

# Toward a Lidar Network in Latin America

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## ABSTRACT

We describe recent, ongoing, and future efforts to create a lidar network in Latin America through the integration of existing lidar projects and the establishment of new ones. An important part of this effort is to build on existing capabilities and to train scientists at each of the new sites to be able to operate their own observatories.

## 1. INTRODUCTION

The Americas have a large number of lidar projects, but these are concentrated in the US and Canada. For this reason, any future effort to organize a hemispheric lidar network should include a focus on supporting the existing lidar projects in Central and South America (Table 1) and seeking ways to increase their number. The implementation of a lidar network in the Americas will also be an important contribution to the Network for the Detection of Stratospheric Change (NDSC, 2002). Such a lidar network will provide regular and consistent monitoring of aerosol vertical profiles and at the same time will be a major resource for intercomparisons of aerosol measurements from satellites and other instruments. International research efforts such as the Stratospheric Processes And their Role in Climate (SPARC, 1998) will also benefit from the long term monitoring program we plan to conduct with the new network, which is named AliNe (American Lidar Network). Several other efforts have been conducted recently in other parts of the world to promote and create lidar networks (e.g., Bösenberg et al., 1998; Sugimoto, 2002), and the one proposed here will supplement those.

The main limitations for creating a lidar network based on existing instruments in Central and South America are the completely different design and building features, and the parameters measured. Such differences make it very difficult to compare measurements taken with different instruments under standardized principles. Also, two of the stations currently conducting stratospheric aerosol measurements are using old instruments based on electronic technology from the 1980s and before. Maintenance and spare parts for such instruments are becoming more expensive every year and the failure frequency of the instruments is increasing.

Existing lidar projects, however, guarantee the most valuable and expensive resource: qualified and trained physicists, engineers, and technicians for the design and building of lidars, and for operation, maintenance, data processing, and future upgrading.

The planned Latin American Network will be based on the contribution of each national lidar project. In the future it will be part of a hemispheric network which we have named AliNe (American Lidar Network). Support for network management will be sought from international funding sources. An important feature of the present project will be the participation of “end-user” scientists who are not directly related to the science of lidar measurements, data processing and analysis, but rather will be using the information provided by the network in global climate studies and modeling.

The scientific goals of this project can be stated as:

- Establishing standardized, regular latitudinally-distributed aerosol backscattering measurements both in the troposphere and the stratosphere.
- Production of a standardized lidar instrument, processing algorithms, and measurement methodologies, with a design flexible enough to provide expandable capabilities for the instrument for the future for polarization, ozone and other species measurement capabilities.

## 2. PAST AND ONGOING ACTIVITIES

Supported by the Inter-American Institute for Climate Change Research (IAI), a workshop on “Lidar Measurements in Latin-America” was held on 6-8 March, 2001 in Camagüey, Cuba (Robock and Antuña, 2001a, 2001b). The objectives of the workshop were:

- To promote communication and cooperation between the members of the scientific community engaged in lidar research in Latin America.
- To plan future lidar research projects in the region

Twenty-seven scientists attended the workshop, including representatives from lidar stations in Argentina, Brazil, Cuba, and Puerto Rico, from the European Space Agency, from Rutgers University, and from two potential sites in Bolivia and Ecuador. The main results were:

- Agreement for a new lidar station in La Paz, Bolivia (16.5°S, 68.1°W, 3420 m asl), with support from the European Space Agency
- Proposal to NASA for a new lidar station in Quito, Ecuador (0°, 78°W, 2850 m asl).
- Feeling of community among the attendees.
- Recognition of the need to create AliNe

The instrument for the new lidar station to be installed at the Laboratorio de Física de la Atmósfera, Universidad Mayor de San Andrés, La Paz, Bolivia, is been refurbished in Italy. Training of Bolivian personal on instrument operation will be conducted as soon as the instrument is ready. We expect the lidar to be deployed by the middle of 2002, becoming operative in the second half of the year.

The proposal for establishing another lidar station at Quito, Ecuador is being submitted to NASA.

A new proposal has been submitted to the IAI Small Grant Program. If approved, it will support a second workshop on “Lidar Measurements in Latin-America,” to be held in Camagüey, Cuba, in February 2003 (Canziani et al., 2002). The proposed objectives for the workshop are:

- To continue communication and cooperation between the members of lidar community in Latin America.
- To establish the basis for the Latin American lidar network.

We invite all people interested in cooperation with our current effort to contact us. We are open to new ideas and suggestions as well as to any contributions.

Table 1. Existing lidar stations in Latin America.

Station	Country	Lat.	Lon.	Measurements
Buenos Aires	Argentina	34.6°S	58.5°W	O <sub>3</sub> , aerosols, cirrus
São José Dos Campos	Brazil	23°S	46°W	Na, str. aerosols, T
São Paulo	Brazil	23.6°S	46.7°W	aerosols
Arecibo	Puerto Rico	18.4°N	66.8°W	Na, winds, str. aerosols, Fe, Ca, O <sub>3</sub>
Camagüey	Cuba	21.4°N	77.9°W	stratospheric aerosols

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# ALiNe Latin American Sites as of March 2002

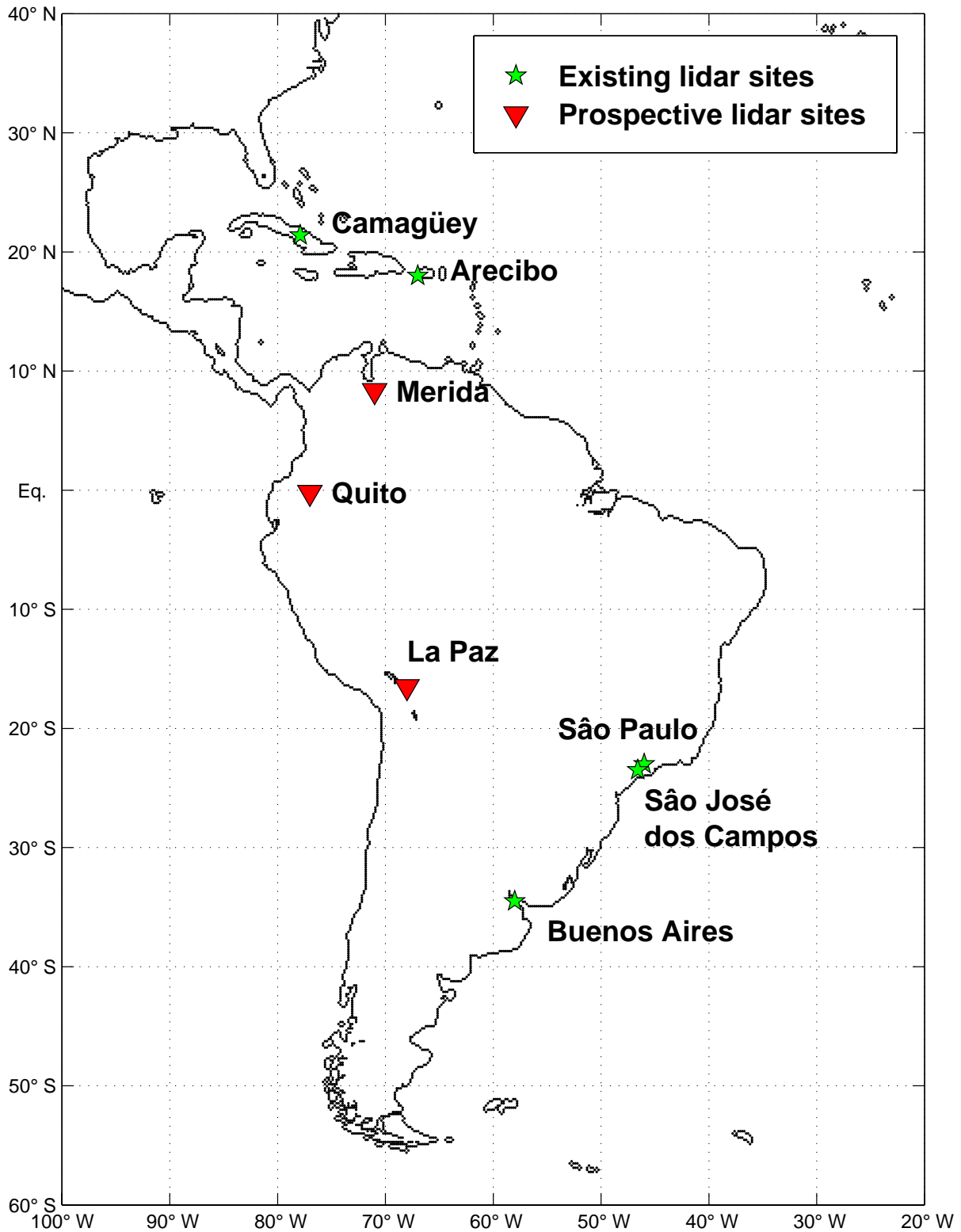


Figure 1. Locations of existing and planned lidar stations for the Americas Lidar Network (ALiNe).