

# TIEMPEROS: Meteorological specialists from the pre-hispanic indigenous cosmogony of Mexico, and the use of technology to promote astronomy and atmospheric sciences

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**Abstract.** The cult of the mountains, the wind and the request for “good rain” constitute today, the fusion of pre-Hispanic religious beliefs and meteorological knowledge in the agricultural development of central Mexico. Understanding this cult of the earth, from an indigenous perspective, led by certain specialists who have extensive knowledge of the landscape and meteorology, called Tiemperos, is a fundamental and necessary feature for the development of atmospheric sciences and the inclusion of rural villages in environmental research, carried out in certain areas of Mexico. Understanding the world in which these specialists are inserted is complex if one does not have a joint vision of the ethnographic data and the social relevance that the Tiemperos have on the communities. During 2018 I carried out an investigation on the request of rain and “goodweather” rituals that are carried out year after year in certain areas of central Mexico. From that initiative we developed an educational model and a prototype weather station that could be designed, built and adapted to the needs of each community, considering the traditions and teachings of the local Tiempero. Making use of microcontrollers, basic electronics, and a traditional indigenous technique, each station was built and designed with the people of the community where it would be installed, with the idea of involving and enriching scientific meteorological knowledge, which could be useful for each community. The project, still in development, included meteorological stations designed by the author and built by the communities, a series of educational exercises for children involved in the project and the proposal of a “goodweather” ritual using the data collected by the meteorological stations, with the intention of using technology and science-based information with traditional indigenous practices giving way to new forms of research and inclusion of science in remote communities in Mexico.

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## 1. We call it Earth, they call it Tlalli

What is Earth exactly? A planet, a rock spinning in space, a home. In Nahuatl<sup>†</sup> The place where there is fire, and therefore there is heat, is called “**Chantequitl**” and at the same time the word assigned for “home” is “**Chantli**”. The Earth, that chaotic and mutant place that protects us, is seen in many cultures as a living, divine entity that feels and decides for us. From planetary sciences specifically geology, rocks bear witness to events that happened millions of years ago, the study of “geological time” is essential to know our home and ourselves. Human culture has observed the earth and its changes since we began to become aware, what were rocks, plants, clouds, rain, cold, wind, fire like in those days? What is different in our way of approaching it, to observation? At present,

<sup>†</sup> Nahuatl is a macro-language spoken in Mexico, it has existed since at least the 5th century and is used in at least 16 states of the country.

the development of science opens new paths for us, many of them on the foundations and excavations of women and men before us who, from curiosity and work, have managed to reach essential conclusions. Technological advancement gives us an insurmountable advantage over our ancestors. Could it be that curiosity is not enough?

This same curiosity led us in 2018 to begin an investigation on the rituals of requesting rain and “good weather” that are carried out year after year in certain areas of central Mexico. From that initiative we developed an educational model and a prototype of a meteorological station that could be designed, built and adapted to the needs of each community, considering the traditions and teachings of the local *Tiempero*. Making use of microcontrollers, basic electronics and a traditional indigenous technique to work the clay. Each station was built and designed with the people of the community where it would be installed, with the idea of involving and enriching scientific meteorological knowledge, which could be useful for each community.

The project, still under development, included meteorological stations designed by us and built by the communities, a series of educational exercises for children involved in the project and the proposal of a ritual of “good weather” using the data collected by the stations, with the intention of using technology and science-based on traditional indigenous practices, opening the way to new forms of research and inclusion of science in communities far from Mexico’s science research centers.

The development of this project led us to several important conclusions in our own way of approaching citizen science, hand in hand with a community rooted in historical, religious and indigenous traditions. During the exercise in the city of Guadalajara, we worked with the community of the municipality of Tonalá, in the state of Jalisco, Mexico. Tonalá is a small town that is part of the metropolitan area of Guadalajara, (the second largest city in Mexico), and where year after year a historical-religious tradition takes place where a large part of the people participates: The dance of the *Tastoanes*.

In the approach of our project, the inclusion of typical traditions of the places was not contemplated, at that moment we failed to consider the fundamental contributions that knowing their traditions would bring to our project, however, the work with the community took our research to know and include their own traditions, under which astronomical observation and scientific experimentation were indisputably reinforced.

At that point of the investigation, two interesting things happened: On the one hand, we learned about the tradition of the dance of the *Tastoanes* and the importance it represents for the inhabitants of the city. When we first arrived in Tonalá, we came across that the only true way to establish a relationship with the community was by participating in its traditions.

## 2. Technology as a substitute for divinity? Or the inclusion of social traditions to incorporate society into science.

This idea, as obvious as it may seem, was the trigger for several significant points in the development of our research, under three important points:

- **Working in collaboration with the local artist.** Angel Santos craftsman of the town, helped us design a new meteorological station, built using the traditional technique of burnished clay and with whom you can share and learn about the questions that the inhabitants of the town ask themselves when living on a hill of great historical tradition.

- **The astronomy group with the village children.** “Sky Observation Club” where we were able to carry out a knowledge exchange with children from 4 to 10 years old, participants of the traditional dance of the *Tastoanes*.

- **The community work of the citizenship.** Involve the neighbors in the construction and obtaining of atmospheric data that the meteorological stations were releasing.

These three new axes formed a new basis for our (still growing) social-artistic-science experiments and gave me new questions:

- Have we failed, assuming that the public is not interested in heaven?
- Is our approach to the popularization of astronomy and meteorology too western?
- How can we involve the public in modern astronomical research?

It will probably be difficult to get out of the security niche that the academy provides, it is easier to assume that society is unwilling but even within those invisible dividing lines, there are cracks and holes where we can cross, and establish new communication bridges where information, experimentation, curiosity but also multidiscipline, can manage to traverse and flow freely.