REFERENCE SITES AND RIVER BASIN DATA

REFERENCE SITE DESCRIPTION

1D Site:

Near surface + surface + sub-surface (Atmospheric sounding* is highly desirable)

2.5D Site:

A few 1D sites + surface heterogeneity with an area of at least 100km^2

3D Site:

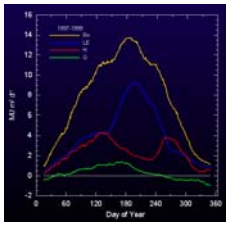
1D sites network (+3D system) or 2.5D site + 3D atmosphere** with an area of about 10^4 km^2

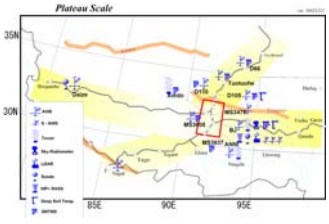
The terminology in summarizing these sites is used in the following manner:

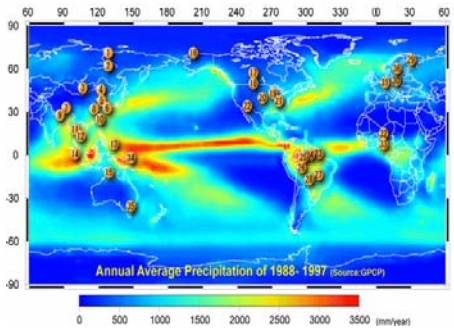
- **Sub-surface (0 to -1m)**: Soil moisture and temperature profile, heat conduction and soil characteristics;
- **Surface (0 to +2m)**: Four-component radiation, PAR, surface temperature, surface soil moisture, precipitation, vegetation type characteristics, snow;
- **Near surface(+2 to +10m)**: Temperature, specific humidity and wind speed profiles, surface pressure, momentum, latent and sensible heat fluxes;

* Atmospheric soundings: Radiosonde, wind profile, LIDAR microwave rain radar

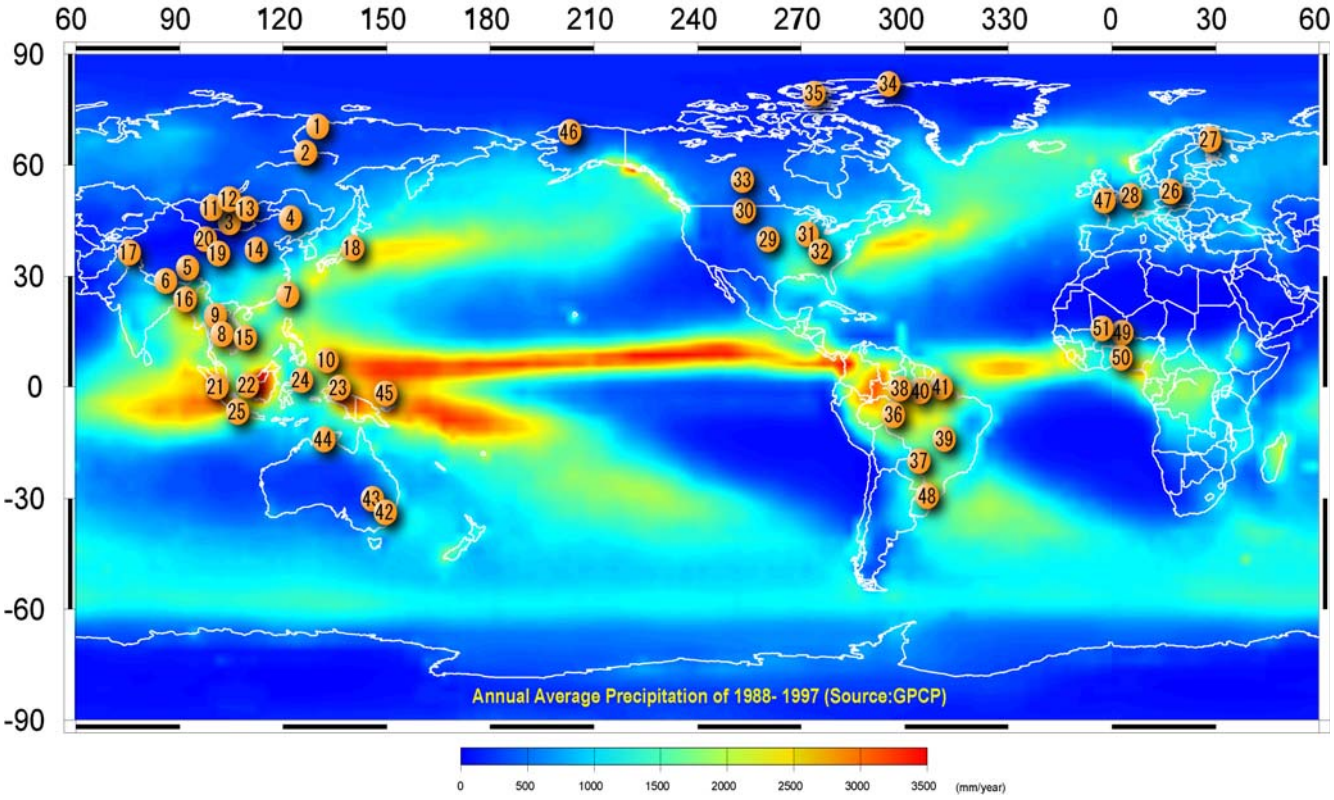
** 3D atmosphere: 3D Doppler radar, cloud radar, aerosonde aircraft.







Proposed CEOP Phase 2 Reference Site Map



Proposed CEOP Phase 2 Reference Sites

CSE/ RHP	Ref #	Ref. Site Name	Latitude		Longitude	
MAHA SRI/(C AMP)	1	Eastern Siberian Tundra	71.617	N	128.750	E
	2	Eastern Siberian Taiga	62.255	N	129.618	E
	3	Mongolia	45.743	N	106.264	E
	4	Tongyu	44.416	N	122.867	E
	5	Tibet	31.370	N	91.900	E
	6	Himalayas	27.959	N	86.813	E
	7	Northern South China Sea - Southern Japan	24.967	N	121.181	E
	8	Chao-Phraya River	18.400	N	99.470	E
	9	North-East Thailand	14.466	N	102.379	E
	10	Western Pacific Ocean	7.452	N	134.476	E
	11	Mongol Arvayheer	46.246	N	102.798	E
	12	Mongol Nalaikh	47.766	N	107.336	E
	13	Northern Mongolia	47.213	N	108.742	E
	14	Downstream of the Yellow River	36.649	N	116.054	E
	15	Central Vietnam	16.033	N	109.185	E
	16	Northeast Bangladesh	24.900	N	91.893	E
	17	Pakistan Karakorum Network	35.728	N	76.286	E
	18	Tsukuba	36.110	N	140.100	E
	19	Lanzhou	35.946	N	104.137	E
	20	Heihe River Basin	39.500	N	100.000	E
	21	Western Maritime Continent	0.200	S	100.300	E
	22	Central Maritime Continent	0.000	S	109.400	E
	23	Eastern Maritime Continent	1.200	S	136.100	E
	24	Northern Maritime Continent	1.500	N	124.900	E
	25	Southern Maritime Continent	6.400	S	106.700	E

CSE/ RHP	Ref #	Ref. Site Name	Latitude		Longitude	
BALTEX	26	Lindenberg	52.170	N	14.120	E
	27	Sodankyla	67.370	N	26.633	E
	28	Cabauw	51.970	N	4.930	E
CPPA /GAPP	29	ARM/Southern Great Plains	36.610	N	97.490	W
	30	Fort Peck	48.310	N	105.100	W
	31	Bondville	40.010	N	88.290	W
	32	Oak Ridge	35.960	N	84.290	W
CliC	33	BERMS (MAGS)	53.990	N	105.120	W
	34	Alert, Nunavut	82.467	N	62.500	W
	35	Eureka, Nunavut	79.995	N	85.813	W
LBA	36	Rondonia	10.080	S	61.930	W
	37	Pantanal	19.560	S	57.010	W
	38	Manaus	2.610	S	60.210	W
	39	Brasilia	15.930	S	47.920	W
	40	Santarem	3.020	S	54.970	W
	41	Caxiuana	1.710	S	51.510	W
MDB	42	Tumbarumba (tower)	35.660	S	148.150	E
	43	Murrumbidgee (soil moisture, tempera	35.116	S	146.375	E
Others	44	ARM/Tropical West Pacific (Manus)	2.060	S	147.430	E
	45	ARM/Tropical West Pacific (Darwin)	12.430	S	130.890	E
	46	ARM/Northern Slope of Alaska	71.320	N	156.620	W
	47	Chilbolton, UK	51.150	N	1.433	W
LPB	48	Cruz Alta	28.600	S	53.400	W
AMMA	49	Niamey	13.530	N	2.660	E
	50	Ouémé	9.692	N	1.662	E
	51	Gourma	15.300	N	1.500	W

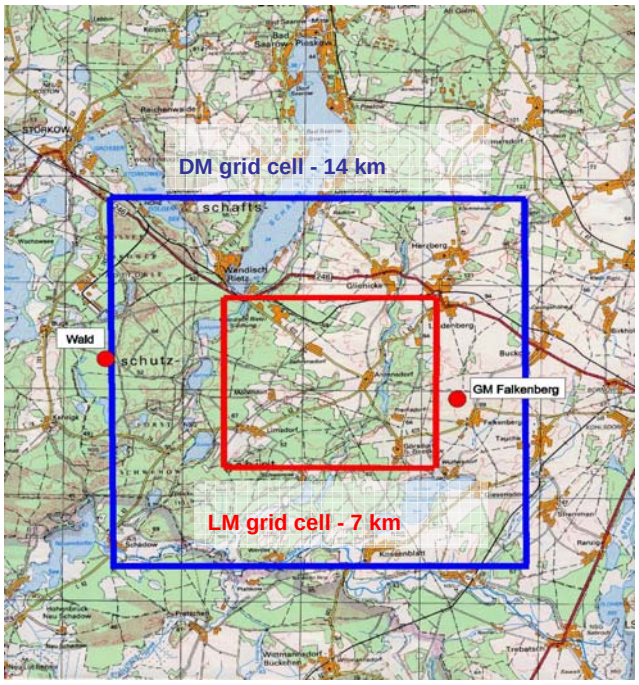
REFERENCE SITE PARTICIPATION REQUIREMENTS

All Reference Sites must:

- Provide commitment for participation
- Provide required metadata/site descriptions
- Abide by CEOP Data Policy
- Perform format conversions and quality control*
- MUST MEET DELIVERY SCHEDULE!

** May use MAHASRI (CAMP) Data System*

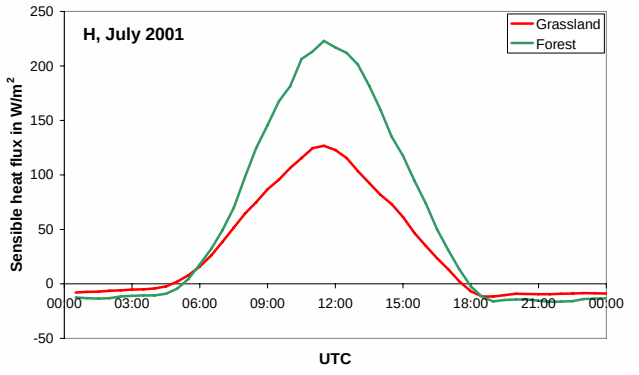
Heterogeneous landscape around Lindenberg

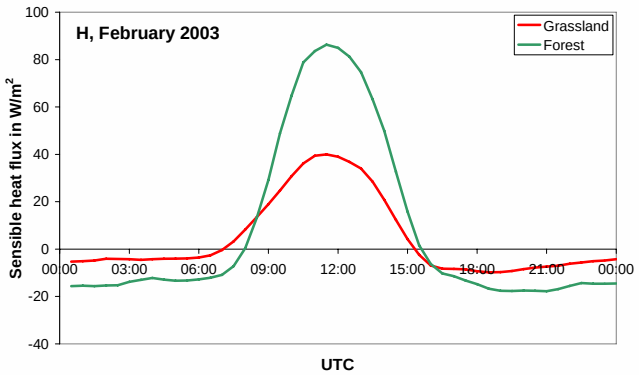


~ 45 % agriculture
~ 43 % forest
~ 7 % water

Differences forest - grassland (IV): Sensible heat flux

... up to 100 %





Lindenberg Reference Site

REFERENCE SITE PARTICIPATION REQUIREMENTS

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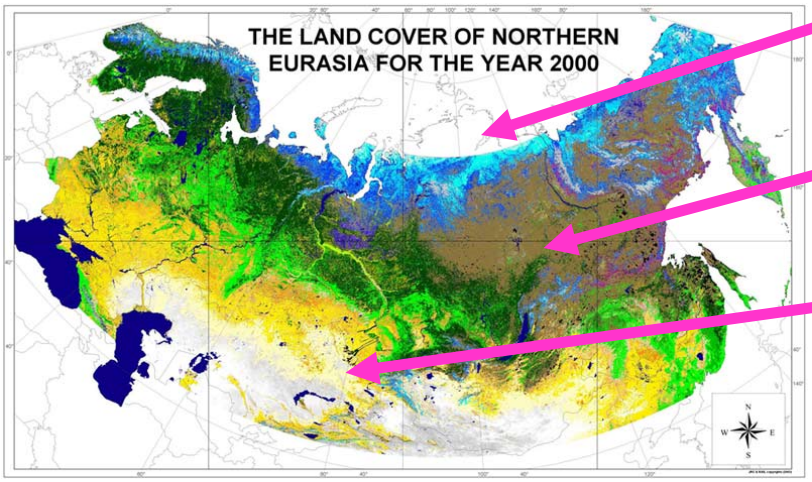
** May use MAHASRI (CAMP) Data System*

NEESPI: The Northern Eurasia Earth Science Partnership Initiative



The world's largest cold region.

Area stores more than half of the Earth's terrestrial carbon.

Large vulnerable natural and agricultural eco-systems, and extensive and variable dry land areas exist in the region.

Potential Sites are currently being identified or installed

Flux observations in Southern Brazil

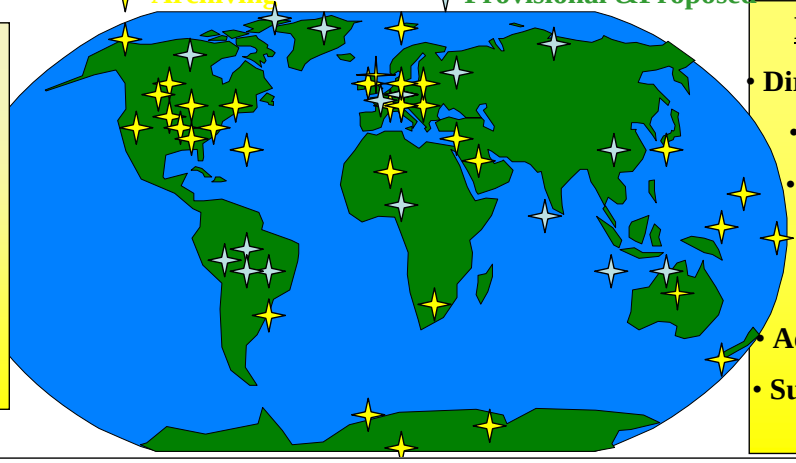
Nova Roma do Sul

Paraíso do Sul

Candiota

Baseline Surface Radiation Network

Archiving Provisional &Proposed



Goal:

To acquire the highest possible quality, globally-diverse, surface-based radiation measurements for climate research.

Measurements

- **Direct & diffuse solar***
- **Downward IR ***
- **Upwelling irrad.**
- **PAR & UV**
- **Upper air met.**
- **Aerosol optical depth**
- **Surface meteorology***

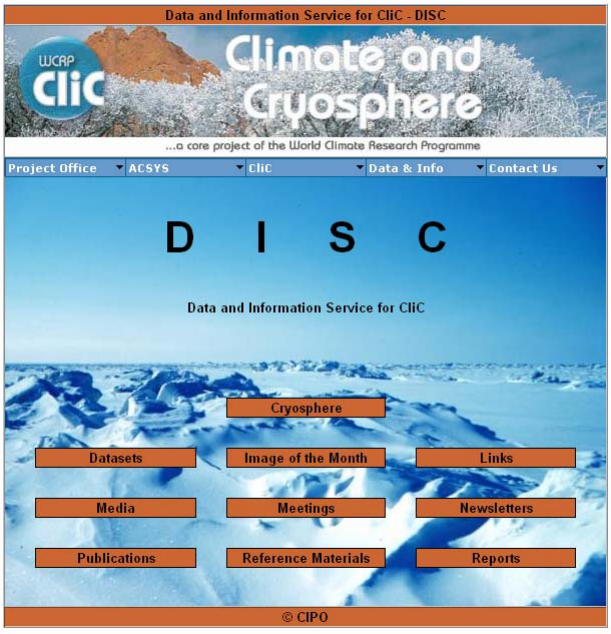
*all sites

Network Status

- 2561 station-months of data
- 34 archiving sites + 15 potential
- Zurich/ETHZ archive extended
- New Brazilian network
- New site – SIRTA - France
- 2 new Canadian sites proposed
- Progress on a China site(s)
- Potential eventual Siberian site
- GCOS invitation
- July 2004 Mtg. in Exeter U.K.

http://BSRN.ETHZ.CH

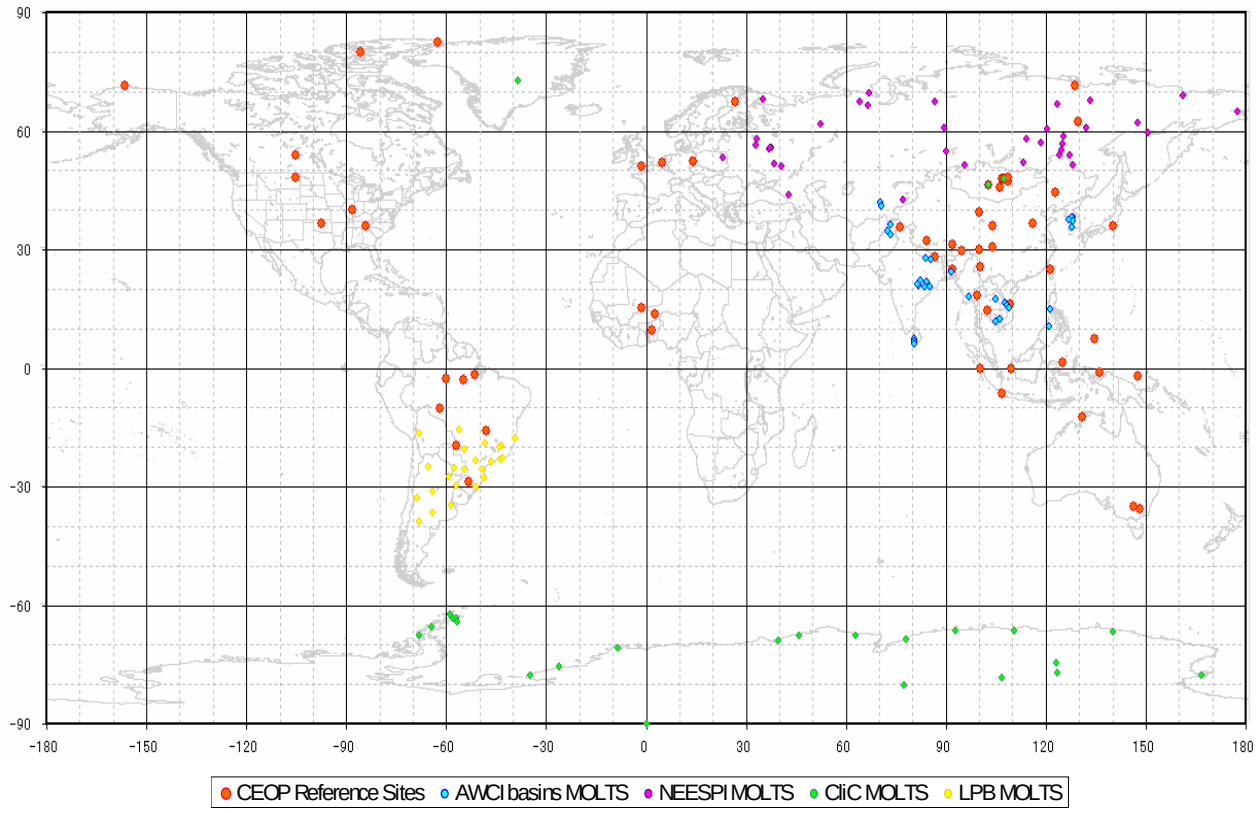
CEOP and CliC COORDINATION ACTIVITIES

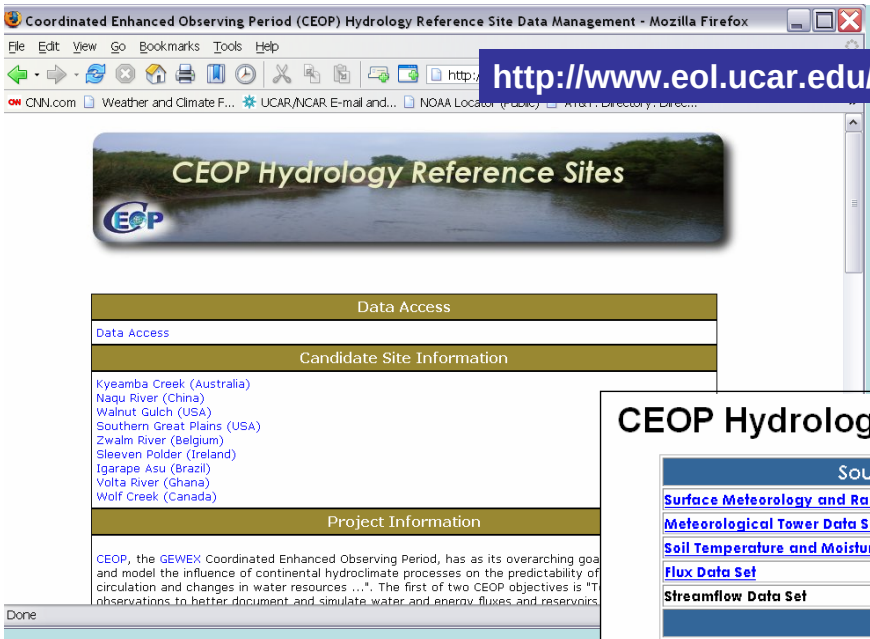


COLLABORATION FOR IPY

- Cold Weather Precip Questionnaire
- Link CEOP Data to DISC
- Common metadata (ISO19115)
- Shared Archives (Interoperability)
  - AON, Buoys, field project data
  - Satellite data/products
- Additional Reference Sites
- Entrain Cryospheric Community
- CEOP/CliC Joint Session (Paris, 2006)

Distribution of MOLTS points proposed for New CEOP





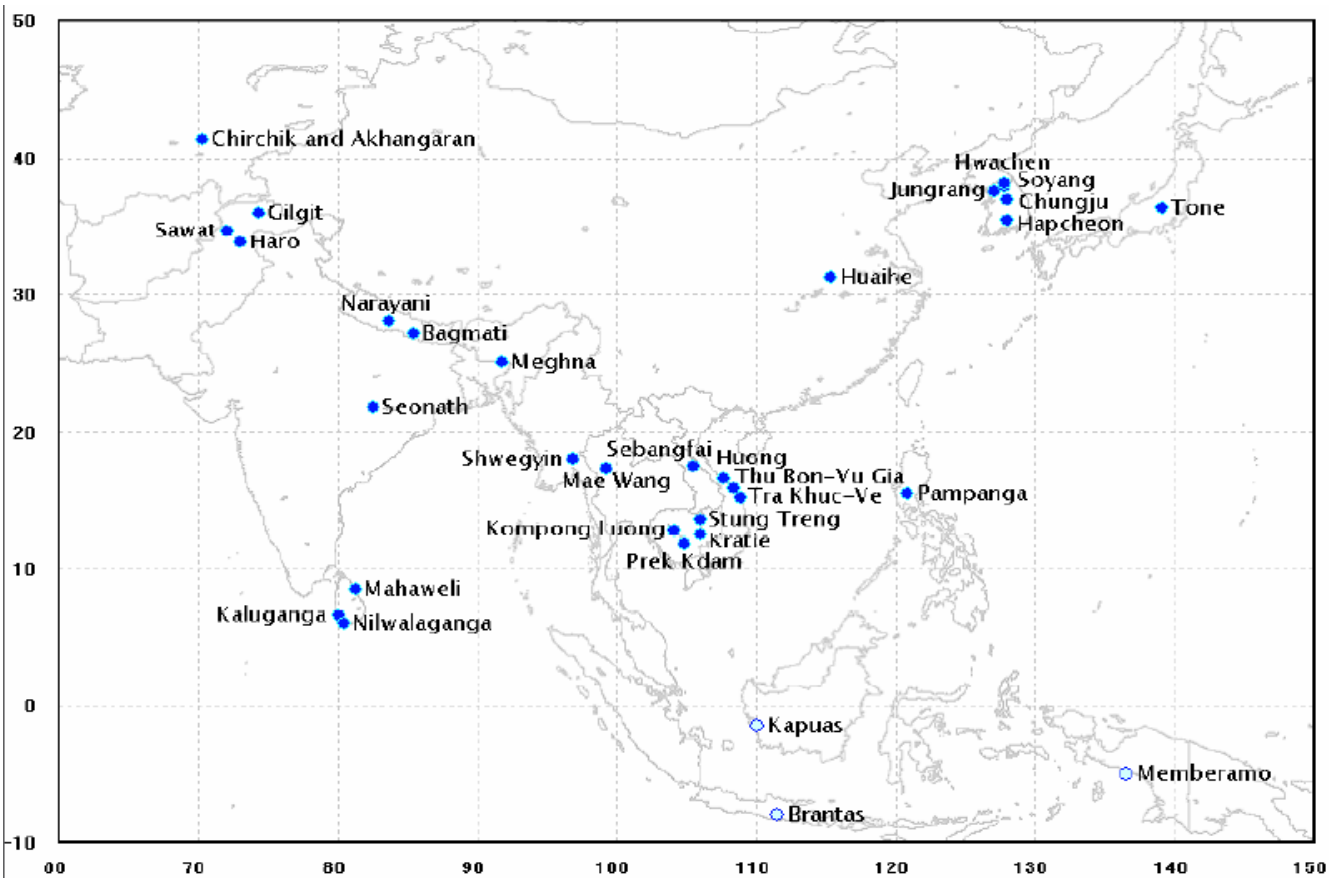
http://www.eol.ucar.edu/projects/ceop/dm/hydro/

- Contacting Data Sources
- Subsetting Data Sets
- Need to reformat into CEOP format

CEOP Hydrology Reference Site Data Sets

Southern Great Plains (USA)		
Surface Meteorology and Radiation Data Set	Oct 2002 - Dec 2004	CEOP Format
Meteorological Tower Data Set	Oct 2002 - Dec 2004	CEOP Format
Soil Temperature and Moisture Data Set	Oct 2002 - Dec 2004	CEOP Format
Flux Data Set	Oct 2002 - Dec 2004	CEOP Format
Streamflow Data Set		
Walnut Gulch (USA)		
Daily/Monthly/Annual Precipitation Data	1954 - Current	Source Format
Daily/Monthly/Annual Runoff Data	1954 - Current	Source Format
Naqu River (China; CAMP Tibet)		
Surface Meteorology and Radiation Data Set)	Oct 2002 - Mar 2003	CEOP Format
Meteorological Tower Data Set	Oct 2002 - Sep 2003	CEOP Format
Soil Temperature and Moisture Data Set	Oct 2002 - Mar 2003	CEOP Format
Flux Data Set	Oct 2002 - Mar 2003	CEOP Format
Zwalm River (Belgium)		
No data yet.		
Kyeamba Creek (Australia)		
No data yet.		
Sleeven Polder (Ireland)		
No data yet.		
Igarape Asu (Brazil)		

Proposed Asian Water-cycle Basins



Country	Ba	Bu	Ca	Ch	In	Is	Ja	Ko					La	Mo	My	Ne		Pa			Ph	Sr			Th	Uz	Vl			18
Reference basin	Me		Se	Sh	Ma	Ma	To	So	Hw	Ch	Ju	Ha	Se	SE	Sh	Na	Ba	Gl	Ha	Sa	Pa	Ma	Ka	Nl	Ma	CA	Hu	Th	Tr	29
Basin Description																														
Basin Maps	1		1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0	0	1	25
Basin Pictures	0		1				1	1	1	1	1	1	0	1	0			1	1	1	1	1	1	1		1	1	1	1	19
River Network Maps	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	28
Soil	0		1				1	1	1	1	1	1	1	1	0	1	1	0	0	0	1	1	1	1		1		1	1	18
Land Use/Vegetation	0		1			1	1	1	1	1	1	1	1	1	0	1	1	0	0	0	1	1	1	1		1	1	0	1	19
River Constructions	0		1				1	1	1	1	1	1	0		0						1	1	1	1		1	1	1	1	15
HYDROLOGICAY																														
Streamflow	1		1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	24
Reservoir	1		1				1	1	1	1	1	1	1	1	0			1	1	1	1	1	1	1		1	0	0	0	18
Groundwater Table	1		0	1									0	1	0			0	0	0	0	0	0	0		1	0	0	0	4
water quality																														
SUB-SURFACE																														
Soil Temperature	1		1	1			0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	1	1	0	1	1	1	0	1	12
Soil Moisture	0		1	1			0	0	0	0	0	0	0	1	0			0	0	0	0	0	0	0	1	1	1	1	1	8
SURFACE																														
Air Temperature	1		1				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	24
Humidity	1		1				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	24
Wind	1		1				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	24
Pressure	1		1				1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	23
Precipitation	1		1	1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	26
Snow	0		0				1	1	1	1	1	1	0	1		1	1	1	0	1	0	0	0	0		1	0	0	0	12
Skin Temperature	0		1				0	0	0	0	0	0		1				0	0	0	0	0	0	0	1	0	0	0	0	3
Upward Shortwave	0		1				0	0	0	0	0	0		1				1	1	1	0	0	0	0	1	0	0	1	0	7
Downward Shortwave	0		1				1	0	0	0	0	0		1				1	1	1	0	0	0	0	1	0	0	1	0	8
Upward Longwave	0		1				0	0	0	0	0	0		1				0	0	0	0	0	0	0	1	0	0	1	0	4
Downward Longwave	0		0				0	0	0	0	0	0	1	1				0	0	0	0	0	0	0	1	0	0	1	0	4
Upward PAR	0		0				0	0	0	0	0	0		1				0	0	0	0	0	0	0		0	0	0	0	1
Downward PAR	0		0				0	0	0	0	0	0		0				0	0	0	0	0	0	0		0	0	0	0	0
Net Radiation	1		0				0	0	0	0	0	0	0	1				0	0	0	0	0	0	0	1	0	0	1	0	4
Sensible Heat Flux	0		0				0	0	0	0	0	0	0	1				0	0	0	0	0	0	0	1	0	0	0	0	2
Latent Heat Flux	0		0				0	0	0	0	0	0	0	1				0	0	0	0	0	0	0	1	0	0	0	0	2
Ground Heat Flux	0		0				0	0	0	0	0	0	0	1				0	0	0	0	0	0	0	1	0	0	0	0	2
Momentum Flux	0		0				0	0	0	0	0	0	0	0				0	0	0	0	0	0	0		0	0	0	0	0
CO2 Flux	0		0				0	0	0	0	0	0		0				0	0	0	0	0	0	0		1	0	0	0	1
Evaporation	1		0	1			1	0	1	1	1	1	1	0		1	1	1	1	1	0	1	1	1		0	1	1	1	19
Vegetation	0		0				0	0	0	0	0	0		1				0	1	0	0	0	0	0		0	1	1	1	5
Atmosphere																														
PB L Tower	0		0				0	0	0	0	0	0	0	0				0	0	0	0	0	0	0		0	0	0	0	0
Radiosonde	1		0				0	0	0	0	0	0	0	1				0	0	0	0	0	0	0		0	1	1	1	5
Radar	1		1	1			1	0	0	0	0	0	0	1				0	0	0	0	0	0	0	1	0	1	1	1	9
Lidar	0		0				0	0	0	0	0	0	0	0				0	0	0	0	0	0	0		0	0	0	0	0
Profiler	0		0				0	0	0	0	0	0	0	0				0	0	0	0	0	0	0		0	0	0	0	0
RASS	0		0				0	0	0	0	0	0	0	0				0	0	0	0	0	0	0		0	0	0	0	0

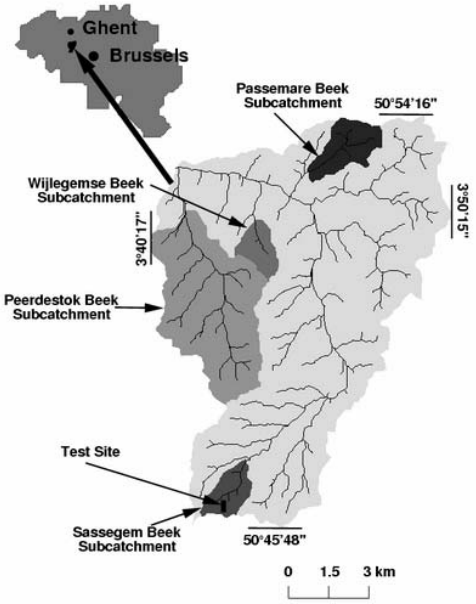
CEOP HYDROLOGY REFERENCE SITES

What is this?
Candidate Sites
> Kyeamba Creek (Australia)
> Sleeven Polder (Ireland)
> Walnut Gulch (US)
> Igarape Asu (Brazil)
> Zwalm River (Belgium)
> Volta River (Ghana)
> Wolf Creek (Canada)
> Naqu River (China)
Submit Your Site
Current Entries

Zwalm River, Belgium

Site Summary

The Zwalm catchment, a subcatchment of the the Schelde River basin, is situated in the province of East-Flanders, Belgium at approximately 50.840N and 3.780 E, (see Figure) with the outlet of the basin south of Gent near the village Nederzwalm. The total drainage area is 114 km2 and the total length of perennial streams is estimated from topographic maps, scale 1:10000, to be 177 km. Therefore, the drainage density is 1.55 km/km2, a value characteristic for humid catchments. The topography of the basin is characterized by rolling hills and mild slopes. The maximum elevation difference in the basin is 150 m. The mean slope of first order streams (Strahler order) is 3.8%. The catchment is situated in the sandy-loam area of Flanders. Surface sampling has confirmed that most of the top layer of the soil profile has sandy loam texture, eventhough the Belgian soilmap surface to consist of deep loam soils (A-texture). The depth of the eolic cover is estimated to range between 0 and 10 m. Most of the land use is agriculture (arable crops and permanent pasture) but in the southern portion of the catchment it is forested (~50% Brakel-bos). The degree of urbanization is about 10% with urbanized areas mainly situated in the Northeast (Zottegem) and Southeast (Brakel).



Within the Zwalm are a number of gauged subcatchments, as shown in the figure. The Passemare Beek is a second order (Horton order) stream with a drainage area of 2.52 km2, and a total channel lengthof 2.97 km. The average slope is around 5% (channel slope 4.8% and hill slope 5.6%). The Sassegem subcatchment, with a drainage area of 2.49km2 and a total channel length of 2.92km, is situated in the extreme south of the Zwalm catchment. With average slopes of 8.5%, it is steeper than the Passemare.

Climatic conditions can be described as humid temperate. The mean annual rainfall is 775 mm and is distributed almost uniformly over the year. The average year temperature is 10 deg. C, with January the coldest month (mean temperature 3 deg. C) and July the warmest month (mean temperature 18 deg. C). The annual evaporation is approximately 450 mm.

Data Discussion Issues

- Consistent Formats, Additional parameters (e.g. aerosol, cloud)? Need survey….
- Finalize number of Reference Sites
- Review Reference Site Criteria
- Convert Reference Site data to NetCDF
- Finalize MOLTS points and formats!
- Continue collaboration and linkages with other Programs
- When does “new” CEOP start? Different times for different datasets? Continuity?