10 Years of Scientific Research of the Hessdalen Phenomena

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"Convengo dedicato a Le Ricerca Italiana nella Valle di Hessdalen, Norwegia"
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1. Abstract

The author has for the last decade been a member of the Hessdalen project research team, and participated in the development of the Hessdalen Interactive Observatory, also called "Blue Box". The author has a master's degree in electronics and specializes in electromagnetic transmission. The author has long experience with radar and radio transmission from the Royal Norwegian Navy. Assistant Professor Erling Strand, the founder of the Hessdalen Project, conducted together with the author the first international congress of the Hessdalen phenomena in 1994. This congress attracted scientists from all over the world and boosted the scientific research in Hessdalen. Statements from the congress indicated that explanation of the phenomena could lead to new concepts in physics. This congress also started the collaboration between Østfold University College in Norway and CNR in Italy. Together with Dr. Stelio Montebugnoli, the author started the EMBLA project with the purpose of studying the electromagnetic radiation and behavior of the Hessdalen phenomena in 1999. The author has participated in a number of investigations in Hessdalen, and last in the CIPH winter mission

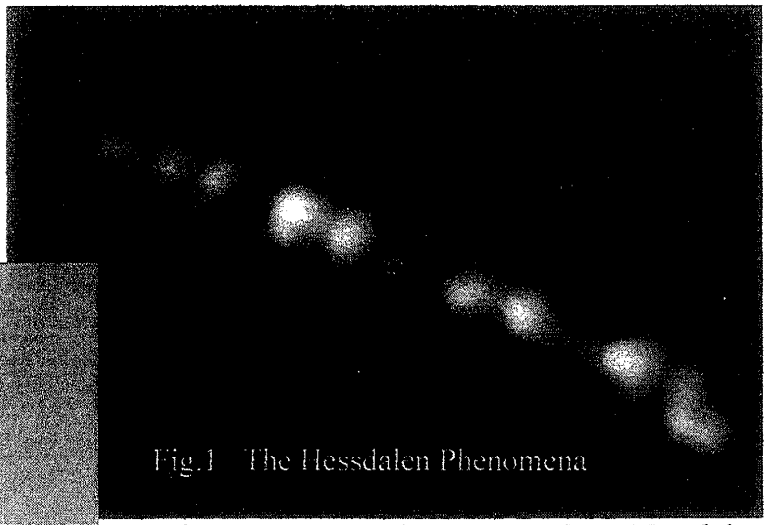

Fig.1 The Hessdalen Phenomena

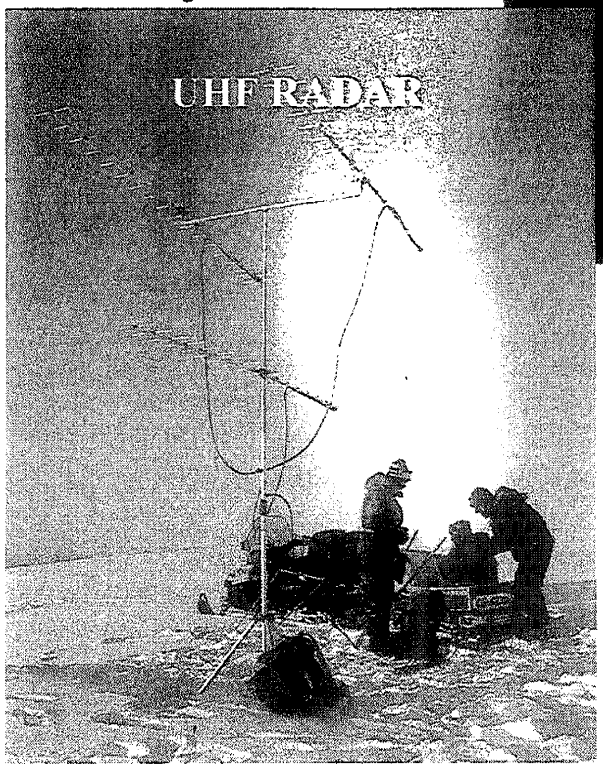

Fig.2 CIPH winter mission 2004

in Hessdalen 2004. Several students from Italy and Norway have also been involved. Since 1998, automatic surveillance of the valley has been done by the "Hessdalen Interactive Observatory". Despite the 24 hour surveillance and well manned and equipped research campaigns in the EMBLA project, no mayor breakthrough has been made. Spectacular pictures and video recordings have been obtained, but correlation with other scientific measurements is hard to find. No "fingerprint" of electromagnetic radiation from the phenomena has been obtained which can identify an unknown light source as the real Hessdalen phenomena. The research has so far demonstrated that the Hessdalen phenomena is difficult to investigate and explanations hard to find. Despite this, the EMBLA/CIPH team has gained significant experience in this kind of scientific study and is possibly the most competent team to carry out such expeditions in the world. The key to the solution lies in scientific knowledge and economic resources and this solution may show us the way to a new storage mechanism for energy.

2. *The Hessdalen Project 1984*

Mysterious lights have been seen flying around in the Hessdalen valley for over 100 years. The intensity of their appearance made a peak in the period of 1982-1985. Lights were seen daily in this period, and the Hessdalen lights became a world known tourist attraction. No scientific investigation was done until Dr. Erling Strand and his team created "Project Hessdalen" in 1983. During a four week long winter mission in 1984, important data was obtained. Results from this campaign were significant: 53 observations were classified as the Hessdalen phenomena, HP. The phenomena were also seen on radar while invisible, indicating that it was going through different phases and releasing energy. The HP was also observed standing still in the middle of the valley for nearly two hours. No other campaign has managed to come even close to the amount of data. The next campaign, Phase 2, was carried out in the winter of 1985 by the same crew, with more instrumentation and better infrastructure. No results were obtained due to heavy winter storms. One research team had to be rescued down from the Rogne Mountain; winter times are dangerous. Scientific reports from Phase 1 were published, and Dr. Erling Strand held numerous speeches around the world for the next 10 years. In 1994, the first international scientific congress was held in Hessdalen. This started a new era of scientific investigation in Hessdalen.

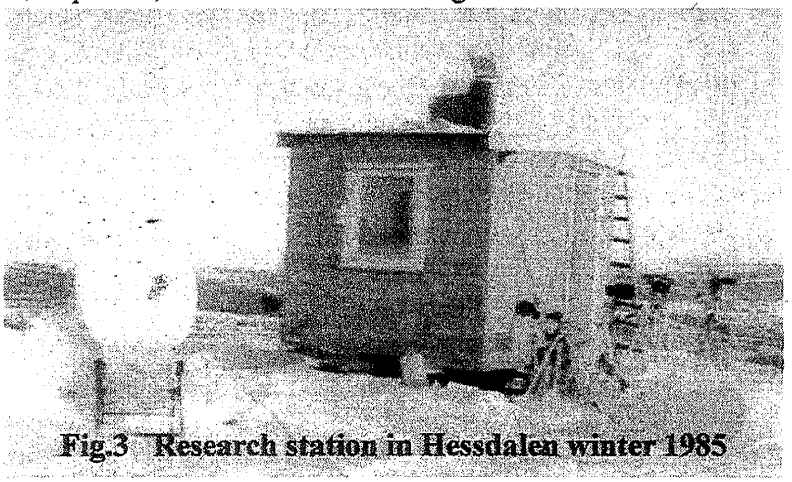

Fig.3 Research station in Hessdalen winter 1985

3. *The First International Scientific Congress 1994*

In the winter of 1994, 28 researchers from all over the world met in Hessdalen for the first scientific congress about the Hessdalen phenomena. Professor Boris Smirnov, nominee for the Nobel price, and Dr. David Fryberger from Stanford Linear Accelerator Center, SLAC, were of the opinion that the Hessdalen phenomena cannot be explained by today's mainstream physics and that further

investigation of the phenomena could lead to new concepts in physics. Several papers and speeches were presented at the congress, but no one was able to explain all of the artifacts with the phenomena (see Table 1). Among the most interesting theories discussed was the "self-contained electromagnetic field theory", "ball lightning model & fractal structure theory" and "rotating plasma theory". The congress urged that investigation of the HP must be intensified and that permanent instrumentation should be installed in the valley. The congress was not able to advise about what kind of instrumentation should be used in the hunt for the phenomena. The congress was given high attention in the media and focused upon scientific investigation. This congress helped move the scientific investigation out of "dead water". Speculation in the media and rumors of supernatural beings and flying saucers had since 1985 halted scientific investigation. No researcher dared to risk his reputation entering this field of investigation. The congress "opened" Hessdalen for scientific research. Attending this congress was astrophysicist Dr..Massimo Teodorani. His publications and connections in Italy would later give birth to Project EMBLA and his work was vital for development of the Hessdalen project.

Fig.4 First international congress of the Hessdalen phenomena

Theory	Speaker	Country
Ball lightning process/fractal structure	Prof. Boris Smirnow	Russia
Self restricted EM field	Dr. Gert H. Arnhof	Austria
EM standing waves	Dr. E.T. Protasevitch	Russia
EM impulse	Ass.prof. Erling Strand	Norway
Tectonic stress	Researcher P. Devereux	England
Rotating plasma	Prof. Y.S Zou	China
Plasma formation process	Prof. Edward Manykin	Russia
Vorton driven ionized gas	Dr. David Fryberger	USA

Table 1. Theories presented at the 1994 Congress in Hessdalen

4. The Medicina Congress

Shortly after the congress, Dr. Stelio Montebugnoli was informed about the congress in Hessdalen by Dr. Massimo Teodorani. Dr. Stelio Montebugnoli invited Assistant Professor Erling Strand and Assistant Professor Bjørn Gitle Hauge to visit the CNR radio telescope, located in the small village of Medicina outside Bologna, Italy. Dr. Montebugnoli organized two conferences about the Hessdalen phenomena, one at the telescope in Medicina, and one at the CNR facility in Bologna. At these two congresses topics about how to extract data from the

Hessdalen phenomena were discussed in detail. The support from Dr. Montebugnoli and the competence at the Medicina radio telescope was crucial for the further development of the research in Hessdalen. Their competence in developing instruments for detecting electromagnetic radiation from faint stars and galaxies made this place ideal to discuss how to extract information from the Hessdalen Phenomena. For people used to looking for mysterious light and radio sources, like quasars far out in the galaxy, the Hessdalen phenomena was not so impressive and mysterious. In the author's experience, astronomers are more used to dealing with unexplainable phenomena than many other researchers. Some of the objects in astronomy have similarities with the Hessdalen phenomena, like the pulsar, the rotating neutron star. Discussions have also been raised about "mini black holes" and whether this also could explain the power source of the Hessdalen phenomena. At these meetings Assistant Professor Erling Strand and the author learned the basics of radio astronomy research, and the author also spent six weeks at the radio telescope to learn more about techniques and instrumentation. The hospitality and help given by the Italian researcher were tremendous and extremely valuable for the later implementation of the "Hessdalen Interactive Observatory", the Blue Box. In the period from 1996 until now, several instruments for observing the Hessdalen phenomena have been developed by Italian researchers, instruments of great importance for the research.

Fig.5 1995 Author and Dr. Stelio Montebugnoli

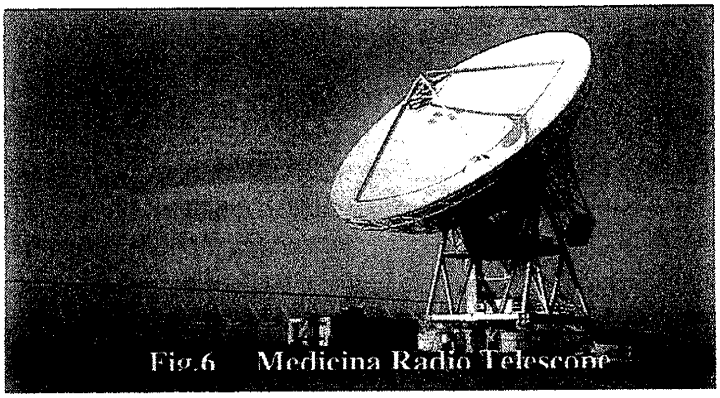

Fig.6 Medicina Radio Telescope

5. *Blue Box*

Back in Norway, Dr. Erling Strand and the author started to work on instruments which could be used to detect optical and electromagnetic radiation from the Hessdalen phenomena. In 1994 a student group made their thesis work on this subject under the guidance of Assistant Professor Erling Strand, Dr Montebugnoli and Dr. Teodorani. The group advised a combination of optical and radio detection systems to be developed. In 1997 this work was carried on when a Norwegian thesis group developed the POSIG radio frequency detection system, Fig.7, under the author's supervision. The system could detect signal frequency, signal level and signal bearing in 360^0 degrees, over a bandwidth of 400 MHz. Field tests were carried out with no significant results; more sensitivity and visibility had to be added. At this point, the system had to be installed in a house with a power

supply and limited visibility. In the Norwegian mountains, all of the houses with power supply are in the bottom of the valleys. A research station had to be built up on the mountain side if any results were to be obtained. The solution had to be a transportable 10x10 foot steel container, with sufficient insulation and temperature control to be able to cope with Norwegian winter conditions. A container was acquired, and work started out to rebuild it for the necessary specifications. In parallel with this, work was started by Assistant Professor Erling Strand to develop an automatic video detection system which was able to filter out all manmade optical lights and to only record light sources which could be the Hessdalen phenomena. This system was connected to the internet, and every time a mysterious light showed up a video recorder started and a picture was displayed on the Hessdalen internet page. This system was coupled together with a magnetometer, also able to send its data to the internet page. The installed equipment was a combined optical and electromagnetic registration system. In the autumn of 1998, the container and the equipment were transported 500 kilometers from the Østfold University College to the Hessdalen valley and installed on the mountainside. This installation had not been possible without the help of the landowner, Mr. Bjarne Lillevold. Power lines were built up to the container and, from 7 August 1998, the systems in the container were up and running. The instruments in the container were totally autonomous and data was sent to Østfold University College over the internet; all of it displayed on www.hessdalen.org. This system was in the beginning called "The Hessdalen Interactive Observatory", later changed to "Hessdalen AMS" (automatic measuring station). Since the container was colored blue, it was nicknamed the "Blue Box".

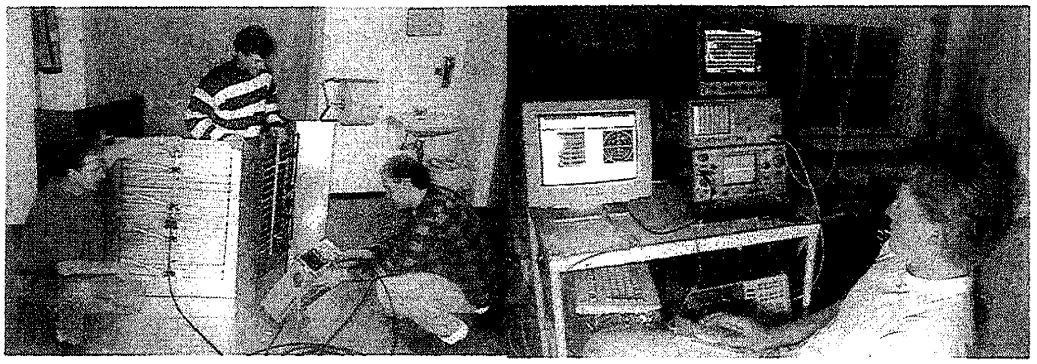

Fig.7 POSIG antenna & receiver

Fig.8 Blue Box 2001

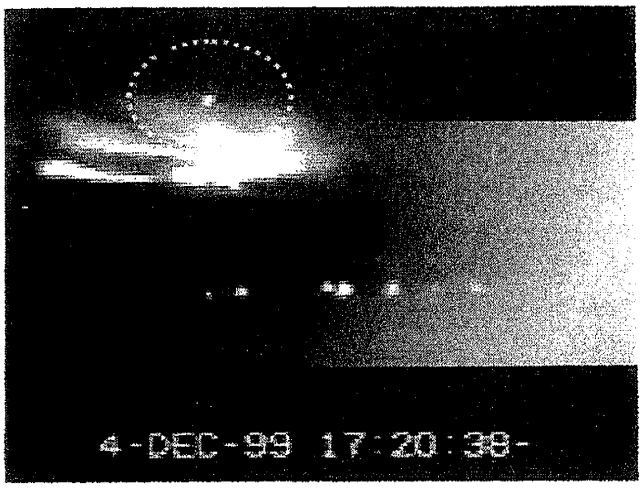

Fig.9 HP detected by Blue Box

The installation was a success and no major problems showed up during the first pilot test in the winter. From 1999 the container was ready to accommodate more scientific equipment to study the Hessdalen Phenomena. Table 2 shows a list of the instruments installed in Hessdalen from 1998-2004.

Instrument	Installation	Supplier
B&W CCD Automatic video recording system	1998	Norway
Fluxgate magnetometer	1998	Norway
POSIG radio signal detection system (dismantled)	1998	Norway
ELFO extremely low frequency observer (0.1-20KHz)	2000	Italy
Sentinel 1 spectrometer (1.42GHz)	2000	Italy
INSPIRE NASA VLF receiver (100-22000Hz) E-field	2000	Italy
Raytheon Radar	2001	Norway
Color CCD Stereo Automatic video rec. system	2001	Norway
Weather station	2002	Norway
VHF & UHF spectrum analyzer	2003	Italy
UHF Radar	2004	Italy

Table 2. Instruments installed permanently in Hessdalen

6. *Student Exchange & Thesis Work*

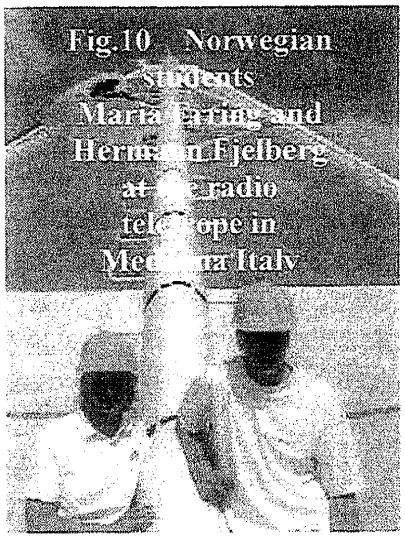

Fig.10 Norwegian students Maria [illegible] and Herman Fjelberg at the radio telescope in Medicina Italy

A key to the development of the Hessdalen Interactive Observatory, Blue Box, is the work done by Italian and Norwegian students in their thesis work. Already in 1996 the Italian engineering student Christiano Miani made his thesis work on an FFT analyser for Hessdalen under the supervision of Dr. Stelio Montebugnoli. Several Italian and Norwegian engineering students have made their thesis work on developing instruments for detecting optical and electromagnetic radiation from the Hessdalen phenomena. Over 70 students from both countries have participated in the project from 1994 until 2004. Students are motivated by the unexplained mystery and the possibility to make a scientific breakthrough. Persons able to supply data that can explain the physics behind the Hessdalen phenomena will receive world wide publicity. In 1998 talks started between the author and

Fig.11 Italian students

Dr. Stelio Montebugnoli about the possibility to exchange students between Norway and Italy. Students coming from Norway to Italy were to work with Italian scientists and students at the Medicina radio telescope developing instrumentation for Hessdalen. Students from Italy were to take part in the development in Italy and then go to Hessdalen in Norway for installing the instruments and to take part in a scientific research mission. The first two Norwegian students to participate in this exchange program were Petter Norli and Cecilie T. Langvik, (Fig.12) in 1999. Both were majoring in electronic engineering. Their thesis report is available at the www.hessdalen.org (English version). Their task was to make a plan for a scientific program for studying the Hessdalen phenomena. This plan was called: "A preliminary study of EMBLA 2000". Embla 2000 was the name of the international research project between Italy and Norway. The task of the project was to study the electromagnetic signature and behaviour of the unexplained Hessdalen phenomena.

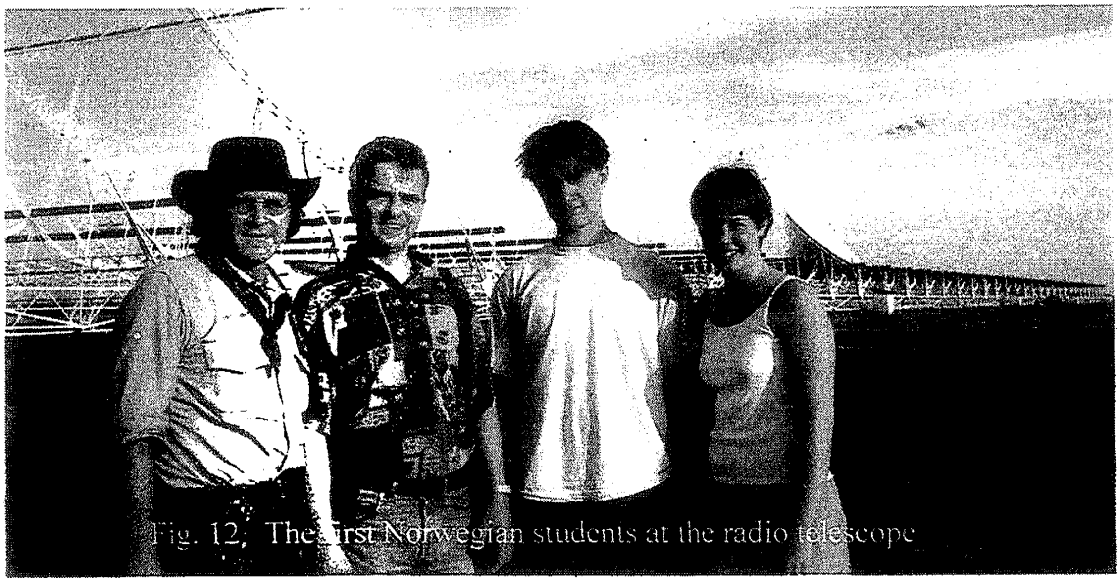

Fig. 12, The first Norwegian students at the radio telescope

7. *Project Embla*

The plan for Project Embla was worked out by Dr. Stelio Montebugnoli and the author. This plan was presented and adopted by IRA (Institute for Radio Astronomy) in Bologna, Italy, and the ØUC (Østfold University College) in Sarpsborg, Norway. Dean Tor Langvik Hansen ØUC and Director Lucia Padrielli IRA authorized and signed the plan 16/4-1999. The main objective for the Embla 2000 plan was:

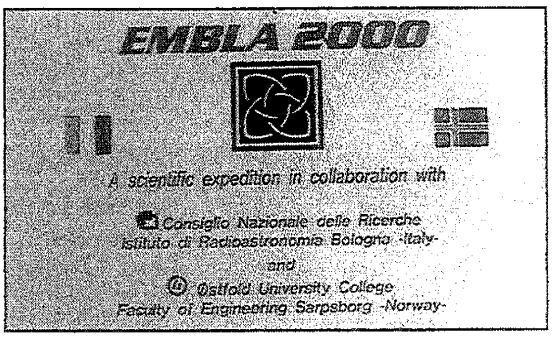

Fig.13 Container signboard

To undertake a 3-month long research period in the Hessdalen valley in the summer of 2000 aimed at extracting new data from the Hessdalen phenomena (radio frequency field) through the use of spectrum analyzer used in radioastronomy, in radio frequency monitoring systems and in Seti program. In previous observations carried out in the past from ØUC, a weak pattern has been observed in the 0,1 - 1,5 GHz range in concomitance of the phenomena breakthrough.

The project will be carried out as cooperation between Østfold College and the Instituto di Radioastronomica, Italy. The project will involve students and researchers from both countries.

As the Hessdalen phenomena generates light which, according to data gathered, indicates that it affects the earths magnetic field, the aim of the project will be to map out radio pattern from the Hessdalen phenomena and thereby try to determine whether Hydrogen is a part of the phenomena (radio emission at 1.42 GHz). This will give new and unique knowledge of the Hessdalen phenomena, which could be of significant international interest.

During the spring of 1999 the two Norwegian engineering students, Petter Norli and Cecilie T. Langvik, had been working out a preliminary instrumentation development and study for the Embla 2000 campaign, together with Italian researchers at the Medicina radiotelescope (Bologna, Italy) under the supervision of Dr. Stelio Montebugnoli and MsC. Jader Monari. The main objective of this work was to purchase, build and measure a front end receiver with antenna and preamplifier, for analyzing electromagnetic radiation from the Hessdalen phenomena. They also investigated and proposed a spectrometer for analyzing the signals. This report gave a theoretical background for studying electromagnetic radiation from the Hessdalen phenomena and made a basis for the Norwegian researchers to prepare for the Embla 2000 campaign next year. During the spring of 2000 Dr. Stelio Montebugnoli and his crew developed several new instruments to be used in Hessdalen and a special receiver for ultra low electromagnetic radiation was developed, the ULFO system (ultra low frequency observer). This system was able to detect the magnetic field in the low frequency range of 100 – 20000 Hz. This was a very sophisticated system with two magnetic field antennas, preamplifiers and correlation receiver made to avoid the 1/f-noise, which is a problem in the low frequency band. Another system, the Sentinel I system for detecting radiation from ionized hydrogen at 1.42 GHz was made ready with an omnidirectional antenna, able to detect electric fields. On suggestion from Flavio Gori, European manager for the NASA INSPIRE program, another ultra low frequency receiver named INSPIRE, Interactive NASA Space Physics

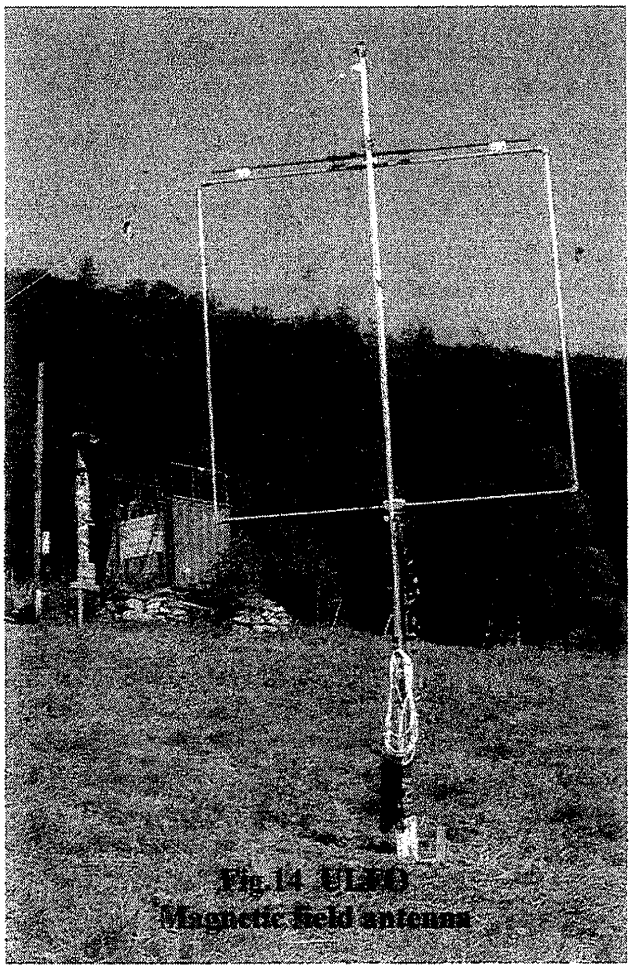

Fig.14 ULFO Magnetic field antenna

Ionosphere Radio Experiments, was developed for the EMBLA 2000 campaign. This receiver was coupled to a 100 m long dipole electrical field antenna and the post processing FFT software was GRAM. This last system has later been further developed and refined by Norwegian students into a "stereo" system where both electric and magnetic fields can be detected and analysed instantly. This INSPIRE-stereo system has been used with success in several campaigns in Hessdalen after 2000. In August 2000 Dr. Stelio Montebugnoli, MsC. Jader Monari, Dr. Massimo Teodorani and 4 other researchers left Italy and drove to Hessdalen by car and truck to install the instruments in the "Blue Box" in Hessdalen. The Italian Embla crew worked together with Assistant Professor Erling Strand, the author and three other Norwegian colleagues to install instruments and antenna systems during the first week of operation. This kind of instrumentation had never been used in Hessdalen before, and the attention from media was huge. The operations combined optical observations with monitoring the spectrometers mounted in the container. Spectrometers were programmed to store interesting signals when detected. But what was an interesting signal? No one had ever detected electromagnetic signals from the Hessdalen phenomena with 100% certainty that the signals were radiated by the phenomena. To obtain sufficient data, the Embla team had to store a huge amount of data to be sure that they were able to detect the correct signals. The amount of data from the receivers, ULFO – SENTINEL I – INSPIRE, that had later to be analysed was large. Instruments were collecting data for 25 days, and slowly they started to give new information. This information raised new questions and gave no hope to a quick solution. In the technical report from the EMBLA 2000 mission, report available at: www.itacomm.net/PH/ Dr. Stelio Montebugnoli, Dr. Massimo Teodorani & MsC Jader Monari wrote:

Fig.15 Embla 2000 Crew

Fig.16 Spectrum Analyzers SENTINEL 1 – INSPIRE – ULFO Student A. Cremonini

The Embla project employed radio spectrum analyzers which where automatically in function for 25 days, and

discovered highly anomalous signals which were characterized by a spike-like and a doppler like morphology. Moreover during the many planned skywatching sessions, it was possible to sight repeatedly luminous atmospheric phenomena in various points of the Hessdalen.

The results of the Embla 2000 campaign are described in detail in the report available at the CIPH web pages. The Italian researchers had brought with them the "firepower" of radioastronomy equipment into a new scientific field and a huge amount of post processing had to be done. To be able to extract signals which were radiated from the phenomena, scientists needed to know which signals were radiated from other natural and manmade sources in the valley. This called for more monitoring of the electromagnetic radiation in Hessdalen and told the Embla crew that the campaign in 2000 was just the first one of many to come.

8. Embla 2001-2002-2003

The Embla 2000 campaign had generated a huge amount of data that needed post processing and no clue was given regards to which signal frequency to search for. No beacon or "radio station" in the frequency band was found which could be directly connected to radiation from the Hessdalen phenomena. In the spring of 2001, Norwegian students Maria Erring and Hermann Fjelberg, worked together with Italian students Andrea Cremonini and Simona Righini, to post

Fig.17 Embla 2001 Congress

process data from the Embla 2000 campaign, develop new instrumentation, and prepare for the new Embla 2001 campaign. In May 2001 a congress about the new Embla 2001 campaign was held at the Medicina radiotelescope, where researchers, students and representatives from both countries met to present papers and discuss the forthcoming campaign in Hessdalen. This congress, conducted by Dr. Stelio Montebugnoli, was an important meeting for researchers working on this kind of phenomena. All kinds of different instrumentation were discussed and the need for a RADAR system in Hessdalen was addressed. Some believed that the phenomena had an optical invisible high-energy state, rotating/moving in a self contained field. If something disturbed this self contained field, it would start to radiate energy and that the optical appearance, when the colour changed from white to yellow and red, indicated that the phenomena was dying. It was also necessary to raise the detection rate to correlate the optical signal with