

TRODIM PROJECT AND THE PATXI DATASET

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1. TRODIM PROJECT



TRODIM (Diagnosis and modelization of the extratropical tropopause) is a collaborative research project focused in the study of the tropopause. It is funded by the Ministry of Science and Innovation (Government of Spain) for the period 2008-2010 and participated by 8 research centres from 3 countries:



TRODIM has five subprojects with different goals:

- ALTRO: study of the interannual variability of the tropopause height.
- TROJET: study of tropopause foldings and jet stream systems.
- PT-DIN: permeability of tropopause.
- TROSAT: characterization of the tropopause using models and satellite images.
- MATRIMOD: maps of tropopause to identify conceptual models.

Some of the activities developed under TRODIM and results are:

- JGR-Atmospheres special issue on the tropopause
- Publications:
 - Ribera, P., Peña-Ortiz, C., Añel, J. A., Gimeno, L., de la Torre, L. (2008), Quasibiennial Modulation of the Northern Hemisphere Tropopause Height and Temperature, *J. Geophys. Res.*, 113, D00B02. DOI: 10.1029/2007JD009765.
 - Añel, J. A., J. C. Antuña, L. de la Torre, J. M. Castanheira, and L. Gimeno (2008), Climatological features of global multiple tropopause events, *J. Geophys. Res.*, 113, D00B08. DOI: 10.1029/2007JD009697.
 - Antuña, J. C., J. A. Añel, A. Sterin, and L. Gimeno (2009) Prof. Zahar Makhover: a major contributor to early tropopause studies, *Meteorol. Zeit.* (in press).
 - Castanheira, J. M., J. A. Añel, C. A. F. Marques, J. C. Antuña, M. L. R. Liberato, L. de la Torre, and L. Gimeno (2009) Increase of upper troposphere/lower stratosphere wave baroclinicity during the second half of the 20th century (submitted to *Atmos. Chem. Phys.*)
- A Tropopause bibliography database
- The PATXI dataset

LEARN MORE ABOUT TRODIM: <http://ephyslab.uvigo.es/trodim>

2. PATXI

PATXI is a dataset of tropopause parameters computed from the Integrated Global Radiosonde Archive (IGRA) [Durre et al., 2006] soundings for the subset S187 (Figure 1) [Añel et al., 2008]. Among other features the PATXI database covers multiple tropopause (MT) phenomena.

The period with available data for the current version of the dataset (v0.2) ranges from 1946 to 2006 and it is a function of the data series for each station. The available computed variables are: geopotential height, pressure, temperature, wind speed, wind direction.

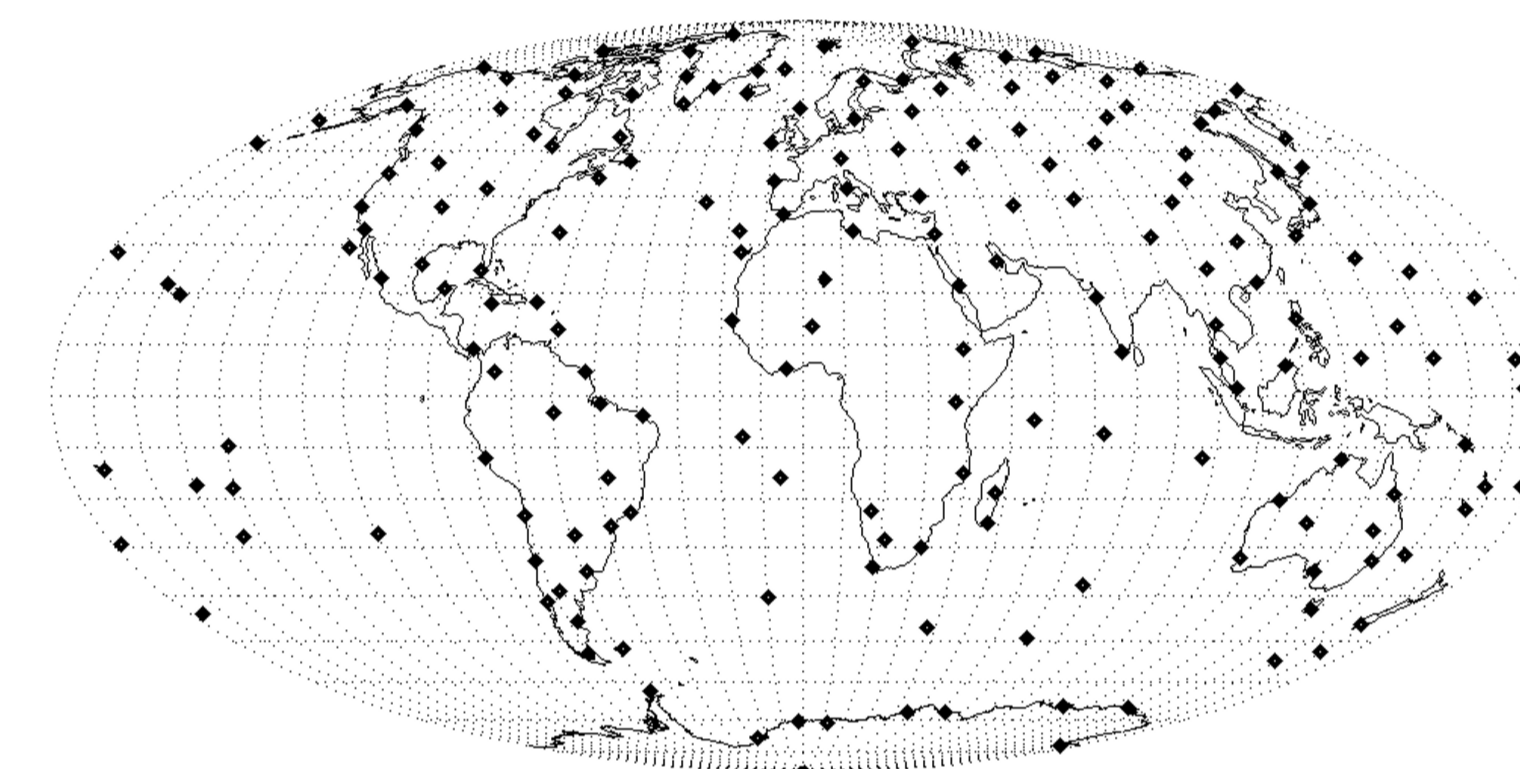


Figure 1: stations included in the PATXI dataset

The pressure of the tropopause was computed using the usual thermal definition [WMO, 1957]:

(a) The first tropopause is defined as the lowest level at which the lapse rate decreases to 2°C/km or less, provided also the average lapse rate between this level and all higher levels within 2 km does not exceed 2°C/km.

(b) If above the first tropopause the average lapse rate between any level and all higher levels within 1 km exceeds 3°C/km then a second tropopause is defined by the same criterion as under (a). This tropopause may be either within or above the 1 km layer.

The geopotential height was calculated by integrating the hydrostatic equation in the "ln p". In a small percentage of cases (9% of all the levels for all the original soundings in IGRA) when pressure data were not available but geopotential height data were present for the respective level of the sounding, the pressure was retrieved inverting the integrated hydrostatic equation.

Results

Añel et al. [2007] presents some results for a subset of 188 stations which can be of application for PATXI. Here we use the following criteria: LRT1 corresponds to the first lapse-rate tropopause, LRT2 to the second lapse-rate tropopause and LRT3 to the third lapse-rate tropopause.

Table 1. Percentage of Reports of Multiple Tropopauses With Respect to the Total Number of Soundings at Each Observation Time (results are shown for the reports in the complete IGRA database and for the calculated data from the used global subset.)

	IGRA (Reported),%	188-Station Subset (Calculated),%
LRT1	41.09	70.74
LRT2	6.08	11.63
LRT3	0.53	1.94

Table 2. Percentage of soundings reaching 10, 15 and 20 km at each observation Time (results are shown for the reports in the complete IGRA database and for the calculated data from the used global subset.)

	IGRA (Reported),%	188-Station Subset (Calculated),%
10 km	70.88	89.65
15 km	63.82	80.64
20 km	42.75	59.4

Table 3. Percentage of reports of LRT2 and LRT3 with respect to the total number of first tropopauses (results are shown for the reports in the complete IGRA database and for the calculated data from the used global subset.)

	IGRA (Reported),%	188-Station Subset (Calculated),%
LRT2	14.79	16.44
LRT3	1.29	2.75

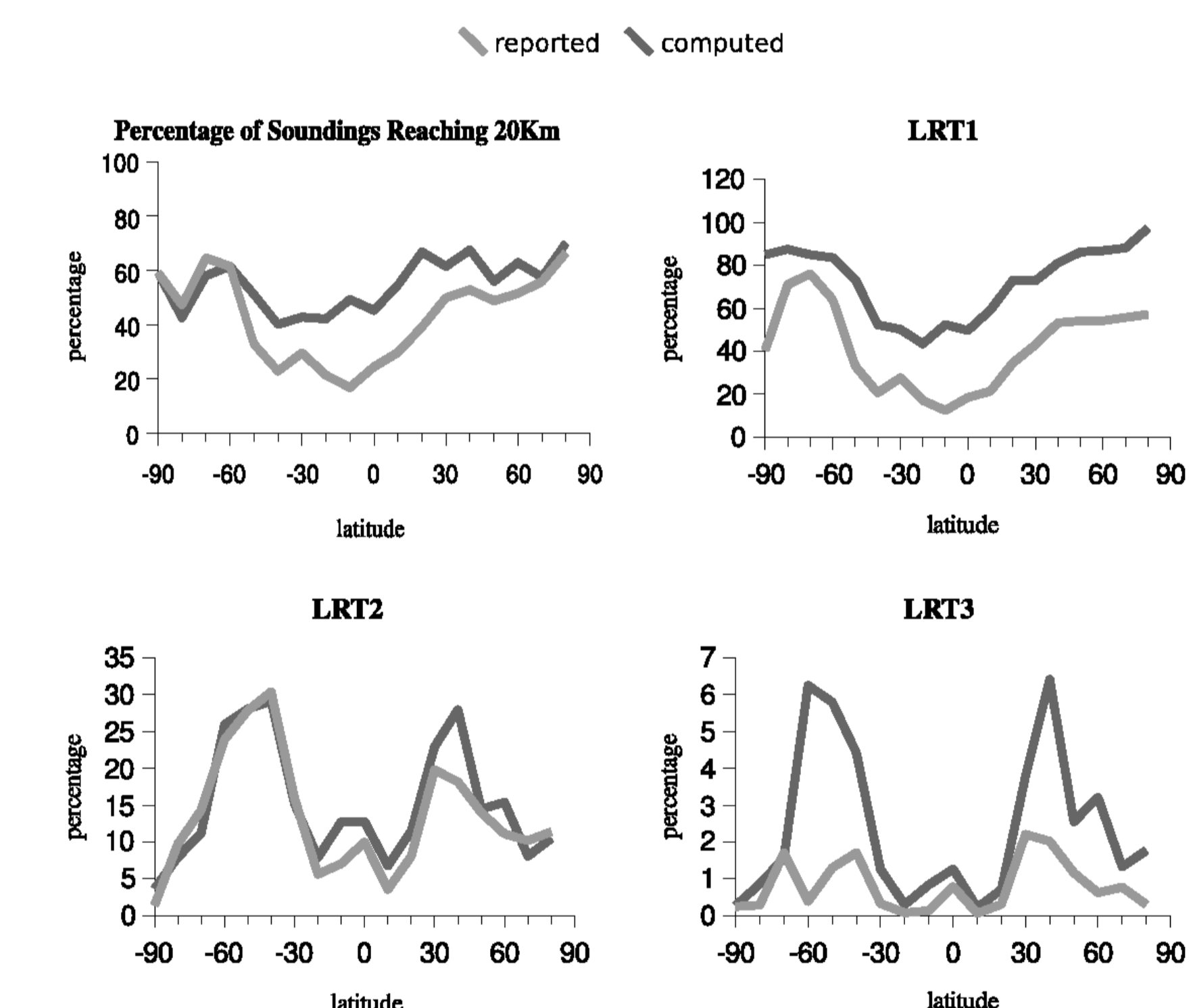


Figure 2: Latitudinal distribution of (top left) percentage of soundings reaching 20 km, (top right) percentage of LRT1 cases with respect to the total number of soundings, (bottom left) percentage of LRT2 cases with respect to the number of LRT1, and (bottom right) percentage of LRT3 cases with respect to the number of LRT1. Results are shown for both full IGRA reports (reported) and the 188-station subset (calculated)

More information:
<http://ephyslab.uvigo.es/patxi>

REFERENCES:

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- Añel, J. A., L. de la Torre, O. García-Feal, J. M. Castanheira, and L. Gimeno (2009) PATXI: a dataset of tropopause parameters (in preparation).
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