Manaus Cross Correlation of Monthly Means - 18 YEARS 1961 to 1978

ρ	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec
jan	1											
feb	0,605	1										
mar	0,581	0,413	1									
apr	0,439	0,615	0,407	1								
may	0,239	0,420	0,310	0,330	1							
jun	0,372	0,500	0,276	0,124	0,385	1						
jul	-0,009	0,351	-0,094	0,322	0,482	0,335	1					
aug	0,137	0,349	-0,258	0,388	0,387	0,197	0,652	1				
sep	0,224	0,425	0,316	0,445	0,701	0,380	0,566	0,436	1			
oct	0,440	0,523	-0,191	0,602	0,392	0,334	0,179	0,209	0,413	1		
nov	0,595	0,610	0,296	0,289	0,516	0,277	0,233	0,469	0,438	0,299	1	
dec	0,340	0,484	0,474	0,272	0,299	0,108	0,353	-0,085	0,450	0,397	0,198	1

Manaus Cross Correlation of Monthly Means - 17 YEARS 1962 to 1978

ρ	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec
jan	1											
feb	0,576	1										
mar	0,548	0,371	1									
apr	0,375	0,578	0,344	1								
may	0,189	0,385	0,267	0,271	1							
jun	0,436	0,565	0,332	0,201	0,437	1						
jul	-0,066	0,318	-0,153	0,274	0,458	0,377	1					
aug	0,029	0,277	-0,413	0,274	0,332	0,288	0,640	1				
sep	0,154	0,377	0,257	0,372	0,682	0,454	0,543	0,358	1			
oct	0,475	0,557	-0,180	0,678	0,417	0,330	0,194	0,256	0,453	1		
nov	0,552	0,579	0,192	0,108	0,480	0,429	0,156	0,326	0,342	0,391	1	
dec	0,333	0,482	0,471	0,264	0,290	0,122	0,346	-0,127	0,449	0,404	0,186	1

Manaus Cross Correlation of Monthly Means - 16 YEARS 1963 to 1978

ρ	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec
jan	1,000											
feb	0,609	1,000										
mar	0,521	0,426	1,000									
apr	0,375	0,585	0,350	1,000								
may	0,155	0,412	0,219	0,268	1,000							
jun	0,417	0,591	0,298	0,198	0,418	1,000						
jul	-0,101	0,338	-0,219	0,271	0,441	0,360	1,000					
aug	-0,007	0,298	-0,506	0,271	0,308	0,267	0,630	1,000				
sep	0,078	0,458	0,141	0,392	0,673	0,429	0,531	0,319	1,000			
oct	0,450	0,594	-0,323	0,687	0,391	0,305	0,166	0,226	0,408	1,000		
nov	0,550	0,590	0,178	0,105	0,475	0,424	0,147	0,319	0,343	0,385	1,000	
dec	0,291	0,535	0,414	0,264	0,248	0,076	0,317	-0,191	0,375	0,363	0,173	1,000

Manaus Cross Correlation of Monthly Means - 15 YEARS 1964 to 1978

ρ	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec
jan	1											
feb	0,623	1										
mar	0,562	0,429	1									
apr	0,343	0,602	0,393	1								
may	0,084	0,445	0,289	0,198	1							
jun	0,399	0,597	0,322	0,168	0,394	1						
jul	-0,209	0,371	-0,187	0,196	0,338	0,360	1					
aug	-0,088	0,319	-0,500	0,205	0,200	0,230	0,567	1				
sep	0,017	0,479	0,187	0,346	0,633	0,407	0,470	0,239	1			
oct	0,432	0,602	-0,400	0,676	0,361	0,287	0,111	0,183	0,382	1		
nov	0,618	0,602	0,158	0,161	0,610	0,470	0,258	0,427	0,431	0,432	1	
dec	0,302	0,535	0,415	0,277	0,276	0,080	0,357	-0,197	0,399	0,372	0,172	1

Porto Alegre Cross Correlation of Monthly Means - 18 YEARS 1961 to 1978

ρ	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec
jan	1											
feb	0,370	1										
mar	0,052	-0,128	1									
apr	-0,126	0,036	0,235	1								
may	0,282	0,096	0,318	-0,025	1							
jun	0,159	-0,127	0,346	0,147	0,215	1						
jul	0,164	0,070	-0,317	0,106	0,144	0,161	1					
aug	0,056	-0,162	-0,114	-0,144	0,237	0,302	0,229	1				
sep	0,110	-0,046	-0,411	-0,026	-0,287	-0,158	-0,127	0,187	1			
oct	0,200	-0,165	-0,356	-0,288	0,092	0,502	0,200	0,595	0,362	1		
nov	0,413	0,192	-0,035	-0,512	0,168	0,259	-0,087	0,308	0,328	0,465	1	
dec	0,056	0,037	0,192	0,286	0,152	0,300	-0,170	0,266	-0,194	0,137	-0,006	1

Porto Alegre Cross Correlation of Monthly Means - 17 YEARS 1962 to 1978

ρ	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec
jan	1											
feb	0,360	1										
mar	0,051	-0,133	1									
apr	-0,100	0,095	0,253	1								
may	0,268	0,060	0,322	0,047	1							
jun	0,173	-0,108	0,351	0,115	0,250	1						
jul	0,166	0,075	-0,317	0,105	0,152	0,160	1					
aug	0,021	-0,246	-0,129	-0,032	0,172	0,377	0,254	1				
sep	0,179	0,040	-0,458	-0,207	-0,213	-0,248	-0,154	0,442	1			
oct	0,208	-0,155	-0,356	-0,327	0,110	0,498	0,200	0,670	0,375	1		
nov	0,404	0,167	-0,039	-0,489	0,135	0,288	-0,085	0,265	0,475	0,486	1	
dec	0,022	-0,027	0,199	0,449	0,081	0,373	-0,175	0,154	-0,029	0,174	-0,076	1

Porto Alegre Cross Correlation of Monthly Means - 16 YEARS 1963 to 1978

ρ	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec
jan	1											
feb	0,346	1										
mar	-0,041	-0,174	1									
apr	-0,140	0,084	0,230	1								
may	0,353	0,048	0,301	0,033	1							
jun	0,059	-0,169	0,255	0,073	0,219	1						
jul	0,284	0,114	-0,242	0,151	0,204	0,344	1					
aug	-0,070	-0,291	-0,243	-0,070	0,142	0,291	0,384	1				
sep	0,153	0,029	-0,523	-0,224	-0,231	-0,331	-0,124	0,430	1			
oct	0,126	-0,202	-0,509	-0,389	0,074	0,419	0,340	0,634	0,359	1		
nov	0,353	0,145	-0,135	-0,544	0,106	0,197	0,002	0,200	0,464	0,436	1	
dec	-0,169	-0,101	0,037	0,465	0,016	0,184	-0,001	-0,011	-0,112	-0,008	-0,281	1

Porto Alegre Cross Correlation of Monthly Means - 15 YEARS 1964 to 1978

ρ	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec
jan	1											
feb	0,384	1										
mar	0,159	-0,182	1									
apr	0,072	0,099	0,087	1								
may	0,361	0,051	0,266	-0,036	1							
jun	0,236	-0,173	0,161	-0,064	0,183	1						
jul	0,385	0,117	-0,310	0,112	0,189	0,325	1					
aug	-0,256	-0,311	-0,145	0,073	0,202	0,425	0,446	1				
sep	-0,493	0,033	-0,419	0,270	-0,191	-0,150	-0,047	0,326	1			
oct	-0,058	-0,223	-0,431	-0,274	0,142	0,601	0,417	0,588	0,090	1		
nov	0,151	0,161	0,069	-0,420	0,217	0,430	0,074	0,050	0,073	0,308	1	
dec	-0,153	-0,100	0,011	0,481	0,005	0,170	-0,009	0,012	-0,093	0,020	-0,285	1

4. Satellite Derived Solar Radiation for Argentina

The radiation distribution was determined by the regression equation of Tarpley and the validation against the ground truth of 80 pyranometers is reported by Friulla et. All. in **Solar Energy**, International Journal, in 1982. The atlas derived from this work is not available is South America.

PROJECTS IN SOUTH AMERICA

1. ARGENTINA

A project is being developed in partnership with Spain and Portugal. The project focuses the assessment of solar irradiation data from ground stations. The coordinator of the project is Dr. H. Grossi - Gallegos. To the best of my knowledge, the proposed method to obtain the distribution of solar radiation is not published. We are still in contact with Dr. Grossi in order to get more details about the organization of the project as well as the technical informations concerned.

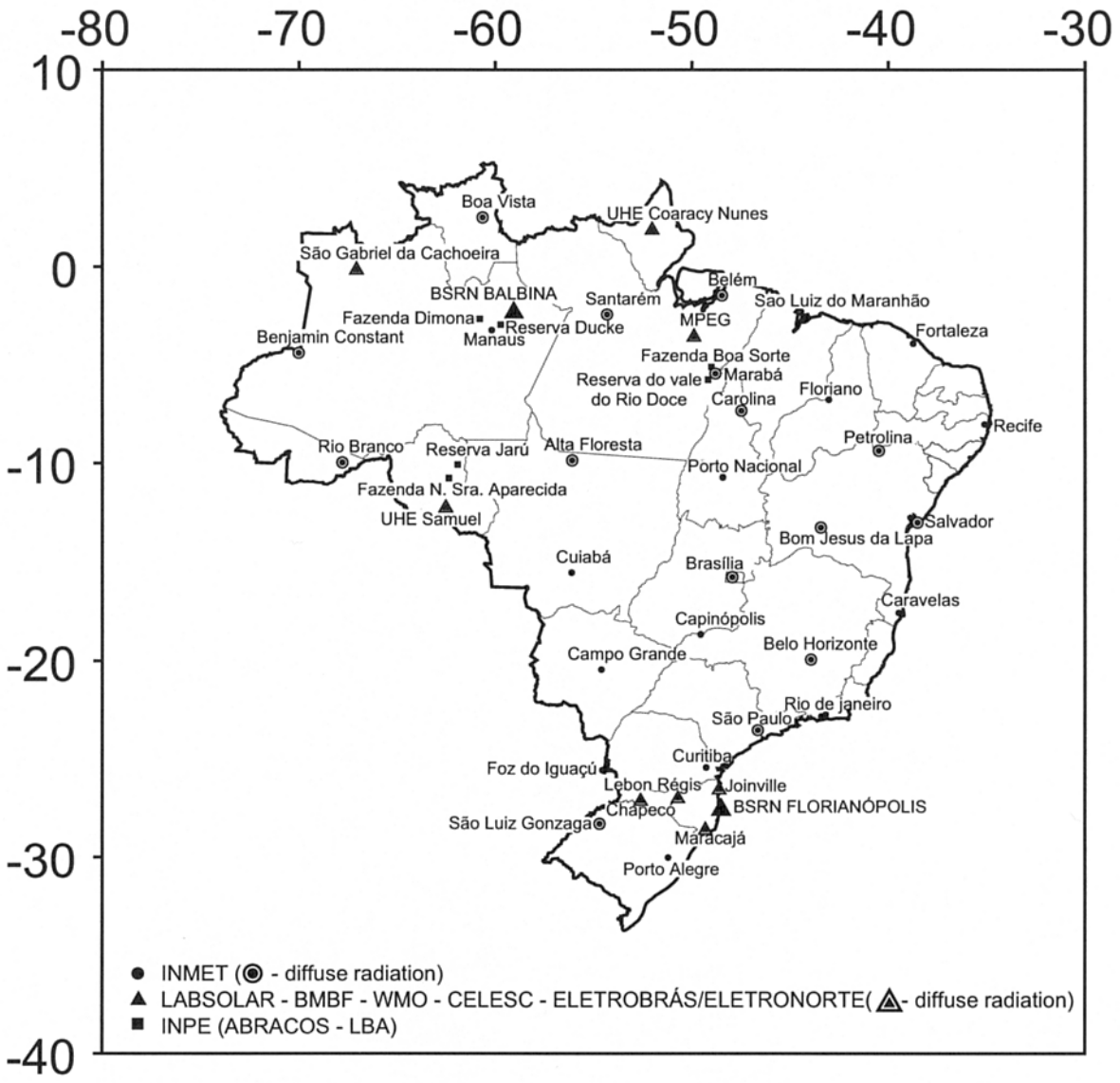
2. BRAZIL

The aim of the project is the assessment of the global, direct and diffuse irradiation as well as the solar irradiation on inclined surfaces for PV and other applications. The project is organized under the leadership of LABSOLAR/NCTS with the partnership of INPE (Brazilian Institute for Space Research) and INMET. Minor partners are the utility company ELETROBRAS (Federal) and CELESC - Utility Company of the State of Santa Catarina.

Goals of the project:
(i) - To rebuild the National Ground Station Network - RSNA (the old network is completely out of work since 1991);
(ii) - To validate satellite derived radiation (SDR) for Brazilian territory;
(iii) - To provide radiation data of highest quality for scientific use (BSRN goal);
(iv) - To extend the computation of SDR to South America;
(v) - To validate SDR for South America (it is presently the most difficult task). The location an type of the ground stations is shown in the next figure.

National Ground Stations Network - RSNA

(INMET, LABSOLAR, BMBF, BSRN/WMO, INPE, SIVAM, USP, UFPA, URGS, ...)



Project Status:

- ☑ 6 stations of LABSOLAR (2 BSRN), 2 GAW - INMET stations, 3 stations of INPE are available.
- ☑ The computer model (Brazil-SR) is fully operational at LABSOLAR.
- ☑ INPE provides the GOES 8 VIS images with one hour and three hour resolution.
- ☑ RSNA is planned in the frame of the deployment of the new standard meteorological stations of INMET which are presently being installed.
- ☑ ICA - International Cooperation Agency is responsible for the procurement and purchasing the radiometers and shade rings.
- ☑ The funds planned for the project proposed to INMET is still not available.

Present Needs:

- ☑ An international cooperation project for South America should be planned.
- ☑ The budget should be planned and the funds should be independent of national governments.
- ☑ The scientific staff should be defined by an international scientific committee.
- ☑ The project should be financed by an international agency.
- ☑ Minor financial counterparts should come from national agencies.