

THE CHALLENGES AND POSSIBILITIES OF THE METEOROLOGICAL EDUCATION IN BRAZIL

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INTRODUCTION

The weather forecast is only one of many activities that can perform Meteorologist. Many engage in research, others are educators, technicians, consultants, managers and entrepreneurs.

So, learning meteorology in Brazil must present a common profile with a solid scientific and professional training that enables the professional to go further and be able to develop new technologies and methods that enable advances for application in several fields of science, due to social demands, with vision critical, creative, ethical and humanistic.

Educational institutions should be seen as a form of participation in social life, as modifier of reality, never as link in orders relay chain, values repositories and information to be transferred or as place to achieve certification guaranteeing get and perform individual professional goals (SILVEIRA et al, 2001).

Therefore, the main questions that is made in this paper are: a) The number of graduates (technical and higher levels) in meteorology meets the demand of the labor market?; b) These professionals are expert or need some kind of training?

METEOROLOGY EDUCATION IN BRAZIL

Brazil has 15 Meteorology courses, 13 undergraduate and 2 technicians, distributed in four Brazilian regions, as following Table and Figures. Note that these courses were created at different times and different characteristics (workload, places, etc.).

Midwest region does not present any course of Meteorology, however, had a technical course of Meteorology at with emphasis on Environment, at Technical School of Brasilia (Taguatinga/DF), but unfortunately its activities were closed in 2007 because of administrative problems and lack of government vision.

Table 1: General information on Meteorology Schools in Brazil.

Region/State/City/Institution	Creation Year	Operation Year	Level	Cycle	Duration (Year)	Period	Hourly Load (hour)	Vacancies	
NORTH	PA/Belém/Federal University of Pará (UFPA)	1975	1976	BS in Meteorology	Semester	4	Daytime	3555	20
	PA/Santarém/Federal University of West of Pará (UFOPA)	2011	2012	BS in Atmospheric Sciences	Semester	5	Daytime	4000	25
	AM/Manaus/State University of Amazonas (UEA)	2005	2006	BS in Meteorology	Semester	4.5	Daytime	3540	26
NORTHEAST	PB/Campina Grande/Federal University of Campina Grande (UFCG)	1973	1974	BS in Meteorology	Semester	4	Daytime	3225	45
	AL/Maceió/Federal University of Alagoas (UFAL)	1978	1979	BS in Meteorology	Semester (Single Entry)	4 / 5	Nightly/Daytime	3200 - 3840	60
SOUTHEAST	PB/Natal/Federal University of Rio Grande do Norte (FERN)	2013	2014	BS in Meteorology	Semester (Single Entry)	4	Daytime	3300	40
	RJ/Rio de Janeiro/Federal University of Rio de Janeiro (UFRRJ)	1963	1964	BS in Meteorology	Semester	4	Daytime	3220	20
SOUTH	RJ/Rio de Janeiro/Federal Center of Technological Education of Rio de Janeiro (CEFET-RJ)	1957	1958	Technician in Meteorology	Semester	4	Daytime	3045	20
	SP/São Paulo/University of São Paulo (USP)	1976	1977	BS in Meteorology	Semester	5	Daytime	3840	30
	MG/Itajubá/Federal University of Itajubá (UNIFEI)	2009	2010	BS in Atmospheric Sciences	Semester	4	Daytime	3247	30
MIDWEST	SP/Baurão/State University of São Paulo (UNESP)	2012	2013	BS in Meteorology	Semester	4	Daytime	3090	40
	RS/Capão do Leão/University of Pelotas (UPEL)	1978	1979	BS in Meteorology	Semester	4	Daytime	3166	37
	RS/Santa Maria/Federal University of Santa Maria (UFSM)	2004	2005	BS in Meteorology	Semester	4	Daytime	3330	20
	SC/Florianópolis/Federal University of Santa Catarina (UFSC)	2011	2012	BS in Meteorology	Semester	4	Daytime	3156	30
	SC/Florianópolis/Federal Institute of Santa Catarina (IFSC)	2002	2003	Technician in Meteorology	Semester	4	Daytime	1200	26

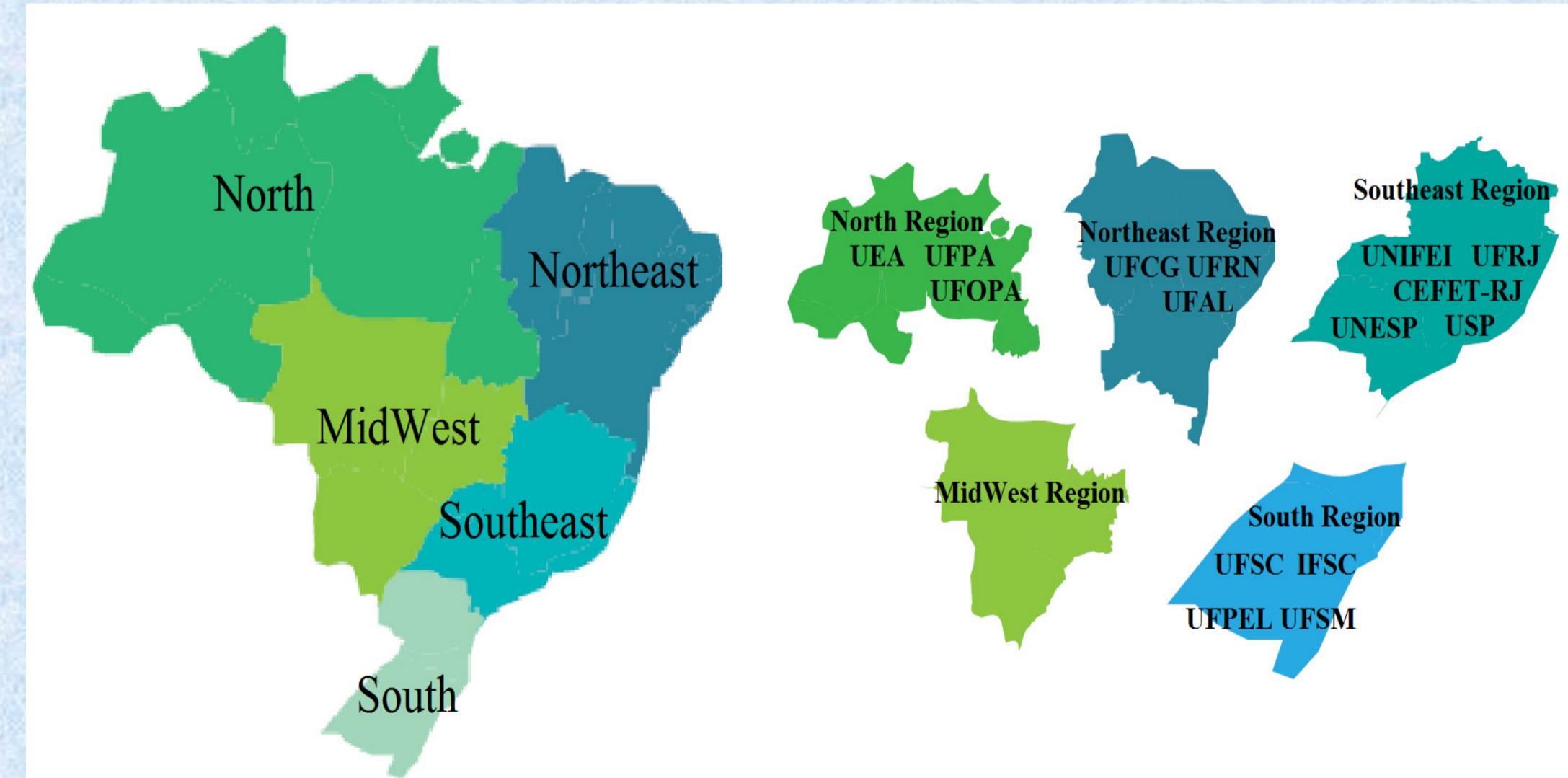


Figure 1: Location Map of Meteorology Schools in Brazil.

Data from the temporal evolution of the number of Meteorology courses (Figure 2) show that in the 1970s was a progressive increase in the number of courses. Other representative times that also occurred similar increase were 2000 and 2010 decades, which were created 8 new courses.

Figure 3 shows the number of courses per Brazilian geographic region.

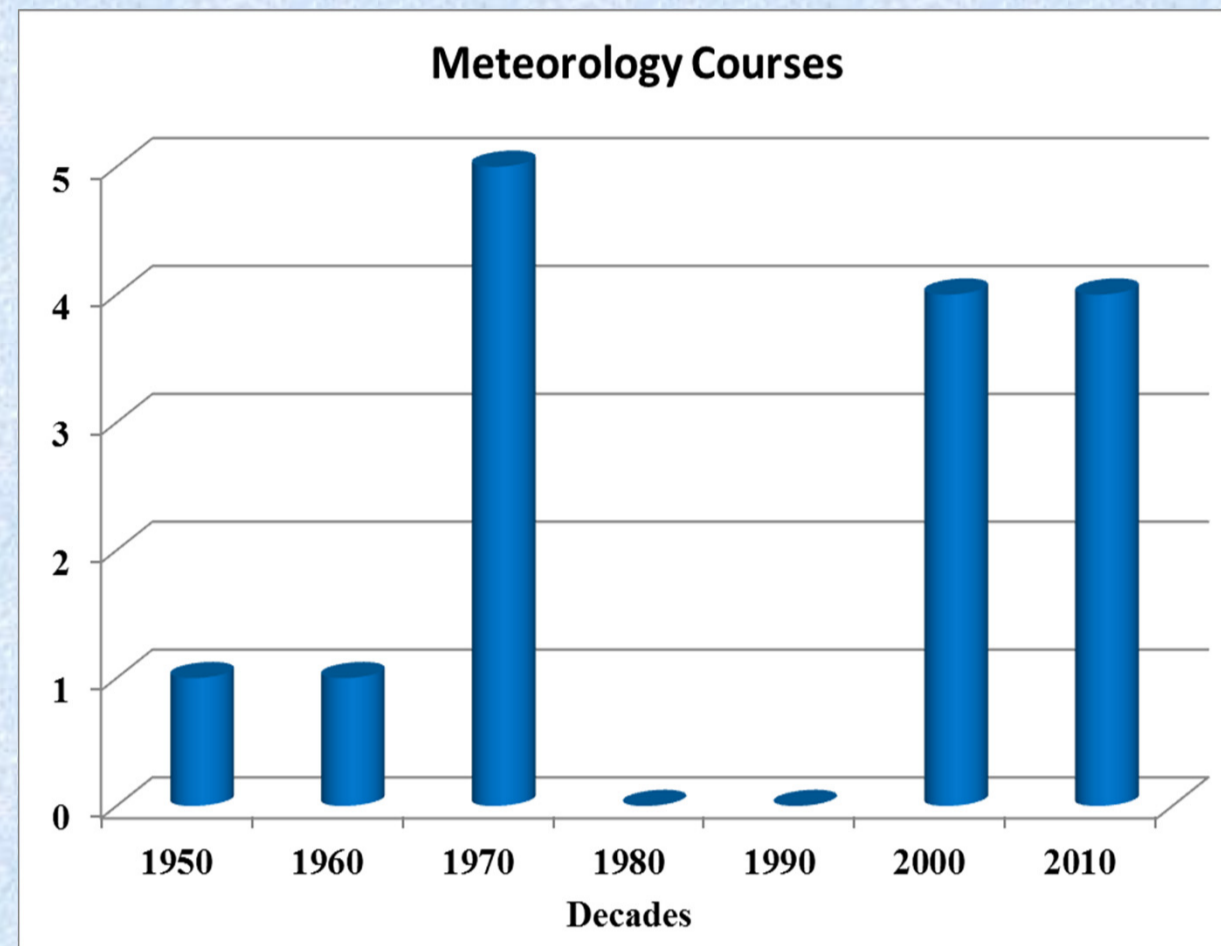


Figure 2: Amount of Meteorology Courses in Brazil (per decade).

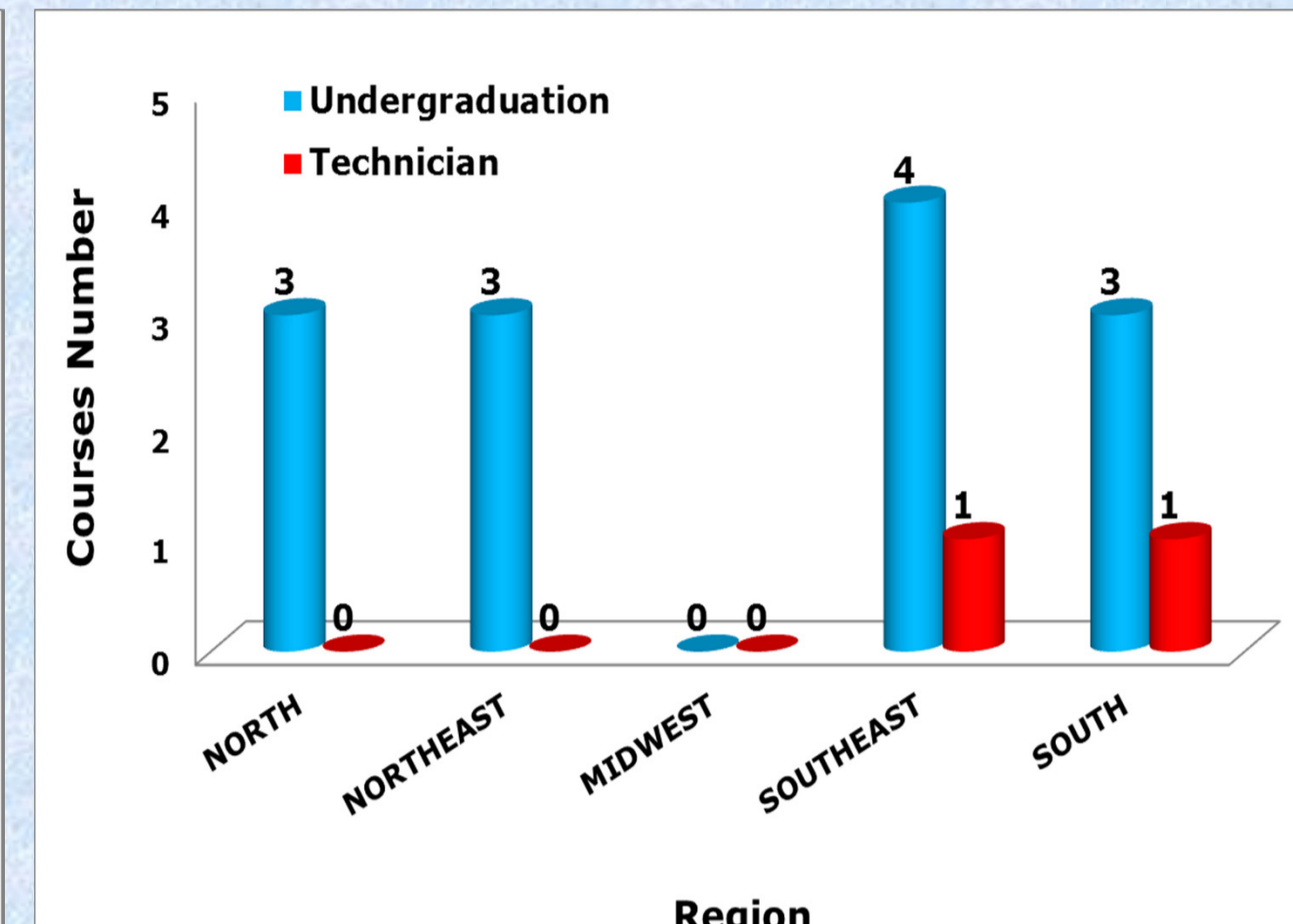


Figure 3: Amount of Meteorology Courses in each Brazilian region.

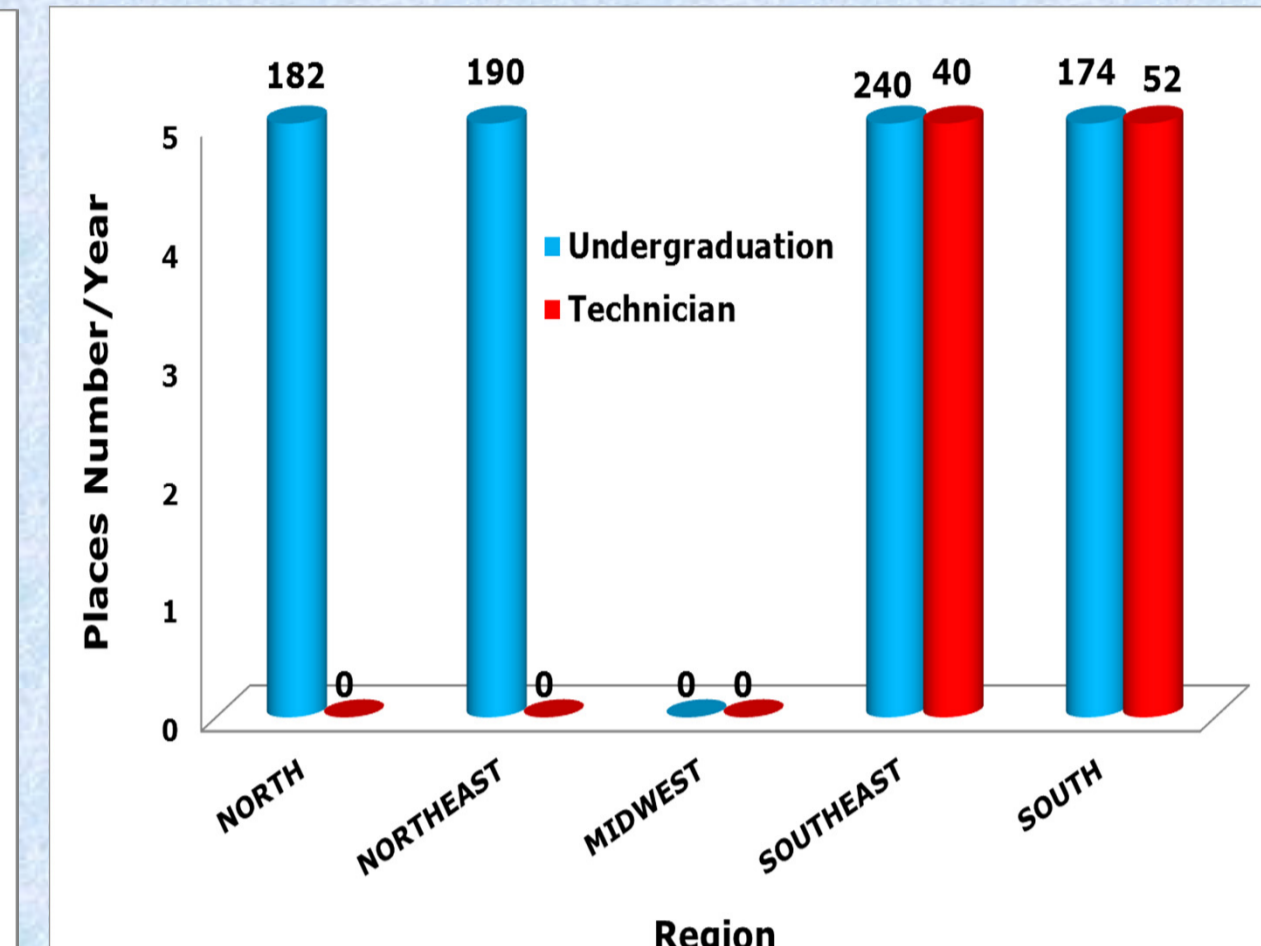


Figure 4: Number of places in each Brazilian region per year.

Currently there are about 786 places offered at undergraduate and about 92 for technician in Brazil. In the following graph can be seen the distribution for each region (Figure 4).

LABOR MARKET OF METEOROLOGY

In Brazil, through contests, the meteorologist can work in places such as National Institute for Space Research (INPE) and National Institute of Meteorology (INMET) - the latter represent Brazil at the WMO. Regarding companies, there are several (e.g. Climatempo, Somar, MetSul, etc.), which provide services such as weather forecast, monitoring and consulting.

In order to be able to present data from this labor market in Meteorology, a survey was carried out among public and private organizations. Thus, the following Figure shows evolution about job available in Meteorology.

Throughout the period analyzed (2000-2014), were provided 390 jobs, when most by public sector (368) and rest by Meteorological companies (22). The annual average for this time (15 years) was 26 job openings.

Largest job vacancies happened in 2009 and 2014, mainly due to job openings to INPE/CPTEC for staff replacement and new jobs.

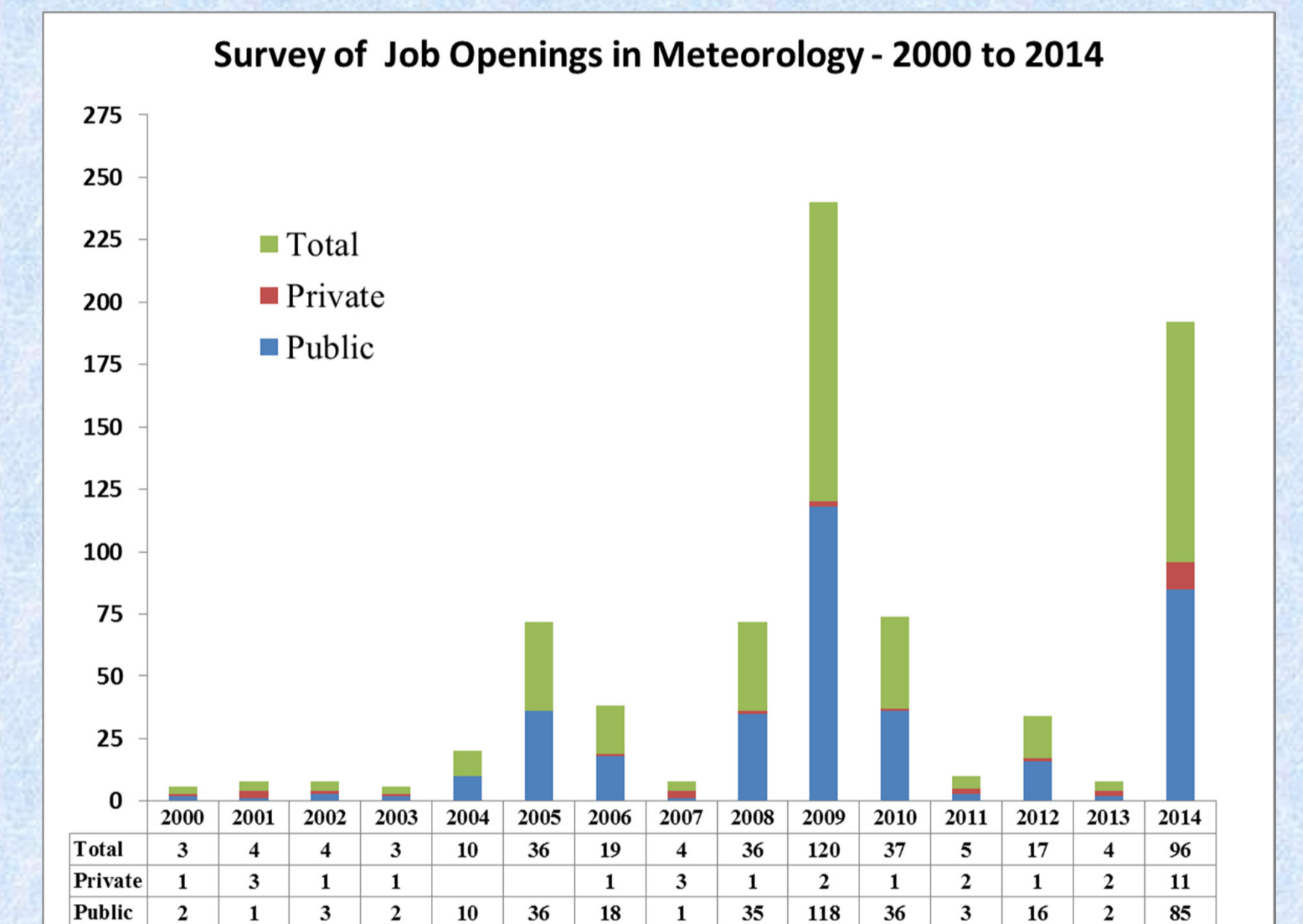


Figure 5: Survey of Job openings in Meteorology from Brazil.

According to data obtained by UNEMET, on average per year, are formed in Brazil about 11 meteorologists and technicians. So, using these average data and multiplying by 15 Meteorology courses, the result of calculation shows that about 165 professionals per year are available in the labor market.

Making a comparison between the numbers of job openings with those of graduates per year, our results show that lack professionals to supply the demands of jobs required by the labor market. Thus, we believe that there are still plenty of job openings for meteorologists.

Survey on Labor Market in Meteorology

A labor market survey was developed with public sector and private companies, using a questionnaire with questions (see the right).

36 questionnaires were sent to public and private organizations;

Unfortunately 6 were answered, 1 public sector and other private sector.

It was not possible to perform a quantitative but only qualitative analysis.

The profile of organizations can be summarized into two main groups:

- ✓ Weather forecasting, climate prediction, weather reports;
- ✓ Weather instrumentation.

Total of 84 professional employees: 18 technician and 66 meteorologists.

With regard to future expectations for new employees it turns out that the aim is to employ new staff in most cases.

All professional employees required training.

It has indicated the need for training in numerical weather prediction technical and its making, that is, the most appropriate way to inform the customer about weather.

ACKNOWLEDGEMENTS

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FINAL REMARKS

Labor market for Meteorology professionals is not being supplied and that there is a need to increase the number of professionals.

there is still capacity to expand the number of places and if necessary new courses in Brazil, but one have to be careful even better assess where region this demand must be supplied.

Attention should be paid to improving learning in Numerical Weather Prediction, i.e., implementation and use of numerical models of weather forecasting, analytical and weather forecast techniques of development focusing

Due to the climate change, natural disasters and environmental issues is expected that labor market for meteorologists grow more and more, so, it will be importance to redirect, adequacy of the curriculum, and continuous training of Meteorology professionals in order to supply the demands of modern Society.