

## MIMOSA – basic package

### Guide with lesson plans

Download educational materials described in this guide from:

<https://www.igf.edu.pl/eris.php>



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# MIMOSA – basic package

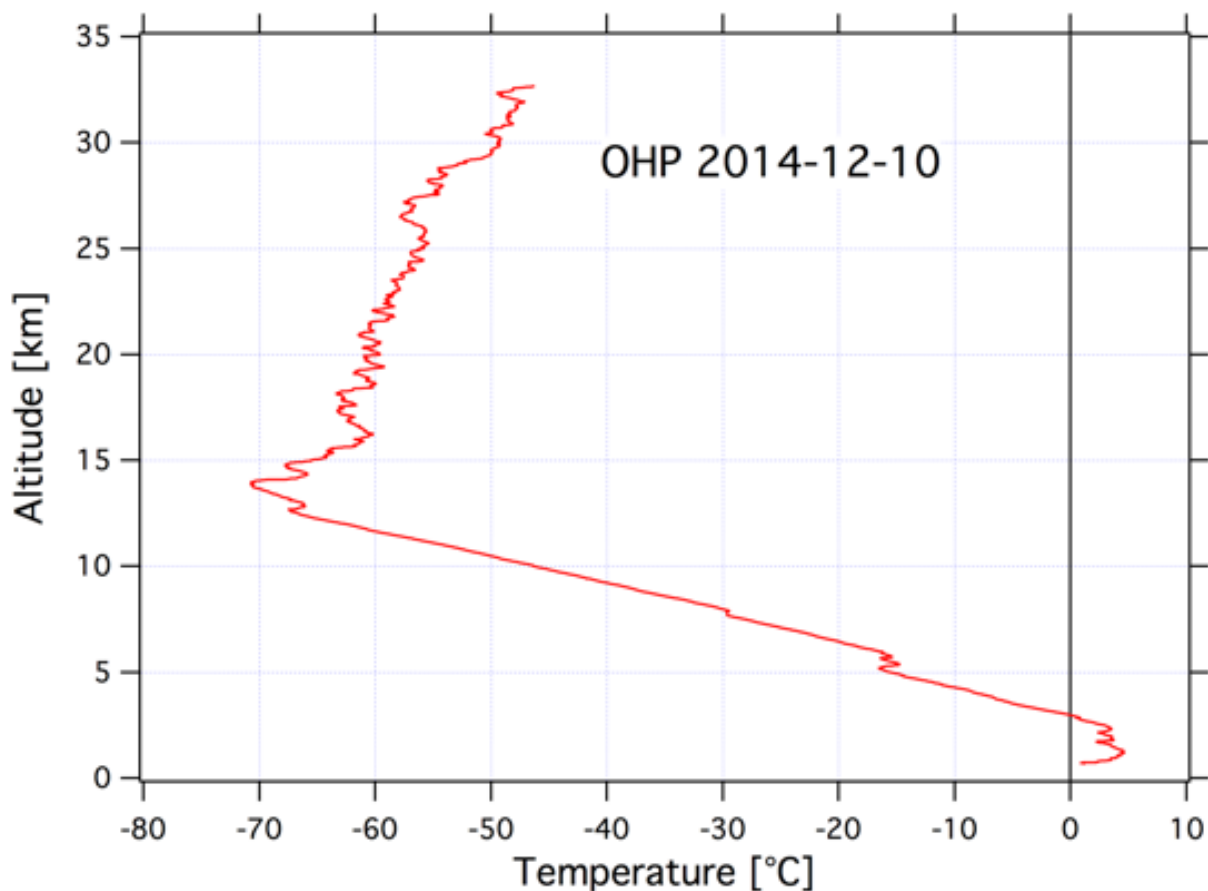
## Guide with lesson plans

<b>Title</b>	<b>MIMOSA</b>
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<b>Students' age</b>	12+
<b>Level of education or type of school</b>	Lower Secondary School
<b>School subject</b>	Physics, Mathematics
<b>Short description of content</b>	
<p>The numerical model MIMOSA allows to understand and to predict the dynamics of the wind, vortex and the transport of air masses in the polar stratosphere (high altitude, 12-25 km). This package will use MIMOSA maps to make understandable these notions.</p> <p><b><u>The troposphere</u></b></p> <p>To understand how the earth's atmosphere behaves, look at the temperature of the air and its variation as a function of altitude, called the temperature profile. The figure below shows the air temperature as a function of altitude from the ground up to 35 km.</p> <p>Knowing that warm air always tends towards the colder, less dense mass of air above it, an air mass of 0 to 10 km goes up.</p> <p>The air in this part of the atmosphere will therefore be constantly stirred, mixed with all the altitudes, rising it cools and mixes with the rest. Similarly, cold air descends and warms up.</p> <p>This part of the atmosphere is called the troposphere.</p> <p><b><u>The stratosphere</u></b></p> <p>The upper part of the temperature profile is different (from 10 to 35 km of altitude): the temperature increases with altitude. A mass of air will not be tempted to rise, it will remain at its level and it creates layers of atmosphere with identical thermal properties, strata, hence the name stratosphere for this part of the atmosphere. In a stratum, the air can mix with the neighbouring air masses with the same properties (horizontally, therefore without passing over a layer of the bottom or top).</p> <p>The intermediate part is called the tropopause and indicates the end of the troposphere and the</p>	

beginning of the stratosphere, with intermediate properties.

MIMOSA is a model that follows the movement (dynamics) of the air masses in the stratosphere to study its evolution. Since these air masses do not mix with the air masses from below or above, MIMOSA can follow the evolution of these air masses over several days.

In the Arctic, in winter (polar night) the stratosphere in addition to not being able to mix vertically, will be caught in a vortex, the polar vortex that will prevent it from mixing with neighbouring air masses to create a vortex or vortex Arctic polar. Our task will be to understand the behaviour of this vortex.



### Concept and learning outcomes

#### The student knows:

- Notion of wind, wind speed, wind direction
- Distances in maps

#### The student understands:

- Atmospheric temperature profile
- Perfect gas law

#### The student can:

- Measure distances on maps
- Interpret transport of air masses
- Understand the dynamics of the stratospheric polar vortex

#### Elements of educational package (created in ERIS)

1. MIMOSA – presentation – basic;  
1a [MIMOSA – movie based on presentation](#);
2. MIMOSA digital model;
3. MIMOSA – quiz;  
<https://play.kahoot.it/#/?quizId=1a6a2b51-f53d-4082-9315-318661c4eec2>
4. MIMOSA – quiz – answers;
5. [Earth Wind – movie](#) - Movie on the dynamics of the stratospheric air in polar region at the altitude of around 25 km;
6. MIMOSA – Movie on the evolution of the polar vortex,  
<https://youtube.com/watch?v=mrgKSqHOiOI>;
7. MIMOSA – images – 125 images from MIMOSA for different periods;
8. Sonde OHP – Temperature profile measured at Observatoire de Haute Provence in France;
9. MIMOSA – Guide with lesson plans.

#### Additional materials for teachers (websites links, science articles, etc.)

[http://ether.ipsl.jussieu.fr/ether/pubipsl/mimosa\\_fr.jsp](http://ether.ipsl.jussieu.fr/ether/pubipsl/mimosa_fr.jsp)

# Lesson 1

## Subject: MIMOSA

Lesson plan for "MIMOSA – basic package"

In order to conduct the lesson, it will be necessary to provide:

- a multimedia projector for the presentation, computer for groups of 2-3 student;
- No print out for students: all necessary documents are in the package and can be visualised on the computer;
- Link to Kahoot quiz: <https://play.kahoot.it/#/?quizId=1a6a2b51-f53d-4082-9315-318661c4eec2>

### Lesson Goals:

The overall goal and detailed objectives are consistent with the objectives of the "Mimosa" education package.

We propose to follow the indications provided in the MIMOSA presentation file (No 1).

### Lesson :

1. Start of the lesson, organizational activities, attendance list check.
2. Start the MIMOSA presentation file (No 1).
3. During the presentation indications are provided in ppt file to show movies 5 and 6 (on youtube).
4. Kahoot quiz if internet available, or traditional test (No 3). Answers for the teacher in file No 4.