1950(1858) ??? 1994/2007	1 1 5 2 2	-	5 3 9+5 99 96	2010 1991/ 2011 1950(1858) ??? 1994/2007	1 1 5 2 2-	-
7.	Italy - Trento		87	1985	1	For most stations data are available from 1991	82	1921	1	For two main group of stations data are available from 1975 and 1991
8.	FRY of Macedonia		27	1951	3,5	-	146	1961	3,5	-
9.	Republic of Srpska		6	-	Online data from 1996. Older meas. internally	Different start of measurements. Most of them in 1892.	6	-	Online data from 1996. Older meas. internally	-

10.	Romania	126	1971	3,4,5	1971 – present and operational in present	126	1971	3,4,5	1971 – present and operational in present
11.	Serbia	100	1949	2 and 3	-	100	1949	2 and 3	-
12.	Ukraine	11	1928	2 and 3	-	11	1928	2 and 3	-

4.A Measurements of temperature										
	Country		Minimum temperature				Maximum temperature			
			n° of stations	Beg.	Access.	Comm.	n° of stations	Beg.	Access.	Comm.
1.	Austria		9	1900/ 1990	2 (5)	-	9	1900/ 1990	2 (5)	-
2.	Bulgaria		105	1892	4; 5	These concern only up today working station - not all available data	112	1892	4; 5	These concern only up today working station - not all available data
3.	Croatia		117	1961	3, 5	-	117	1961	3, 5	-
4.	Greece		-	-	-	-	-	-	-	-
5.	Hungary		101	1996	3, 5	-	101	1996	3, 5	-
6.	Italy – CMCC	UC AM SPC RAR	3 9+5 85 99	1991/ 2011 1950(1858) ??? 1994/2007	1 5 2 2	-	3 9+5 85 96	1991/ 2011 1950(1858) ??? 1994/2007	1 5 2 2	-
7.	Italy - Trento		71	1925	1	For two main group of stations data are available from 1975 and 1991	71	1925	1	For two main group of stations data are available from 1975 and 1991
8.	FRY of Macedonia		27	1961	3,5	-	27	1961	3,5	-
9.	Republic of Srpska		5	-	Online data from 1996. Older meas. internally	-	5	-	Online data from 1996. Older meas. internally	-
10.	Romania		126	1971	3,4,5	1971 – present and	126	1971	3,4,5	1971 – present and

					operational in present				operational in present
11.	Serbia	99	1949	2 and 3	-	99	1949	2 and 3	-
12.	Ukraine	11	1928	2 and 3	-	11	1928	2 and 3	-

4.B Other measurements and observations										
	Country		Wind direction and speed				Relative humidity			
			n° of stations	Beg.	Access.	Comm.	n° of stations	Beg.	Access.	Comm.
1.	Austria		9	1900/ 1990	2 (5)	-	9	1960/ 1990	2 (5)	-
2.	Bulgaria		112	1892	4,5	-	112	1892	4,5	
3.	Croatia		117	1961	3, 5	-	117	1961	3, 5	-
4.	Greece		-	-	-	-	-	-	-	-
5.	Hungary		101	1996	3, 5	-	101	1996	3, 5	-
6.	Italy – CMCC	AP UC AM SPC RAR	5 3 9+5 10 96	2010 1991/ 2011 1950(1858) ??? 1994/2007	1 1 5 2 2	-	5 3 9+5 13 96	2010 1991/ 2011 1950(1858) ??? 1994/2007	1 1 5 2 2	-
7.	Italy - Trento		25	2004	1	-	36	2004	1	-
8.	FRY of Macedonia		13	1961	3,5	+6 main stations from 1980	13	1961	3,5	+6 main stations from 1980
9.	Republic of Srpska		4	-	Internally	-	4	-	Internally	-
10.	Romania		97	1971	3,4,5	1971 – present and operational in present	126	1971	3,4,5	1971 – present and operational in present
11.	Serbia		28	1949	2 and 3	-	60	1949	2 and 3	-
12.	Ukraine		11	1928	2 and 3	-	11	1928	2 and 3	-

4.B Other measurements and observations									
	Country	Duration of sunshine				Cloud cover			
		n° of stations	Beg.	Access.	Comm.	n° of stations	Beg.	Access.	Comm.
1.	Austria	1	1960	2 (5)	-	1	1960	2 (5)	-
2.	Bulgaria	34	1925	4;5	-	330	1892	4;5	-
3.	Croatia	50	1961	3, 5	-	117	1961	3, 5	-
4.	Greece	-	-	-	-	-	-	-	-
5.	Hungary	16	1961	3, 5	-	16	1961	3, 5	-
6.	Italy – CMCC	-	-	-	-	-	-	-	-
7.	Italy - Trento	-	-	-	-	-	-	-	-
8.	FRY of Macedonia	13	1961	3,5	-	27	1961	3,5	-
9.	Republic of Srpska	3	-	Internally	-	4	-	Internally	-
10.	Romania	118	1971	3,4,5	1971 – present and operational in present	81	1971	3,4,5	1971 – present and operational in present
11.	Serbia	46	1949	2 and 3	-	100	1949	2 and 3	-
12.	Ukraine	11	1928	2 and 3	-	11	1928	2 and 3	-

4.B Other measurements and observations									
	Country	Soil temperature				Snow depth			
		n° of stations	Beg.	Access.	Comm.	n° of stations	Beg.	Access.	Comm.
1.	Austria	1	1993	2 (5)	-	7	1980/ 1990	2 (5)	-
2.	Bulgaria	51	1921	4;5	Available not from the beginning of observation – only last 50 years	330	1892	4,5	-
3.	Croatia	50	1961	3, 5	-	117	1961	3, 5	-
4.	Greece	-	-	-	-	-	-	-	-
5.	Hungary	28	1996	3, 5	-	22	1961	3, 5	-
6.	Italy – CMCC	UC – 3 RAR - 61	UC - 2 from 1991, one from 2011 RAR - 1994	UC – 1 RAR - 2	-	-	-	-	-
7.	Italy - Trento	-	-	-	-	-	-	-	-
8.	FRY of Macedonia	9	1961	3,5	-	146	1961	3,5	-
9.	Republic of Srpska	1	-	Internally	Banja Luka from 1983.	3	-	Internally	Other station less than 15 years.
10.	Romania	107	1971	3,4,5	1971 – present and operational in present	76	1971	3,4,5	1971 – present and operational in present
11.	Serbia	20	1951	2 and 3	-	100	1949	2 and 3	-
12.	Ukraine	11	1928	2 and 3	-	11	1928	2 and 3	-

4.B Other measurements and observations									
	Country	River discharge				Phenology			
		n° of stations	Beg.	Access.	Comm.	n° of stations	Beg.	Access.	Comm.
1.	Austria	3	1957/ 1990	2	-	-	-	-	-
2.	Bulgaria	-	-	-	-	-	-	-	-
3.	Croatia	522	1961	3,5	-	60 60 60 60	1961 1961 1961 1961	3,5	Foliation Blooming Fruit ripening Leaf fall
4.	Greece	-	-	-	-	-	-	-	-
5.	Hungary	-	-	-	-	-	-	-	-
6.	Italy – CMCC	-	-	-	-	-	-	-	-
7.	Italy - Trento	-	-	-	-	-	-	-	-
8.	FRY of Macedonia	110	1961	3,5	-	24 24 24 24	1961	3,5	Foliation Blooming Fruit ripening Leaf fall
9.	Republic of Srpska	3	-	Online data from 1996. Older meas. internally	-	-	-	-	-
10.	Romania	-	-	-	-	-	-	-	-
11.	Serbia	140	1925	3 and 5	For the most of the stations, data are available from 1950	20 20 30	1961 1961 1961	2 and 3	Foliation Blooming Leaf fall
12.	Ukraine	2	1944	3 and 5	For the most of the stations, data are available from 1950	6 6 6	1965 1965 1965	2 and 3	Foliation Blooming Leaf fall

5. Daily data - Temperature					
	Country	**Number of measurements per day**	**Measurements time (UTC)**	**Daily average**	**Comments**
1.	Austria	3	7, 14, 21	**-**	depends on station holder
2.	Bulgaria	- *Main* – 8 times - *Clim* – 3 times	- *Main* – 02,05,08,11, 14,17,20,23 local time - *Clim* – 07,14,21 local time	- *Main* – average of all daily data - *Clim* – $(T_{07}+T_{14}+2*T_{21})/4$	Commonly BG local time= UTC + 2 hours
3.	Croatia	- *Main* – every 10 minutes - *Climatological* – 3 times per day	*Main* – every 10 minutes *Climatological* – 06, 13 and 20 UTC or hourly	mean of four values ($t\_mean=(t06+t13+2 \times t20u)/4$)	-
4.	Greece	-	-	-	-
5.	Hungary	- *Main* – every 10 minutes - *Climatological* – 3 or 24	- *Main* – every 10 min - *Climatological* – 06, 12 and 18 UTC or hourly	mean of four values d_ta= (t01+t07+t13+t19)/4	-
6.	Italy – CMCC	AP – 48 UC – 24 AM – 24 SPC – 48 RAR – 24	AM - every 10min SPC – every 1/2h or daily RAR – every 10 min	AP – no calculation UC – no calculation AM – no calculation SPC – no indication on the method RAR – no indication on the method	-
7.	Italy - Trento	96	Every 15 minutes	Trapezoidal calculation $Sum(i=1..n-1)\ 0.5(D_{i+1}+D_i)*(T_{i+1}-T_i)) / (T_n-T_1)$	-
8.	FRY of Macedonia	- *Main* -24 - *Climatological* -3	- *Main* -hourly - *Climatological* -	mean of four values ($t\_mean=(t06+t13+2 \times t20)/4$)	Every 10 minutes from AWS

			06,13,20 UTC		
9.	Republic of Srpska	- *main station Banja Luka* - 24 - *climatological* - 3	*Climatological* – 07,14,21 local	Daily average (T7+T14+2*T21)/4	-
10.	Romania	- *122 stations* - 24 measurements per day - *37 stations* - 10 measurements per day	00 – 23UTC 05 - 09, 11,12,17-19UTC	$(t_{00UTC}+t_{06UTC}+t_{12UTC}+t_{18UTC})/4$	-
11.	Serbia	- *Main* -24 - *Climatological* -3	- *Main* – every hour - *Climatological* – 6,13,20	- *Main* - arithmetic mean - *Climatological* - (T7+T14+2*T21)/4	-
12.	Ukraine	Main - 8	Main – every 3 hours	Main - arithmetic mean	**-**

5. Daily data - Precipitation						
	Country	**Number of measurements per day**	**Start time (UTC)**	**End time (UTC)**	**Date for reporting**	**Comments**
1.	Austria	At least hourly	**-**	**-**	**-**	depends on station holder
2.	Bulgaria	- *Main* - 4 times - *Clim & prec* - 1 times	- *Main* - 02,08,14, 20 local time - *Clim & prec* - 07 local time	-	- *Main* - on the same day - *Clim & prec* - the day in which precipitation is measured	Commonly BG local time= UTC + 2 hours
3.	Croatia	*Main* – every 10 minutes *Climatological* – 1	6 UTC	6UTC	Date of end time	-
4.	Greece	-	-	-	-	
5.	Hungary	- *Main* – every 10 minutes - *Climatological* – 1 or 3	6 UTC	6UTC	Date of end time	-
6.	Italy – CMCC	AP – 48 UC – 24 AM – 24 SPC – 48 RAR - 24	-	-	-	AM – every 10 min SPC – every 1/2h or daily RAR - every 10 min
7.	Italy - Trento	288	08	08	Date of end time	For daily data we calculate the total precipitation from 08 to 08
8.	FRY of Macedonia	*Main* – 1 (once a day) *Climatological* – 1 (once a day)	6 UTC	6UTC	Date of end time	-

9.	Republic of Srpska	- *main station Banja Luka* - 4 - *climatological* - 1	06h 07h local	06h next day 07h local next day	Tomorrow 06h Tomorrow 07h	-
10.	Romania	4 per day	18UTC day 'dd'	18UTC day 'dd'+1	'dd'+1	**-**
11.	Serbia	1	6	6	Date of end time	-
12.	Ukraine	2	06	18	Date of end time	-

5. Daily data - Minimum temperature					
	Country	**Measurements time (UTC)**	**Period of validity (i.e. 12h/24h)**	**Start & end of period validity**	**Comments**
1.	Austria	-	-	-	Depends on application
2.	Bulgaria	- *Main* – 8 times - *Clim* – 3 times	2 times per day: 06 and 20 UTC	-	-
3.	Croatia	- *Main* – every 10 minutes - *Climatological* – 20 UTC	24	20-20UTC	-
4.	Greece	-	-	-	-
5.	Hungary	- *Main* – every 10 minutes - *Climatological* – 06 UTC	24	18 - 18UTC	-
6.	Italy – CMCC	AP – no calculation Others ???	-	-	-
7.	Italy - Trento	1	24	08 - 08 UTC	-
8.	FRY of Macedonia	- *Main* – 1 (once a day) - *Climatological* – 1 (once a day)	- *Main* -12 - *Climatological* - 24	18 – 06 UTC 20 - 20 UTC	-
9.	Republic of Srpska	- *main station Banja Luka* - 06h and 20h - *climatological* - 07h and 21h local	24 h 24 h	From 06h till 06h From 07h till 07h	-
10.	Romania	00,06,12,18UTC	24h/24h	18UTC – 18UTC	-
11.	Serbia	1	- *Main* – 12 - *Climatological* - 24	18 - 06 UTC 21h - 21h	-
12.	Ukraine	Main – every 3 hours	Main-24	03-06-09-12-15-18-21-24 UTC	-

5. Daily data - Maximum temperature					
	Country	**Measurements time (UTC)**	**Period of validity (i.e. 12h/24h)**	**Start & end of period validity**	**Comments**
1.	Austria	-	-	-	Depends on application
2.	Bulgaria	- *Main* – 8 times - *Clim* – 3 times	2 times per day: 06 and 20 UTC	-	-
3.	Croatia	- *Main* – every 10 minutes - *Climatological* – 20 UTC	24	20-20UTC	-
4.	Greece	-	-	-	-
5.	Hungary	- *Main* – every 10 minutes - *Climatological* – 18 UTC	24	18 - 18UTC	-
6.	Italy – CMCC	AP – no calculation Others ???	-	-	-
7.	Italy - Trento	1	24	08 - 08 UTC	-
8.	FRY of Macedonia	- *Main* – 1 (once a day) - *Climatological* – 1 (once a day)	24	20-20 UTC	
9.	Republic of Srpska	- *main station Banja Luka* - 21h local time - *climatological* - 21h local time	24 h 24 h	From 21 till 21h From 21 till 21h	-
10.	Romania	00,06,12,18UTC	24h/24h	18UTC – 18UTC	-
11.	Serbia	1	- *Main* - 12 - *Climatologica*l - 24	06 - 18 UTC 21h - 21h	-
12.	Ukraine	Main – every 3 hours	Main- 24	03-06-09-12-15-18-21-24 UTC	-

5. Daily data - Wind direction and speed					
	Country	**Number of measurements per day**	**Measurements time (UTC)**	**Daily average**	**Comments**
1.	Austria	At least hourly	-	-	Calculation depend on application
2.	Bulgaria	- *Main* – 8 times - *Clim* – 3 times	- *Main* - 02,05,08,11, 14,17,20,23 local time - *Clim* - 07,14,21 local time	average of all daily data	Commonly BG local time= UTC + 2 hours
3.	Croatia	*Main* – every 10 minutes	*Main* – every 10 minutes	arithmetic mean of 10-minute measurements	-
4.	Greece	-	-	-	-
5.	Hungary	*Main* – every 10 minutes	*Main* – every 10 minutes	arithmetic mean of 10-minute measurements	-
6.	Italy – CMCC	AP – 48 UC – 144 AM – 144 SPC - 48 RAR - 144	SPC – every 1//2h or daily RAR – every 10min	AP – no calculation AM - no calculation	-
7.	Italy - Trento	96	Every 15 minutes	- Vector mean for wind direction - Trapezoidal mean for speed	-
8.	FRY of Macedonia	- *Main* – hourly (24 measurements/day) - *Climatological* – 3 times per day	- *Main* – hourly - *Climatological* – (at 06, 13, 20 UTC) – local time	Speed : Arithmetic mean	-
9.	Republic of Srpska	- *main station Banja Luka* - 24 - *climatological* - 3	Hourly 07, 14, 21 local	- Daily average - Average	-
10.	Romania	- *122 stations* - 24 measurements per day	00 – 23UTC 05-09, 11,12,17-19UTC	$(t_{00UTC}+t_{06UTC}+t_{12UTC}+t_{18UTC})/4$	-

		- *37 stations* - 10 measurements per day			
11.	Serbia	- *Main* – 24 - *Climatological* - 3	- *Main* - every hour - *Climatological* - 6,13,20	- *Main* - arithmetic mean - *Climatological* - (X7+X14+X21)/3	-
12.	Ukraine	8	Every 3 hours	Arithmetic mean	-

5. Daily data - Relative humidity					
	Country	**Number of measurements per day**	**Measurements time (UTC)**	**Daily average**	**Comments**
1.	Austria	3	7, 14, 21	-	depends on station holder
2.	Bulgaria	- *Main* – 8 times - *Clim* – 3 times	- Main - 02,05,08, 11,14,17,20,23 local time - *Clim* - 07,14,21 local time	average of all daily data	Commonly BG local time= UTC + 2 hours
3.	Croatia	*Main* – every 10 minutes *Climatological* – 3 times per day	*Main* – every 10 minutes *Climatological* – 06, 13 and 20 UTC or hourly	arithmetic mean	-
4.	Greece	-	-	-	-
5.	Hungary	- *Main* – every 10 min - *Climatological* – 3 or 24	- *Main* – every 10 min - *Climatological* – 06, 12 and 18 UTC or hourly	arithmetic mean	-
6.	Italy – CMCC	AP – 48 UC – 24 AM – 24 SPC – 48 RAR – 24	AM - every 10min SPC – every 1/2h or daily RAR – every 10 min	AP – no calculation UC – no calculation AM – no calculation SPC – no indication on the method RAR – no indication on the method	-
7.	Italy - Trento	96	Every 15 minutes	Trapezoidal calculation Sum(i=1..n-1) $0.5(D_{i+1}+D_i)*(T_{i+1}-T_i)) / (T_n-T_1)$	-
8.	FRY of	- *Main* – hourly	- *Main* – hourly	arithmetic mean	Every 10 minutes from

	Macedonia	(24 measurements/day) - *Climatological* – 3 times per day	- *Climatological* – 3 times per day (at 06, 13, 20 UTC) – local time	RHmean= (x06+x13+x20)/3	AWS
9.	Republic of Srpska	- *main station Banja Luka* - 24 - *climatological* - 3	*climatological* - 07,14,21 local	Daily average average	-
10.	Romania	- *122 stations* - 24 measurements per day - *37 stations* - 10 measurements per day	00 – 23UTC 05-09, 11,12,17-19UTC	$(U_{00UTC}+U_{06UTC}+U_{12UTC}+U_{18UTC})/4$	-
11.	Serbia	- *Main* - 24 - *Climatological* - 3	- *Main* - every hour - *Climatological* – 6,13,20	- *Main* - arithmetic mean - *Climatological* - (X7+X14+X21)/3	-
12.	Ukraine	Main-8	Main - every 3 hours	Main- arithmetic mean	-

5. Daily data - Duration of sunshine					
	Country	**Number of measurements per day**	**Measurements time (UTC)**	**Daily average**	**Comments**
1.	Austria	Half hourly where available	-	-	Calculation depend on application
2.	Bulgaria	1 measurement	sunrise - sunset	Sum of all hours with sunshine	Heliograph Cambel-Stocks
3.	Croatia	1	after sunset	daily sum	-
4.	Greece	-	-	-	-
5.	Hungary	1	after sunset	daily sum	-
6.	Italy – CMCC	-	-	-	-
7.	Italy - Trento	-	-	-	-
8.	FRY of Macedonia	1	after sunset	daily sum	-
9.	Republic of Srpska	- *main station Banja Luka* - 1 - *climatological* **-** 1	In the evening In the evening	-	-
10.	Romania	- *122 stations* - 24 measurements per day - *37 stations* – 1 per day	00 – 23UTC 00UTC	-	-
11.	Serbia	- *Main* – 24 - *Climatological* - 3	- *Main* - every hour - *Climatological* - 6,13,20	*Main* - arithmetic mean	-
12.	Ukraine	8	Every 3 hours	Arithmetic mean	-

5. Daily data - Cloud cover					
	Country	**Number of measurements per day**	**Measurements time (UTC)**	**Daily average**	**Comments**
1.	Austria	-	-	-	Calculation depend on application
2.	Bulgaria	- *Main* – 8 times - *Clim* – 3 times - *Precipitation station* – 3 times	- *Main* - 02,05,08, 11,14,17,20,23 local time - *Clim* - 07,14,21 local time - *Prec* - 07,14,19 local time	average of all daily data	Commonly BG local time= UTC + 2 hours Total cloud cover is measured in all stations, while low cloud cover and cloud types – only in main stations
3.	Croatia	*Main with obs*. - 24	every hour	arithmetic mean	-
4.	Greece	-	-	-	-
5.	Hungary	*Main with obs.* - 24	every hour	arithmetic mean	-
6.	Italy – CMCC	-	-	-	-
7.	Italy - Trento	-	-	-	-
8.	FRY of Macedonia	- *Main*. – (hourly) 24 per day - *Climatological* – 3 times per day	- *Main* - every hour **-** *Climatological* – (at 06, 13, 20 UTC) – local time	arithmetic mean	-
9.	Republic of Srpska	- *main station Banja Luka* 24 - *climatological* 3	- hourly - 07, 14, 21 local	- Mean of meas. in 07, 14, 21 local - Average	-
10.	Romania	- *44 stations* - 24 measurements per day - *115 stations* – between 10 and 20 per day	00 – 23UTC 05-09, 11,12,17-19UTC 05-19UTC 00,05-23UTC	-	-
11.	Serbia	- *Main* - 24 - *Climatological* - 3	- *Main* - every hour - *Climatological* -	- *Main* - arithmetic mean	-

			6,13,20	- *Climatological*- (X7+X14+X21)/3	
12.	Ukraine	8	Every 3 hours	Arithmetic mean	-

5. Daily data - Soil temperature					
	Country	**Number of measurements per day**	**Measurements time (UTC)**	**Daily average**	**Comments**
1.	Austria	Half hourly where available	-	-	Calculation depend on application
2.	Bulgaria	3	07 for all depths; 14 only for 125 cm	average of all daily data	Commonly BG local time= UTC + 2 hours
3.	Croatia	*Main* – 3 times per day	*Main* – 06, 13 and 20 UTC	arithmetic mean	-
4.	Greece	-	-	-	-
5.	Hungary	*Main* – every 10 minutes	*Main* – every 10 minutes	arithmetic mean	-
6.	Italy – CMCC	UC – 8 RAR – 24 (every 10min)	-	UC – no calculation	-
7.	Italy - Trento	-	-	-	-
8.	FRY of Macedonia	- *Main* – 3 times per day - *Climatological* – 3 times per day	06, 13 and 20 UTC, local	arithmetic mean	-
9.	Republic of Srpska	- *main station Banja Luka* - 3 - *climatological* - 3	07, 14, 21 local time 07, 14, 21 local time	(T7+T14+T21)/3 (T7+T14+T21)/3	-
10.	Romania	55 stations - 4 measurements per day	00,06,12,18UTC	$(t_{00UTC}+t_{06UTC}+t_{12UTC}+t_{18UTC})/4$	-
11.	Serbia	main and climatological - 3	6.00; 13.00; 20.00	$(T_{z6.00} + T_{z13.00} + T_{z20.00})/3$	-
12.	Ukraine	main and climatological - 3	6.00; 13.00; 20.00	$(T_{z6.00} + T_{z13.00} + T_{z20.00})/3$	-

5. Daily data - Snow depth						
	Country	**Number of measurements per day**	**Start time (UTC)**	**End time (UTC)**	**Date for reporting**	**Comments**
1.	Austria	At least hourly	**-**	**-**	**-**	depends on station holder
2.	Bulgaria	- *Main* – 8 times - - *Climatological* and *precipitation* stations – 1 times	- *Main* - 02 local time - *Clim & prec* - 07 local time	- *Main* - 23:00 local time	- *Main* - on the same day - *Clim & prec* the day in which precipitation is measured	Commonly BG local time= UTC + 2 hours
3.	Croatia	*Climatological* – 1	6 UTC	6UTC	Date of end time	-
4.	Greece	-	-	-	-	-
5.	Hungary	*Climatological* – 1 or 2	6 UTC	6UTC	Date of end time	-
6.	Italy – CMCC	-	-	-	-	-
7.	Italy - Trento	-	-	-	-	-
8.	FRY of Macedonia	- *Main* – 1 (once a day) - *Climatological* – 1 (once a day)	6 UTC	6UTC	Date of end time	-
9.	Republic of Srpska	- *main station Banja Luka* - 2 - *climatological* **-** 1	06h 07h local	06h next day 07h next day	Tomorrow 06h Tomorrow 07h	-
10.	Romania	4 per day	18UTC day ‘dd’	18UTC day ‘dd’+1	‘dd’+1	06UTC measurement
11.	Serbia	1	6	6	Date of end time for new snow depth	two types of measurements - total snow depth and new snow depth

12.	Ukraine	1	06	06	Date of end time for new snow depth	total snow depth

5. Daily data - River discharge					
	Country	**Number of measurements per day**	**Measurements time (UTC)**	**Daily average**	**Comments**
1.	Austria	At least hourly	-	-	Calculation depend on application
2.	Bulgaria	-	-	-	-
3.	Croatia	1 or 24 times per day	06 UTC or each hour	Arthimetic mean	-
4.	Greece	-	-	-	-
5.	Hungary	-	-	-	-
6.	Italy – CMCC	-	-	-	-
7.	Italy - Trento	-	-	-	-
8.	FRY of Macedonia	1 per month	-	-	-
9.	Republic of Srpska	- *main station Banja Luka* - 1 - *climatological* **-** 1	08 local 08 local	-	- Measurements are continuous and data is given as daily average - On one station there is only one measurement per day, and on the other continuously and data is given as daily average
10.	Romania	-	-	-	-
11.	Serbia	-	Various	-	- 5 meas./year for navigable rivers - 10 meas./year for other rivers
12.	Ukraine	-	-	-	-

5. Daily data - Phenology				
	Country	**Number of measurements per day**	**Phenophases**	**Comments**
1.	Austria	-	-	-
2.	Bulgaria	-	-	-
3.	Croatia	Each 4 – 8 days during vegetation period	Foliation Blooming Fruit ripening Leaf fall	See Appendix II
4.	Greece	-	-	-
5.	Hungary	-	-	-
6.	Italy – CMCC	-	-	-
7.	Italy - Trento	-	-	-
8.	FRY of Macedonia	Each 2 – 7 days during vegetation period	Foliation Blooming Fruit ripening Leaf fall	**-**
9.	Republic of Srpska	-	-	-
10.	Romania	**Phenological phases - BBCH Code:** - drilling - BBCH 00 - sprouting / germination – BBCH 05 - emergence – BBCH 10 - the 3rd leaf – BBCH 13 - tillering – BBCH 21 - rest period / dormancy – BBCH 29 - steam elongation – BBCH 30 - heading – BBCH 51 - flowering – BBCH 61 - milk maturity/ripeness – BBCH 75 - wax maturity/ripeness/hard dough – BBCH 87 - full maturity/ripeness – BBCH 89 - harvest – BBCH 99	Winter wheat Winter barley	**CROPS** • winter cereals / **winter wheat and winter barley** • technical crops / **maize, sun-flower** • **vine and fruit trees** The phenological phases include the specific stages of growth and development by BBCH-code (BBCH-Monograph, Growth Stages of Mono and Dicotyledonous Plants, 1997) of agricultural plant species (starting with 2005). The
		Phenological phase – BBCH Code: - drilling – BBCH 00 - sprouting / germination – BBCH 05 - emergence – BBCH 10 - the 3rd leaf – BBCH 13	Maize	

		- leafing – BBCH 19 - initation panicle / tassel – BBCH 30 - flowering panicle / tassel – BBCH 51 - silk phase / silking – BBCH 65 - milk maturity/ripeness – BBCH 75 - wax maturity/ripeness/hard dough – BBCH 83 full maturity/ripeness – BBCH 89 - harvest – BBCH 99		time series vary as function of period during which the station was included in the agrometeorological program, especially 1971-2012.
		Phenological phase – BBCH Code: - drilling – BBCH 00 - sprouting / germination – BBCH 05 - emergence – BBCH 10 - the 3rd leaf – BBCH 12 - leafing BBCH 19 - bud formation / seed formation – BBCH 51 - flowering –BBCH 61 - wax ripeness / hard seed – BBCH 75 - full ripeness –BBCH 89 - harvest – BBCH 99	Sun-flower	
		Phenological phase – BBCH Code: ✓ first weeping of the vine ✓ beginning of sprouting / bud developing - BBCH 01 ✓ bud-bursting / unfoulding – BBCH 07 ✓ leafing – BBCH 11 ✓ shooting ✓ flowering – BBCH 61 ✓ grape setting – BBCH 71 ✓ grape growth – BBCH 73 ✓ grape maturity – BBCH 81 ✓ harvesting - BBCH 89 ✓ wood maturity ✓ leaf yellowing and fall – BBCH 92	Grape-vine	
		Phenological phase – BBCH Code 1. the rest period / dormancy – BBCH 00 2. the period of active vegetation - bud development – BBCH 01 - bud-bursting / unfoulding – BBCH 07 - first flowers open – flowering – BBCH 60 - fruit set and growth – BBCH 69 - fruit maturity – BBCH 81 - harvesting - BBCH 89 - wood maturity, leaf yellowing and fall – BBCH 92	Fruit trees	

11.	Serbia	1961 - 2011	Foliation Blooming Leaf fall	Wild herbaceous plants, forest trees and shrubs and fruit
12.	Ukraine	1965 - 2011	Foliation Blooming Leaf fall	Wild herbaceous plants, forest trees and shrubs and fruit

6. Data quality control					
	Country	**Do you perform?**	**Data**	**Type**	**When**
1.	Austria	YES	Depends on the station but usually on the 10 or 30 minutes data	Depends on data holder	After station data was sent to the server
2.	Bulgaria	YES	Of all meteorological data	Logical, statistical	Before their entering in meteorological database
3.	Croatia	YES	all	There is a breaf quality control of data from conventional stations before entering them into the database. The conventional climatological stations data as well as data of automated stations are checked using spatial and temporal graphical quality control. Logical conditions are also treated.	After collection of conventional or automatic observations with a delay from several weeks to several months, depending of data type.
4.	Greece	NO	-	-	-
5.	Hungary	YES	all	There is a spatial quality, multi-source comparison, integrated (in-situ and remote sensing control) on data from manual stations before entering the data into the database. Also the automatic measurement is used for quality controlling procedure. The classical climatological stations data are checked with the drawings of thermograph and hygrograph. Logical condition are also treated.	The QC procedure runs at 6.15 UTC and 11.25 UTC
6.	Italy – CMCC	NO	-	-	-
7.	Italy - Trento	YES	- Precipitation and - temperature	Logical	Monthly

8.	FRY of Macedonia	YES	all	Logical, graphical and statistical QC of data from conventional main and climatological staion before entering them into the database.	After measurement and data recording within one month
9.	Republic of Srpska	YES, partially Not all data are validated because there was not data base till 2008	All data	Logical	During the key entry/quality control in CLICOM(spatial and time control specified for each station)
10.	Romania	YES	- All synop data and - climatological data	- *Synop data* - logical and spatial - *Climatological data* – logical, statistical and spatial	- *Synop data* – hourly - *Climatological data* – monthly
11.	Serbia	YES	- All meteorological, - phenological data, - water levels, - discharge and - water temperature	- *Met. data* - logical, statistical, spatial - *Phenological data* – statistical - For water level and *water temperature*: +Comparison of the values obtained from digital and / or analog images and control values during inspections of hydrological stations and the observed values of observers +Checking two consecutive values +Checking two successive values along the time axis – check for incomplete time series data +Comparison of extreme values for a given period of with historical extreme values +Graphical and analytical	- *Met. data* - Within one month after data lag - *Phenological data* - at the end of the year - *Hydrological data* - When the data from all sources are collected

				comparison with neighboring hydrological stations on the same river or hydrological stations that make up the balance node For *disharge*: +Graphical and analytical comparison with neighboring hydrological stations on the same river or hydrological stations that make up the balance node +Review the results of flow balancing along the stream +On the bases of monitoring of morphological changes in the channel (based on the recorded cross sections of the river) and the latest hydrometric measurements additional analyses are performed to establish dependence Q = f (H), and if necessary, correction of previous processing flow for stations where there is a change of this	
12.	Ukraine	YES	-	-	-

7. Interpolation of meteorological data						
	Country	**Do you interpolate met. data?**	**Meteorological data**	**Method of interpolation**	**Software for interpolation**	**Additional data**
1.	Austria	NO	-	-	-	-
2.	Bulgaria	YES	- Temperature, - precipitation, - sunshine duration, - humidity	Ordinary kriging	Surfer, ArcGIS	Landuse, elevation
3.	Croatia	YES	- temperature (mean, minimum, maximum), - relative humidity, - air pressure, - wind speed, - precipitation, - sunshine duration	Kriging	GIS, Surfer, GRADS	- Topographic values, - maritimity index and - different gridded statistics
4.	Greece	NO	-	-	-	-
5.	Hungary	YES	- temperature (mean, minimum, maximum), - relative humidity, - air pressure, - windspeed, - precipitation, - sunshine duration	MISH, Spline, Kriging	Own developed software in Fortran, C and PLSQL	In case of MISH: DEM (0.5'), other topographic values, (for wind speed: roughness, elevation of wind measurement), different gridded statistics of long term data series, radar and satellite data, weather forecast
6.	Italy – CMCC	NO	-	-	-	-
7.	Italy - Trento	YES	- Precipitation, - temperature, - relative humidity, - wind direction and speed	- Precipitation: kriging (created FORTRAN program) - Other meteorological data: optimal interpolaton method with detrending	created FORTRAN program	NO

				procedure		
8.	FRY of Macedonia	YES	- temperature (mean), - relative humidity, - air pressure, - precipitation	Kriging	Surfer	-
9.	Republic of Srpska	NO	-	-	-	-
10.	Romania	YES	- Temperature, - precipitation, - precipitation deviation against multiannual mean (1961-1990), - temperature deviation against multiannual mean (1961-1990)	- Ordinary kriging for deviation maps and - Residual kriging for temperature and precipitation maps	R language for statistical computing (http://www.r-project.org/)	Additional predictors derived from Digital Elevation Model (altitude, longitude, latitude, distance from the coast,) and from Landcover Corine (water bodies, urban areas).
11.	Serbia	YES	- Temperature, - precipitation, - duration of sunshine - temp. and prec anomalies	- Kriging (linear interpolation), - Nearest Neighbor Method	- Surfer, - created FORTRAN program	-
12.	Ukraine	YES	- Temperature, - precipitation, - duration of sunshine	Kriging (linear interpolation)	-	State bounders

7. Interpolation of meteorological data						
	Country	**Software for visualization**	**Output**	**Resolution**	**Mapping time-step**	**Users**
1.	Austria	-	-	-	-	-
2.	Bulgaria	Surfer, ArcGIS	According to end-user needs: pictures, vector files, rasters	10 x 10 km and above	Weekly, monthly, seasonal, annual	Public and governmental organizations as well as various private companies; Agriculture, civil eginering, energy sector, scientists from different sectors, water management sector), trafic, tourism, helath, civil protectionc.
3.	Croatia	Own developed software in the data base, ArcView, ArcGIS, Surfer, GRADS	According to end-user needs: pictures, vector files, rasters	100 m	monthly, seasonal and annual	Agriculture, civil eginering, energy sector, scientists from different sectors, water management sector (flood protection, drought monitoring, irrigation planning), trafic (land, maritime and ait trafic), tourism, helath, civil protection (e.g. forest fire prptection service), risk assesment applications etc.
4.	Greece	-	-	-	-	-
5.	Hungary	Own developed software in the data base, ArcView, ArcGIS,	According to end-user needs (pictures of maps (*.jpg), vector	0.5’ or 6’	- web: monthly, seasonal, annual, long term - others:	Agronomy, (building) industry, energy sector, scientists

		Surfer, SAGA	files (*.shp), grids (ArcASCII))		according to end-user needs	from different sectors
6.	Italy – CMCC	NO	-	-	-	-
7.	Italy - Trento	GRADS, ArcView	Map and grid	200 m	The interpolated map are produced hourly and the grid when there is the need	Public
8.	FRY of Macedonia	Surfer	Pictures	-	Daily, monthly	Agriculture, civil eginering, energy sector, scientists from different sectors, water management sector (flood protection, drought monitoring, irrigation planning), trafic (land and ait trafic), tourism, helath, civil protection (e.g. forest fire protection service), risk assesment applications etc.
9.	Republic of Srpska	-	-	-	-	-
10.	Romania	R language and ArcMAP	GeoTIFF	1000 x1000 meters	Daily, monthly, annually	-
11.	Serbia	Surfer, GRADS	Map	- 30`x30` (~90m) in Surfer, - 0.1666666° lat/lon (18.5km) in GRADS	Weekly, monthly, seasonal, yearly	Public and government
12.	Ukraine	-	Map	-	Weekly, monthly, seasonal, yearly	Public and government

2. Climate indices

8.A Climate indices based on air temperature and precipitation amount					
	Country	**Have you ever used some indices?**	**Indices**	**Indices requested by stake-holders**	**Software for calculation**
1.	Austria	NO	-	-	-
2.	Bulgaria	YES	They are so many, for example: - SPI - Standardized Precipitation Index , - PDSI – Palmer Drought Severity Index, - de Martone, - hydrothermal index of Selyaninov, - GDD – growing degree days, - heat waves, - human comphort, - drought occurense, - intensive precipitation, etc. A STARDEX project Fortran software was improved in Meteo-France and applied on data from Bulgaria some years ago. The number of these indices is higher than 80. Later on more than 100 indices were calculated for the EU project CECILIA under current and expected climate conditions. In this relation the attached indices are more or less considered/covered in Bulgaria too. Examples: - R0.1, R1, R5, R30, R50, R100, - SPI, PDSI, FD10, TD	Perhaps the SPI, which requested by the ministry of environment and water	Fortran based software
3.	Croatia	YES	- FD, SU, ID, TR20, GSL, - TXx, TNx, TXn, TNn, - TN10p, TX10p, TN90p, TX90p, - WSDI, CSDI, DTR, RX1day, - RX5day, SDII, R10, R20, CDD,	Almost all of the indices above	Own developed software

			- CWD, R95p, R99p, PRCPTOT, - SPI, PDSI - FD10 – heavy frost days: count of days where TN (daily minimum temperature) < -10°C - TD - tropical days: count of days where TX (daily maximum temperature) > 30°C - R0.1mm – count of days where RR ≥ 0.1 mm - R1mm - count of days where RR ≥ 1 mm - R5mm - count of days where RR ≥ 5 mm - R30 - count of days where RR ≥ 30 mm - R50mm - count of days where RR ≥ 50 mm - R100mm - count of days where RR ≥ 100 mm		
4.	Greece	NO	-	-	-
5.	Hungary	YES	- FD, SU, ID, TR20, GSL, - TXx, TNx, TXn, TNn, - TN10p, TX10p, TN90p, TX90p, - WSDI, CSDI, DTR, RX1day, - RX5day, SDII, R10, R20, CDD, - CWD, R95p, R99p, PRCPTOT, - FD10 – heavy frost days: count of days where TN (daily minimum temperature) < -10°C - TD - tropical days: count of days where TX (daily maximum temperature) > 30°C - R0.1mm – count of days where RR ≥ 0.1 mm - R1mm - count of days where RR ≥ 1 mm - R5mm - count of days where RR ≥ 5 mm - R30 - count of days where RR ≥ 30 mm - R50mm - count of days where RR	almost all of the indices above, mainly indices accounted with fix threshold	PLSQL, C++, own developed software

			≥ 50 mm - R100mm - count of days where RR ≥ 100 mm - PADI – Pálfai Drought Index - SPI, PDSI		
6.	Italy – CMCC	YES	- Growing Degree Days (**GDD**): are calculated by subtracting the plant's lower base temperature of 5 °C from the average daily air temperature. Average daily air temperature is calculated by averaging the daily maximum and minimum air temperatures measured in a 24 hour period. - Thermal Growing Season Length (**GSL**) - Consecutive Dry Days (**CDD**) - Warm spell duration index (**WSDI**)	- Yearly and monthly temperature and precipitation anomalies from climate normal values; - Simple daily intensity index: anomaly of mean daily precipitation intensity from climate normal values - Number of heat waves, where heat waves are define more than 3 days with daylight average temperature above 32°C and deviating from 30-year mean of at least 5°C - Others to be better defined	CDO, Fortran Language, ARCGIS spatial tools, excel sheets
7.	Italy - Trento	YES with daily homogenized time series of max and min temperature and precipitation	- FD, SU, ID, TR20, GSL, - TXx, TNx, TXn, TNn, - TN10p, TX10p, TN90p, - TX90p, WSDI, CSDI, DTR, - RX1day, RX5day, SDII, - R20, CDD, CWD, - R95p, R99p, - TND90p – number of warm nights: count of days where TN> 90th percentile - TXD90p – number of warm day-times: count of days where TX> 90th percentile - TND10p – number of cold nights: count of days where TN< 10th percentile - TXD10p – number of cold day-	-	RClimDex, created procedures in Excel and specially created FORTRAN programs

			times: count of days where TX< 10th percentile		
8.	FRY of Macedonia	YES	- FD, SU, ID, TR20, GSL, - TXx, TNx, TXn, TNn, - TN10p, TX10p, TN90p, TX90p, - WSDI, CSDI, DTR, RX1day, - RX5day, SDII, R10, R20, CDD, - CWD, R95p, R99p, PRCPTOT, - SPI, PDSI, - FD10 – heavy frost days: count of days where TN (daily minimum temperature) < -10°C - TD - tropical days: count of days where TX (daily maximum temperature) > 30°C - R0.1mm – count of days where RR ≥ 0.1 mm R1mm - count of days where RR ≥ 1 mm - R5mm - count of days where RR ≥ 5 mm - R30 - count of days where RR ≥ 30 mm - R50mm - count of days where RR ≥ 50 mm - R100mm - count of days where RR ≥ 100 mm	Almost all of the indices above	CLIDATA, Excell
9.	Republic of Srpska	YES	Almost all from the list. SPI	All	Clicom program or Excel
10.	Romania	YES	SPI, PDSI, SPEI	SPI	R language (SPI, SPEI) and sc-pdsi (PDSI)
11.	Serbia	YES	- FD, SU, ID, TR20, GSL, - TXx, TNx, TXn, TNn, - TN10p, TX10p, TN90p, - TX90p, WSDI, CSDI, DTR, - RX1day, RX5day, SDII, - R10, R20, CDD, CWD, - R95p, R99p, PRCPTOT, - SPI, SPEI, PDSI - FD10 – heavy frost days: count of days where TN (daily minimum temperature) < -10°C	FD10, TD, R25mm, EQ, FAI	RClimDex, created procedures in Excel and created FORTRAN programs

			- TD - tropical days: count of days where TX (daily maximum temperature) > 30°C - R0.1mm – count of days where RR ≥ 0.1 mm - R1mm - count of days where RR ≥ 1 mm - R5mm - count of days where RR ≥ 5 mm - R25mm - count of days where RR ≥ 25 mm - R50mm - count of days where RR ≥ 50 mm - EQ – Ellenberg's climate quotient - EQ = (Tvii / Pannual) * 1000 - FAI - forest aridity index – FAI = 100 * Tvii-viii / (Pv-vii + Pvii-viii)		
12.	Ukraine	NO	-	-	-

8.A Climate indices based on air temperature and precipitation amount					
	Country	**Calculation of indices**	**Indices that show the greatest change**	**Indices in impact study**	**Time period used for indices calculation**
1.	Austria	-	-	-	-
2.	Bulgaria	In stations, and seldom in grids	It is difficult to say which one is changing a lot, it depends on the index, its application/significance for the human population and related socioeconomic sectors. But as major conclusion: the indices related to increase of temperature.	Yes, in various impact studies, eg., impacts on agriculture, water resources, forestry, human health For example GDD, de MArtone, etc, some oter examples: FD, SU, ID, TR20, GSL, TXx, TNx, TXn, TNn, TN10p, TX10p, TN90p, TX90p, WSDI, CSDI, DTR, RX1day, RX5day, SDII, R10, R20, CDD, CWD, R95p, R99p, PRCPTOT, SPI, PDSI	Different slices from the 20th century as well as for the entire previous century (i.e., from 1901 to 2000 and beyond
3.	Croatia	In station and in grid points as well	warm indices have significant increasing	Contribution to the National Climate Change Strategy for the tome being - FD, SU, ID, TR20, - GSL, TXx, TNx, TXn, - TNn, TN10p, TX10p, - TN90p, TX90p, WSDI, - CSDI, DTR, RX1day, - RX5day, SDII, R10, - R20, CDD, CWD, - R95p, R99p, - PRCPTOT, SPI, PDSI	1862-2010, 1961-2010
4.	Greece	-	-	-	-

5.	Hungary	in station and in grid points as well, the basic element are interpolated first and then calculate the indices	warm indices have significant increasing	contribution to the National Climate Change Strategy - FD, SU, ID, TR20, - GSL, TXx, TNx, TXn, - TNn, TN10p, TX10p, - TN90p, TX90p, WSDI, - CSDI, DTR, RX1day, - RX5day, SDII, R10, - R20, CDD, CWD, - R95p, R99p, - PRCPTOT	1901-2010, 1961-2010
6.	Italy – CMCC	Directly from GRID points in case of available observational gridded datasets at high resolution (e.g. Climate Research Unit; European Climate Assessment & Dataset)	Analyses in progress	GDD, GSL, CDD	1971-2005
7.	Italy - Trento	Stations	TXx, TNn, TX10p, TN10p, TX90p, DTR, GSL, SU25, TND90p, TXD90p, WSDI	-	-
8.	FRY of Macedonia	In station	Warm indices have significant increasing	Almost all in different studies	1951- 2010
9.	Republic of Srpska	In stations	SU, TR, TX90p, WSDI, RX1day, R20mm, CDD, FD, ID, SPI	Almost all in different studies	Main time used for collecting data (there was not data base in past)
10.	Romania	We calculate indices in stations point	-	-	-
11.	Serbia	- In stations. Interpolation is done only for the SPI index and for anomalies of 5	FD10, TN10p, TX90p, TN90p – significant trend	-	-

		indices. Indices calculation is done first, then the interpolation. - In grid points – only the SPI and SPEI. No interpolation.	observed on more than 50% of stations		
12.	Ukraine	-	-	-	-

8.B Climate indices based on other parameters							
	Country	**Indices**	**Software for calculation**	**Calculation of indices**	**Indices that show the greatest change**	**Indices in impact study**	**Time period used for indices calculation**
1.	Austria	-	-	-	-	-	-
2.	Bulgaria	- Human comfort Index, - Forest Fire Weather Index Ministry of agriculture, Ministry of environment and water, etc. and of course the related to Tourism, media, State Directorate for civil Protection	Own developed	We calculate indices for stations and interpolate them	Human Comfort Index, Forest Fire Weather Index	Human Comfort Index, Forest Fire Weather Index	Different slices from the 20th century as well as for the entire previous century (i.e., from 1901 to 2000 and beyond
3.	Croatia	- Comfort Index - Forest Fire Weather Index Requested by tourism, media, State Directorate for Rescue and Protection	Own developed	We calculate indices for stations and interpolated	Comfort Index, Forest Fire Weather Index	Comfort Index, Forest Fire Weather Index	1862-2010; 1961-2010
4.	Greece	-	-	-	-	-	-
5.	Hungary	- PET – Physiologically Equivalent Temperature - UTCI – Universal Thermal Climate Index	RayMan	We calculate indices in stations and then interpolate	-	PET, UTCI	1961-2010
6.	Italy – CMCC	- Temperature Humidity Index (**THI**):	CDO,	THI, PET, AI	Analyses in	THI, SYC,	1971-2005,

		combination of temperature and humidity that is a measure of the degree of discomfort experienced by grazing animal species. - Area under the curve of Storage Yield Curve (**SYC**): it is a hydrological index, based on monthly river discharge series (at least 30 year) and representing the basin water yield produced from a given level of storage or, alternatively, storage capacity needed to provide a given basin yield. Useful for irrigation planning purposes - Potential EvapoTranspiration (**PET**) based on the Penman Monteith method. - Aridity Index (**AI**): the ratio of annual precipitation over annual PET. - Potential Soil Moisture Deficit (**PSMD**): the cumulated (daily or monthly basis) deficit of precipitation to satisfy PET during the growing season. - Keetch-Byram	Fortran Language, ARCGIS spatial tools, Excel sheets,	PSMD and KBDI were calculated directly from GRID points in case of available observational gridded datasets at high resolution (e.g. Climate Research Unit; European Climate Assessment & Dataset) SYC was calculated at the outlet of hydrographic basin under study	progress	AI, PSMD and KBDI	1960-1990, 2020, 2050, 2080

		Drought Index (**KBDI**): representing the net effect of evapotranspiration and precipitation in producing cumulative moisture deficiency in deep duff and upper soil layers Requested: - Drought /Aridity Index - Others to be better defined, potentially SYC or proxies					
7.	Italy - Trento	-	-	-	-	-	-
8.	FRY of Macedonia	Days with: fog, hail, lightning, strong wind	CLIDATA, Excell	In stations	-	Days with fog	1961 - 2010
9.	Republic of Srpska	Days with fog, hail, lightning, strong and stormy wind.	-	In station	Strong and stormy wind	-	-
10.	Romania	-	-	-	-	-	-
11.	Serbia	Forest Fire Weather Index	-	-	-	-	-
12.	Ukraine	-	-	-	-	-	-

8.C and 8.D Parameters for the indices calculation has not been stated in the Table 4 and 5										
	Country	**Param.**	**n^{o} of stations**	**Beg.**	**Acce ss.**	**Comm.**	**n^{o} of meas. per day**	**Meas. time (UTC)**	**Daily averag e**	**Com m.**
1.	Austria	-	-	-	-	-	-	-	-	-
2.	Bulgaria	-	-	-	-	-	-	-	-	-
3.	Croatia	Soil type	Experi-mental study	Last 100 years	3,5	Not available at DHMZ, but at Faculty for Agronomy at Zagreb University	-	-	-	-
		Veg. cover	Remote-sensing	Last 30 years	3,5	Not available at DHMZ, but at Faculty of Agronomy at Zagreb University	-	-	-	-
4.	Greece	-	-	-	-	-	-	-	-	-
5.	Hungary	-	-	-	-	-	-	-	-	-
6.	Italy – CMCC	-	-	-	-	-	-	-	-	-
7.	Italy - Trento	-	-	-	-	-	-	-	-	-
8.	FRY of Macedonia	Met. phen.	33	-	3,5	-	- 24 - *main station*, - 3 -*clim*	*Main* - hourly *Clim*. – 6, 13, 20 UTC, local time	-	-
		Evaporati on	8	-	3,5	-	2	06, 18 UTC		
9.	Republic of Srpska	Met. phenomen a	6		3		- 24 - *main station*, - 3 -*clim*	07, 14, 21h local	-	-
		Pressure	1		3		24 on *main station*	Hourly	avg	-

		Vapor pressure	1		3		24 on *main station*	Hourly	avg	-
10.	Romania	-	-	-	-	-	-	-	-	-
11.	Serbia	-	-	-	-	-	-	-	-	-
12.	Ukraine	-	-	-	-	-	-	-	-	-

10. Interpolation of climate indices						
	Country	**Do you interpolate indices?**	**Indices**	**Method of interpolation**	**Software for interpolation**	**Additional data**
1.	Austria	NO	-	-	-	-
2.	Bulgaria	YES	Eg, SPI	Ordinary kriging	Surfer	Elevation, landuse
3.	Croatia	YES	SPI	Kriging	Surfer	Soil type, vegetation cover index
4.	Greece	NO	-	-	-	-
5.	Hungary	YES	SPI	MISH	Own developed software: MISH in Fortran	-
6.	Italy – CMCC	NO as we directly use observational gridded datasets	-	-	-	-
7.	Italy - Trento	NO	-	-	-	-
8.	FRY of Macedonia	YES	SPI	Kriging	MISH	Soil type, vegetation cover index
9.	Republic of Srpska	NO	-	-	-	-
10.	Romania	YES	SPI, PDSI	Ordinary Kriging	R language for statistical computing	NO
11.	Serbia	YES	SPI, anomalies of TD, TR, SU, FD and ID	Kriging (linear interpolation)	Surfer	-
12.	Ukraine	NO	-	-	-	-

10. Interpolation of climate indices						
	Country	**Software for visualization**	**Output**	**Resolution**	**Mapping time-step**	**Users**
1.	Austria	-	-	-	-	-
2.	Bulgaria	Surfer	Map, grid	10 x 10 km and >	Montly, seasonal, annual	Public and government
3.	Croatia	GIS, (ILWIS, ArcView, ArcGIS), Surfer, GRADS	According to end-user needs	100 m	monthly	Agriculture, government, water management sector, forest fire protection sector, tourism, health, civil enginering, transportation etc.
4.	Greece	-	-	-	-	-
5.	Hungary	ArcView, ArcGIS, Surfer, SAGA	According to end-user needs (pictures of maps (*.jpg), vector files (*.shp), grids (ArcASCII))	0.5’ or 6’	monthly	Agronomy, government
6.	Italy – CMCC	-	-	-	-	-
7.	Italy - Trento	-	-	-	-	-
8.	FRY of Macedonia	SAGA GIS	Maps	-	monthly	Agriculture, government, water management sector, forest fire protection sector, tourism, health, civil enginering, transportation etc.
9.	Republic of Srpska	-	-	-	-	-
10.	Romania	R language, ArcMAP	GeoTIFF	1000 x 1000m	monthly	-

11.	Serbia	Surfer	Map	30`x30` (~90m)	SPI weekly; anomalies of the indices seasonal	Public and government
12.	Ukraine	-	-	-	-	-

3. Climate models results

11. Climate change models output							
	Country	**Possession of cc output**	**Run by the country**	**Name of the model**	**Available output**	**Service**	**Format**
1.	Austria	YES (we will use downscaled data for Austria)	NO	reclip:century	YES	http://reclip.ait.ac.at/reclip_century/	-
2.	Bulgaria	YES	The climatic version of the ALADINE model is run in order to calculate climate change scenarios for the region of the Balkan peninsula inqluding Bulgaria	ALADINE	The data are restricted to be used by users beyond the institute. However some data could be provided, it depends on the expected application/etc	-	Grib, ascii, etc
3.	Croatia	YES	YES	RegCM developed in Institute for Theoretical Physics at Trieste (Italy)	YES	none	GRIB files
4.	Greece	NO	-	-	-	-	-
5.	Hungary	YES	YES	ALADIN-Climate, REMO	YES	none	NetCDF-CF convention, GRIB files
6.	Italy – CMCC	YES	Not directly, as climate	Models are CMCC-MED,	On demand and generally	Various (usually	NetCDF, yes we are using

			models are run by climate divisions at CMCC.	COSMO-CLM	freely within the project for which the model is run.	THREDDS, FTP)	CF convention
7.	Italy - Trento	NO	-	-	-	-	-
8.	FRY of Macedonia	NO	-	-	-	-	-
9.	Republic of Srpska	YES	NO	???	YES only basic fields of temperatures and precipitation	-	-
10.	Romania	YES	YES	RegCM	YES (a part of them)	FTP	NetCDF (NetCDF-CF standard)
11.	Serbia	YES	YES	RCM-SEEVCCC	YES	none	GRADS files
12.	Ukraine	NO	-	-	-	-	-

11. Climate change models output						
	Country	**Data policy**	**Size**	**Metadata**	**Data you need**	**Indices based on cc output**
1.	Austria	Free download	-	-	???	No, we use the climate data as an input for an ecosystem model
2.	Bulgaria	NIMH provides to the users products but not data. Of course there are some duties to the government, presidency/etc	Depends on the data sets	-	All data is welcome if it could helps for a study, but mostly temperature and precipitation is requested	Yes, the list of these indices can be located from the CECILIA project (> 100 indices
3.	Croatia	Data available on the request	~ 10 TBs	As originally defined	Basic meteorological fields	FD, SU, ID, TR, RX1, SDII, R10, R20, CDD, CWD
4.	Greece	-	-	-	Rainfall and Temperature at a monthly time step for the next 50 years	-
5.	Hungary	Data available on the request	~ 10 TBs	NO	Basic meteorological fields	FD, SU, ID, TR, RX1, SDII, R10, R20, CDD, CWD
6.	Italy – CMCC	They depend on the project that produces climate outputs	Various, it depends on simulation length (number of years), data aggregation (monthly, annual) and list of variables, if separated or stored in the same file. This depend on data user requirements within each project for which climate models are run and climate	NetCDF-CF	Monthly, daily and sub-daily information on: precipitation, daily minimum and maximum temperature, solar radiation, wind speed, relative humidity Monthly fields on	GDD; GSL; THI, AI, PSMD, KBDI, CDD and WSDI SYC in progress

			outputs are post-processed		runoff All under AR-4 and/or AR-5 emission scenarios; preferably A1B, RCPs 4.5 and 8.5	
7.	Italy - Trento	-	-	-	???	-
8.	FRY of Macedonia	-	-	-	Basic meteorological fields	NO
9.	Republic of Srpska	-	-	YES ???	Temperatures and precipitation and distribution of rain during the seasons	Yes. Temperature and precipitation
10.	Romania	Results from regional models are free, except for extraction and delivery costs	Regional experiments: 1.control 1961-1990 (30 files/8.5 GB) 2.scenario 2021-2050 (30 files/8.5 GB) 3.scenario 2071-2100 (30 files/8.5 GB)	YES Proprietary schema	Lateral and initial conditions for RegCM under control and climatic change scenarios from CMIP5	- Potential evapotranspiration (ETP), - Palmer Drought Severity Index (PDSI)
11.	Serbia	Data available on the request	175200 files (In total 1.2TB)	NO	Basic meteorological fields	TD, FD, CFD, GSL, SDII, R10, CDD, EQ, FAI, SPI, SPEI
12.	Ukraine	-	-	-	???	-