de potencial eólico regionais que precisam ser melhor validados com dados de vento de boa qualidade.

Neste trabalho são apresentados resultados preliminares da análise de dados de vento de cerca de 30 estações meteorológicas automáticas – Plataformas de Coleta de Dados – operadas pelo Instituto Nacional de Pesquisas Espaciais – INPE na região Nordeste. Os dados meteorológicos, do período de 1998 a 2004, foram filtrados e analisados estatisticamente para se determinar as características climatológicas representativas das microregiões onde as estações estão localizadas.

Também é apresentada uma análise estatística dos dados de vento de 3 estações anemométricas de 50m de alura recentemente instaladas pelo Projeto SONDA. Estas estações, operadas pelo Centro Brasileiro de Energia Eólica – CBEE em parceria com o INPE, foram posiciondas em uma pequena área dentro da região Nordeste escolhida para a realização de um exercício de comparação e validação de técnicas de simulação para elaboração de mapas de potencial eólico. Os dados de vento destas três estações são do período julho-dezembro de 2004.

Técnicas de Correlação-Medição-Previsão – MCP foram utilizadas para tentar corrijir algumas séries de dados de vento com problemas de descontinuidade de dados e/ou valores inconsistentes. Entretanto, as longas distâncias entre as estações prejudicam bastante a correlação entre os dados coletados limitando a aplicação desta correção para umas poucas estações.

A caracterização do potencial eólico em cada uma das estações estudada foi utlizada em uma comparacao com os dados encontrados nos mapas de potencial eólico existentes para o Nordeste do Brasil. Esta comparação é um indicativo da qualidade da informação contida nos mapas de potencial eólico e pode ser considerada como uma validação preliminar dos mesmos.

Um dos pontos críticos da análise estatística de dados de vento e consequentemente da elaboração/validação de mapas eólicos é a qualidade das séries temporais. A dificuldade em se obter uma medição de vento de longa duração com boa qualidade justifica o grande esforço e investimento na área de medição anemométrica e de desenvolvimento de técnicas MCP para melhorar a qualidade e quantidade de informação de potencial eólico no Brasil.

Solar Resource Assessment in Brazil

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The number of ground stations for solar radiation assessment in Brazil is poor when compared to the 8.512.000 km2 country's area. There are a lot of remote regions where no radiation data is available at all. Data most sites are usually sunshine duration records or cloud cover

observations. For these sites solar irradiation data is derived using known statistical methods, which implies in large uncertainties even at the measuring sites. Some measurement sites are provided with actinographers and radiometers but only a relatively small number of them are subjected to the desired level of maintenance and data quality control.

Interpolation uncertainties of solar irradiation maps derived from ground station's data are affected by the distance between measurements sites and by the measurement uncertainties and, in most cases, they are not useful for applications such as for dimensioning of large CSP systems. Solar radiation maps derived from satellite data are usually more reliable when ground sites are very scattered, provided adequate satellite data are available. Several satellite models to derive solar irradiance at surface and for thermal and photochemical studies in the atmosphere are operational in Brazil. One of these models, the BRASIL-SR, was implemented during SWERA specifically for solar energy resources assessment, taking into account the climatological and environmental conditions observed in Brazil.

The model BRASIL-SR were developed using the IGMK model as the main reference by a research program started through an agreement between the Solar Energy Laboratory of the Federal University of Santa Catarina (LABSOLAR/UFSC), the Brazilian Institute for Space Research (INPE), and the GMK institute in Germany. Several ground stations for solar radiation measurements were upgraded or newly implemented during SWERA for model implementation and cross-validation in Brazil. Caicó station was set up by SWERA project in the Northeast Brazil specifically for cross-validation between the four core radiation models of the project (BRAZIL-SR, Sunny-Albany, DLR and NREL). The Florianópolis ground station is operational since 1992 and it follows the standard procedures established by the Baseline Surface Radiation Network (BSRN) with support of the World Meteorological Organization (WMO). It was taken as a reference station for the new national network that is being installed under the umbrella of project SONDA (Sistema de Organização Nacional de Dados Ambientais para o setor de energia), providing the benchmarks for measurements that is being targeted by all other ground stations. The project SONDA (National Network of Environmental Data for Renewable Energy Resource Assessment) was an important outcome of SWERA and it is a topic to be described in another lecture during this workshop.

Data series such as Typical Meteorological Years are being obtained from selected reliable ground data to decrease the uncertainties in solar systems simulations. During the SWERA project, the TMY calculations are being derived by NREL, in a partnership with LABSOLAR, for 32 selected sites in Brazil from long term data observations from airports and meteorological stations, using in most cases cloud cover data.

This speech will present some of the solar resource assessment work developed for Brazil during the SWERA project along with the most important outcomes. Solar radiation maps provided by BRASIL-SR for the global, direct, diffuse and tilted radiation will be shown for Brazil with a spatial resolution of 10 x 10 km, and for South America, with a spatial resolution of 40 x 40 km. Maps of instantaneous values, daily sums (interpolating from 3 hourly data) and monthly means will be available for a period that started in 1995. The limitations and confidence levels of current results will also be presented along with a discussion of the ongoing efforts to improve the results. A comparison between the different methodologies used to estimate the solar irradiation data during SWERA, and expected uncertainties using ground data from selected cross-validation sites will also be presented.