# THE NET OF AUTOMATIC METEOROLOGICAL STATIONS OF THE "DIRECÇÃO REGIONAL DE AGRICULTURA DO ALGARVE (DRAALG)"

**Paulo Oliveira [(1)], Celestino Soares [(2)] and J. Entrudo Fernandes [(3)]**
Ministério da Agricultura do Desenvolvimento Rural e das Pescas,
Direcção Regional de Agricultura do Algarve, Apartado 282, 8001 – 904 Faro, Portugal
[(1)] pauloliv@draalg.min-agricultura.pt
[(2)] cbsoares@draalg.min-agricultura.pt
[(3)] jentrudo@draalg.min-agricultura.pt

***Abstract***

*In synthesis, it is intended in this presentation to effect a description and characterization of the Automatic Meteorological Net of the "DRAALG", becoming more clear its understanding on the part of the interested ones, in this thematic.*
*Regardless of the net being in a phase of consolidation of the structures, equipment and formation of staff, it has already 12 stations working, and with available data..*
*Considered as a service of public utility, has as main objective, the attainment of meteorological data that can serve of base to the technical question, related with agriculture, the models of forecast of occurrence of pests and diseases of the cultures are combined in this scope, calculation of irrigation necessities, phenological evolution, etc.*

## 1. INTRODUCTION

In the end of the seventies, through the initiative of the Agricultural Forecast and Warning Service, a sector of agricultural meteorology in the *"Direcção Regional de Agricultura do Algarve (DRAALG) / Ministério da Agricultura, do Desenvolvimento Rural e das Pescas (MADRP)"* (Agricultural Administration of the Algarve Region / Agricultural Ministry of Rural Development and Fishing) was created, which made use of conventional meteorological stations. With the technological evolution, on this type of equipment, it was possible to find in the market new alternatives, that they had come to give effective reply to an ample set of necessities. These sophisticated equipment allowed to give more data, with more precision and easy access, they also had a better adaptation in terms of application of forecast models. Conscientious of the necessity to modify the existing situation, the *"DRAALG"*, through the area of the Plant Protection, initiated the converting process from the conventional stations to the automatic ones.
Currently this net is constituted for 12 stations, having as main objective the attainment of meteorological data that can serve of base to the technical questions, related with agriculture, the models of forecast of occurrence of pests and diseases of the cultures are combined in this scope, calculation of irrigation necessities, phenological evolution, etc. In this phase the gotten data is already available, so that the different interested ones can use it (Farmers, Associations, Technician, Universities, etc..).

## 2. THE NET

### 2.1 Implementation

In order to effect an implementation of the net in strategical places for the agricultural activity, some aspects and procedures had been taken in consideration, having itself proceeded to some consultations of the sectors from the specialty, zones of bigger cultural index had also been looked, giving special relief to the zones of citrus production, having chosen locals that were the most representative of the involving zone, on the concerning of the predominant culture and relief or

orography. In meteorological equipment terms, the good covering of the telecommunications mobile net was overcome in consideration; places in closed property; easiness of access and taking in account the involving zone, places that were not subject to situations that provoked interferences in the readings or could in some ways provoke instability in the infrastructures of the meteorological park.

### 2.2 Localization

Concerning the localization and taking care of to the attempt to effect the largest possible covering of the region of the Algarve in agronomical terms, we have 12 stations installed and working in zones: predominant of citrus (culture with great potential in the region); on the influence of the maritime coast – Atlantic Ocean and the Mediterranean Sea; clay land (horticulture and fruit trees in irrigated land); mountain range (trees and vegetation in dry land).


***Fig.1 Geographic localization of the net of automatic meteorological stations in the Algarve region.***

### 2.3 The meteorological station

Each station is mainly equipped with a mast, in which the environmental box is installed, this one lodges the equipment of command and storage (logger and memory card), the power circuit (battery and solar panel), the protection circuit (earth electrode and over-tension module) and the circuit of communication (modem GSM). On the mast we also have installed connecting rods for several sensors, nominated: combined sensor of temperature and relative humidity of air (thermohygrometer); precipitation sensor (udometer); radiation sensor (pyranometer); sensors of speed (anemometer) and wind direction (weather vane); surface wetness sensor (leaf humidity); we still have the sensor of soil temperature on 15cm of depth and in only one of the stations a evaporimetric tank with an ultrasonic sensor.

Although there are some differences among the sensors of some stations in what concerns to the fabricants/models, the most important characteristics for us are similar (measuring intervals, precisions).
In terms of communications, on the exception of one station, the mobile net (GSM) is used in all the others.
The choice of the installation height of the sensors was made in accordance with the predominant vegetation in the Region of the Algarve, wind 2,00m and the remains about 1,60m.

***Fig.2 – Patacão.***

***Fig.3 – Tavira.***

***Fig.4 – Portimão.***

***Fig.5 – Alcantarilha.***

***Fig.6 – Maragota.***

***Fig.7 – Messines.***

*Fig.8 – Alte.*

*Fig.9 – Junqueira.*

*Fig.10 – Arrochela.*

*Fig.11 – Cacela.*

*Fig.12 – Serominheiro.*

*Fig.13 – Norinha.*

## 3. FUNCTIONING

### 3.1 Information processing

In each station, every 10 seconds all the sensors take readings, then the necessary statistical treatments are applied, these data is stored in hourly and daily reports. Beyond the common statistical processing of sums, averages, minimum and maximum values, we have algorithms of agrometeorological character as: the calculation of the insolation; potential evapotranspiration with the method of Penman-Monteith; number of cold hours; and very specific formulas or conditions

that gives us, the occurrence of propitious conditions to the development of several pests and diseases (normally using the sensor of leaf humidity).
Daily, the collected data is automatically transferred via GSM from all the net to the central station (PC), located in the headquarters of the *"DRAALG"* in Patacão/Faro, where is saved in a database for processing and divulgation.
The validation of the data is made by an automatic spreadsheet, that gives a monthly treatment for each station, making use of established intervals reliable in historical data. We also validate the treated data based in the comparison with other stations next to the analyzed one.
The central station is a personal computer, in which specific software of management of meteorological nets is installed, which allows: to collect the data automatically; visualize the readings in real time with the synoptic panel (fig.14), through analogical/digital counters and predefined functions; to program and to make the check-up of the stations.

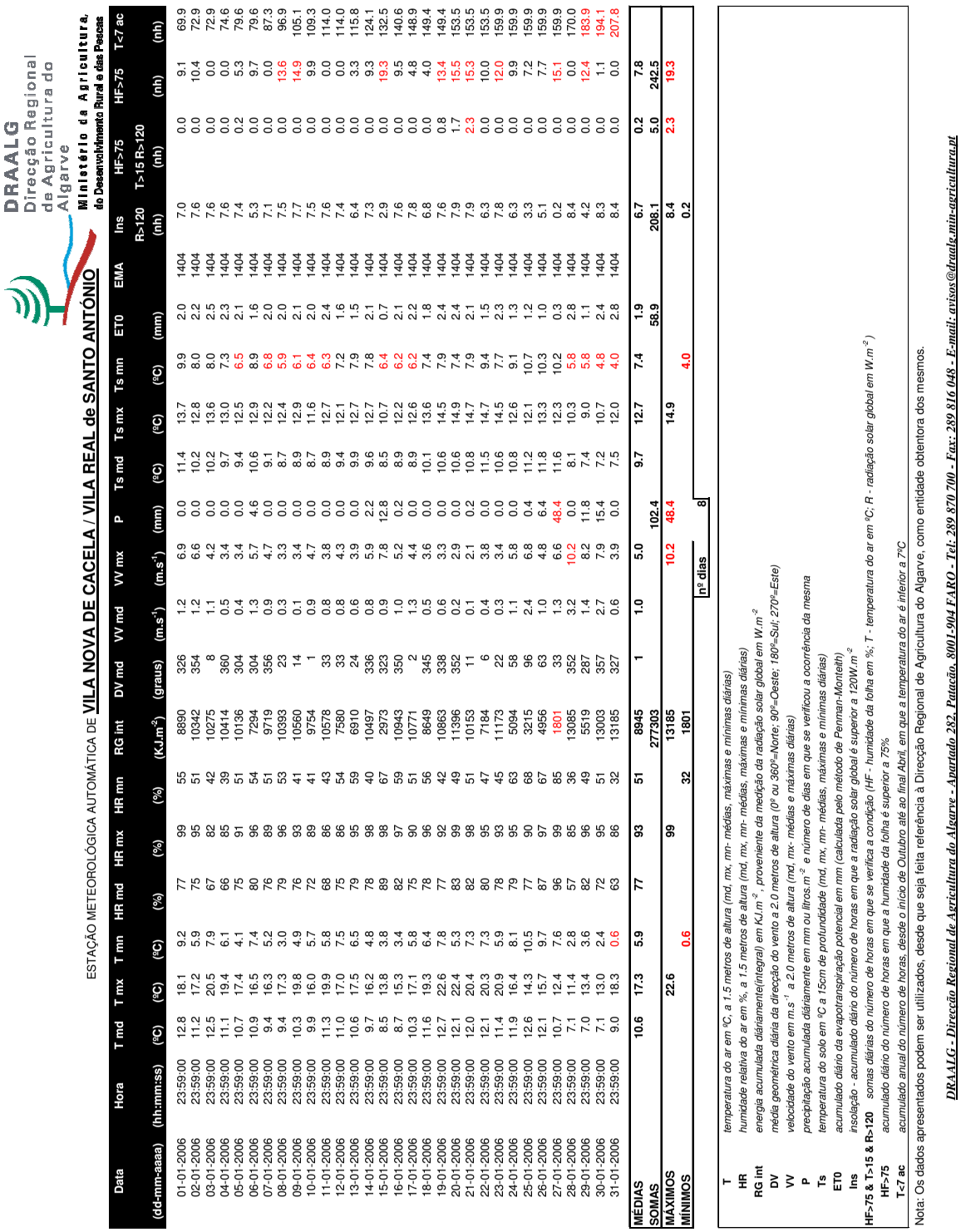
***Fig.14 Visualization panel of the readings in real time.***

### 3.2 Maintenance

Technician of the *"DRAALG"* execute regularly, four types of interventions:
**Maintenance** - Partial dismount of some sensors, cleanness, verification of the readings and state of conservation. Electric check-up to the logger and all mentioned circuits in the environmental box. Periodically, the space of the meteorological park is cleaned, applying an appropriate herbicide, in order to guarantee that the vegetal cover is similar to the one of the involving zone.
**Repairing** - To minimize the loss of data in the case of damage in the equipment, we have in stock a complete set, that allows a fast substitution.
**Calibration** – Periodically, and in accordance with technical indications of the suppliers/manufacturers. The technicians received specialized formation to improve the executed procedures.
**Reprogramming** - Always that, due to lack of power or in case of damage the logger stops, or to modify the terms of gathering and processing data.

## 4. AVAILABILITY OF DATA

The requests for meteorological data have been many, from the most varied entities: companies of commerce of agricultural products, universities, institutions, ministries, farmers associations, golf courses, operative centers, entities in the area of the harvests insurances and people in individual name. Normally we provide the daily reports (fig. 15), however sometimes, we also have requests of the hourly, mainly regarding the wind and precipitation, for characterization of a bad weather period.



DRAALG
Direcção Regional de Agricultura do Algarve
Ministério da Agricultura, do Desenvolvimento Rural e das Pescas

ESTAÇÃO METEOROLÓGICA AUTOMÁTICA DE **VILA NOVA DE CACELA / VILA REAL de SANTO ANTÓNIO**

| Data | Hora | T md | T mx | T mn | HR md | HR mx | HR mn | RG int | DV md | VV md | VV mx | P | Ts md | Ts mx | Ts mn | ET0 | EMA | Ins | HF>75 | HF>75 | T<7 ac |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | R>120 | T>15 R>120 | | |
| (dd-mm-aaaa) | (hh:mm:ss) | (ºC) | (ºC) | (ºC) | (%) | (%) | (%) | (KJ.m$^{-2}$) | (graus) | (m.s$^{-1}$) | (m.s$^{-1}$) | (mm) | (ºC) | (ºC) | (ºC) | (mm) | | (nh) | (nh) | (nh) | (nh) |
| 01-01-2006 | 23:59:00 | 12.8 | 18.1 | 9.2 | 77 | 99 | 55 | 8890 | 326 | 1.2 | 6.9 | 0.0 | 11.4 | 13.7 | 9.9 | 2.0 | 1404 | 7.0 | 0.0 | 9.1 | 69.9 |
| 02-01-2006 | 23:59:00 | 11.2 | 17.2 | 5.9 | 75 | 95 | 51 | 10342 | 354 | 1.2 | 6.6 | 0.0 | 10.2 | 12.8 | 8.0 | 2.2 | 1404 | 7.6 | 0.0 | 10.4 | 72.9 |
| 03-01-2006 | 23:59:00 | 12.5 | 20.5 | 7.9 | 67 | 82 | 42 | 10275 | 8 | 1.1 | 4.2 | 0.0 | 10.2 | 13.6 | 8.0 | 2.5 | 1404 | 7.6 | 0.0 | 0.0 | 72.9 |
| 04-01-2006 | 23:59:00 | 11.1 | 19.4 | 6.1 | 66 | 85 | 39 | 10414 | 360 | 0.5 | 3.4 | 0.0 | 9.7 | 13.0 | 7.3 | 2.3 | 1404 | 7.6 | 0.0 | 0.0 | 74.6 |
| 05-01-2006 | 23:59:00 | 10.7 | 17.4 | 4.1 | 75 | 91 | 51 | 10136 | 304 | 0.4 | 3.4 | 0.0 | 9.4 | 12.5 | 6.5 | 2.1 | 1404 | 7.4 | 0.2 | 5.3 | 79.6 |
| 06-01-2006 | 23:59:00 | 10.9 | 16.5 | 7.4 | 80 | 96 | 54 | 7294 | 304 | 1.3 | 5.7 | 4.6 | 10.6 | 12.9 | 8.9 | 1.6 | 1404 | 5.3 | 0.0 | 9.7 | 79.6 |
| 07-01-2006 | 23:59:00 | 9.4 | 16.3 | 5.2 | 76 | 89 | 51 | 9719 | 356 | 0.9 | 4.7 | 0.0 | 9.1 | 12.2 | 6.8 | 2.0 | 1404 | 7.1 | 0.0 | 0.0 | 87.3 |
| 08-01-2006 | 23:59:00 | 9.4 | 17.3 | 3.0 | 79 | 96 | 53 | 10393 | 23 | 0.3 | 3.3 | 0.0 | 8.7 | 12.4 | 5.9 | 2.0 | 1404 | 7.5 | 0.0 | 13.6 | 96.9 |
| 09-01-2006 | 23:59:00 | 10.3 | 19.8 | 4.9 | 76 | 93 | 41 | 10560 | 14 | 0.1 | 3.4 | 0.0 | 8.9 | 12.9 | 6.1 | 2.1 | 1404 | 7.7 | 0.0 | 14.9 | 105.1 |
| 10-01-2006 | 23:59:00 | 9.9 | 16.0 | 5.7 | 72 | 89 | 41 | 9754 | 1 | 0.9 | 4.7 | 0.0 | 8.7 | 11.6 | 6.4 | 2.0 | 1404 | 7.5 | 0.0 | 9.9 | 109.3 |
| 11-01-2006 | 23:59:00 | 11.3 | 19.9 | 5.8 | 68 | 86 | 43 | 10578 | 33 | 0.8 | 3.8 | 0.0 | 8.9 | 12.7 | 6.3 | 2.4 | 1404 | 7.6 | 0.0 | 0.0 | 114.0 |
| 12-01-2006 | 23:59:00 | 11.0 | 17.0 | 7.5 | 75 | 86 | 54 | 7580 | 33 | 0.8 | 4.3 | 0.0 | 9.4 | 12.1 | 7.2 | 1.6 | 1404 | 7.4 | 0.0 | 0.0 | 114.0 |
| 13-01-2006 | 23:59:00 | 10.6 | 17.5 | 6.5 | 79 | 95 | 59 | 6910 | 24 | 0.6 | 3.9 | 0.0 | 9.9 | 12.7 | 7.9 | 1.5 | 1404 | 6.4 | 0.0 | 3.3 | 115.8 |
| 14-01-2006 | 23:59:00 | 9.7 | 16.2 | 4.8 | 78 | 98 | 40 | 10497 | 336 | 0.8 | 5.9 | 2.2 | 9.6 | 12.7 | 7.8 | 2.1 | 1404 | 7.3 | 0.0 | 9.3 | 124.1 |
| 15-01-2006 | 23:59:00 | 8.5 | 13.8 | 3.8 | 89 | 98 | 67 | 2973 | 323 | 0.9 | 7.8 | 12.8 | 8.5 | 10.7 | 6.4 | 0.7 | 1404 | 2.9 | 0.0 | 19.3 | 132.5 |
| 16-01-2006 | 23:59:00 | 8.7 | 15.3 | 3.4 | 82 | 97 | 59 | 10943 | 350 | 1.0 | 5.2 | 0.2 | 8.9 | 12.2 | 6.2 | 2.1 | 1404 | 7.6 | 0.0 | 9.5 | 140.6 |
| 17-01-2006 | 23:59:00 | 10.3 | 17.1 | 5.8 | 75 | 90 | 51 | 10771 | 2 | 1.3 | 4.4 | 0.0 | 8.9 | 12.6 | 6.2 | 2.2 | 1404 | 7.8 | 0.0 | 4.8 | 148.9 |
| 18-01-2006 | 23:59:00 | 11.6 | 19.3 | 6.4 | 78 | 96 | 56 | 8649 | 345 | 0.5 | 3.6 | 0.0 | 10.1 | 13.6 | 7.4 | 1.8 | 1404 | 6.8 | 0.0 | 4.0 | 149.4 |
| 19-01-2006 | 23:59:00 | 12.7 | 22.6 | 7.8 | 77 | 92 | 42 | 10863 | 338 | 0.6 | 3.3 | 0.0 | 10.6 | 14.5 | 7.9 | 2.4 | 1404 | 7.6 | 0.8 | 13.4 | 149.4 |
| 20-01-2006 | 23:59:00 | 12.1 | 22.4 | 5.3 | 83 | 99 | 49 | 11396 | 352 | 0.2 | 2.9 | 0.0 | 10.6 | 14.9 | 7.4 | 2.4 | 1404 | 7.9 | 1.7 | 15.5 | 153.5 |
| 21-01-2006 | 23:59:00 | 12.0 | 20.4 | 7.3 | 82 | 98 | 51 | 10153 | 11 | 0.1 | 2.1 | 0.2 | 10.8 | 14.7 | 7.9 | 2.1 | 1404 | 7.9 | 2.3 | 15.3 | 153.5 |
| 22-01-2006 | 23:59:00 | 12.1 | 20.3 | 7.3 | 80 | 95 | 47 | 7184 | 6 | 0.4 | 3.8 | 0.0 | 11.5 | 14.7 | 9.4 | 1.5 | 1404 | 6.3 | 0.0 | 10.0 | 153.5 |
| 23-01-2006 | 23:59:00 | 11.4 | 20.9 | 5.9 | 78 | 93 | 45 | 11173 | 22 | 0.3 | 3.4 | 0.0 | 10.6 | 14.5 | 7.7 | 2.3 | 1404 | 7.8 | 0.0 | 12.0 | 159.9 |
| 24-01-2006 | 23:59:00 | 11.9 | 16.4 | 8.1 | 79 | 95 | 63 | 5094 | 58 | 1.1 | 5.8 | 0.0 | 10.8 | 12.6 | 9.1 | 1.3 | 1404 | 6.3 | 0.0 | 9.9 | 159.9 |
| 25-01-2006 | 23:59:00 | 12.6 | 14.3 | 10.5 | 77 | 90 | 68 | 3215 | 96 | 2.4 | 6.8 | 0.4 | 11.2 | 12.1 | 10.7 | 1.2 | 1404 | 3.3 | 0.0 | 7.2 | 159.9 |
| 26-01-2006 | 23:59:00 | 12.1 | 15.7 | 9.7 | 87 | 97 | 67 | 4956 | 63 | 1.0 | 4.8 | 6.4 | 11.8 | 13.3 | 10.3 | 1.0 | 1404 | 5.1 | 0.0 | 7.7 | 159.9 |
| 27-01-2006 | 23:59:00 | 10.7 | 12.4 | 7.6 | 96 | 99 | 85 | 1801 | 33 | 1.3 | 6.6 | 48.4 | 11.6 | 12.3 | 10.2 | 0.3 | 1404 | 0.2 | 0.0 | 15.1 | 159.9 |
| 28-01-2006 | 23:59:00 | 7.1 | 11.4 | 2.8 | 57 | 85 | 36 | 13085 | 352 | 3.2 | 10.2 | 0.0 | 8.1 | 10.3 | 5.8 | 2.8 | 1404 | 8.4 | 0.0 | 0.0 | 170.0 |
| 29-01-2006 | 23:59:00 | 7.0 | 13.4 | 3.6 | 82 | 96 | 49 | 5519 | 287 | 1.4 | 8.2 | 11.8 | 7.4 | 9.0 | 5.8 | 1.1 | 1404 | 4.2 | 0.0 | 12.4 | 183.9 |
| 30-01-2006 | 23:59:00 | 7.1 | 13.0 | 2.4 | 72 | 95 | 51 | 13003 | 357 | 2.7 | 7.9 | 15.4 | 7.2 | 10.7 | 4.8 | 2.4 | 1404 | 8.3 | 0.0 | 1.1 | 194.1 |
| 31-01-2006 | 23:59:00 | 9.0 | 18.3 | 0.6 | 63 | 86 | 32 | 13185 | 327 | 0.6 | 3.9 | 0.0 | 7.5 | 12.0 | 4.0 | 2.8 | 1404 | 8.4 | 0.0 | 0.0 | 207.8 |
| **MEDIAS** | | **10.6** | **17.3** | **5.9** | **77** | **93** | **51** | **8945** | **1** | **1.0** | **5.0** | | **9.7** | **12.7** | **7.4** | **1.9** | | **6.7** | **0.2** | **7.8** | |
| **SOMAS** | | | | | | | | **277303** | | | | **102.4** | | | | **58.9** | | **208.1** | **5.0** | **242.5** | |
| **MAXIMOS** | | **22.6** | | | **99** | | | **13185** | | | **10.2** | **48.4** | | **14.9** | | | | **8.4** | **2.3** | **19.3** | |
| **MINIMOS** | | | | **0.6** | | | **32** | **1801** | | | | | | | **4.0** | | | **0.2** | | | |
| | | | | | | | | | | | | **nº dias** | **8** | | | | | | | | |

| | |
|---|---|
| **T** | *temperatura do ar em ºC, a 1.5 metros de altura (md, mx, mn- médias, máximas e mínimas diárias)* |
| **HR** | *humidade relativa do ar em %, a 1.5 metros de altura (md, mx, mn- médias, máximas e mínimas diárias)* |
| **RG int** | *energia acumulada diária(integral) em KJ.m$^{-2}$, proveniente da medição da radiação solar global em W.m$^{-2}$* |
| **DV** | *média geométrica diária da direcção do vento a 2.0 metros de altura (0º ou 360º=Norte; 90º=Oeste; 180º=Sul; 270º=Este)* |
| **VV** | *velocidade do vento em m.s$^{-1}$ a 2.0 metros de altura (md, mx- médias e máximas diárias)* |
| **P** | *precipitação acumulada diáriamente em mm ou litros.m$^{-2}$ e número de dias em que se verificou a ocorrência da mesma* |
| **Ts** | *temperatura do solo em ºC a 15cm de profundidade (md, mx, mn- médias, máximas e mínimas diárias)* |
| **ET0** | *acumulado diário da evapotranspiração potencial em mm (calculada pelo método de Penman-Monteith)* |
| **Ins** | *insolação - acumulado diário do número de horas em que a radiação solar global é superior a 120W.m$^{-2}$* |
| **HF>75 & T>15 & R>120** | *somas diárias do número de horas em que se verifica a condição (HF - humidade da folha em %; T - temperatura do ar em ºC; R - radiação solar global em W.m$^{-2}$)* |
| **HF>75** | *acumulado diário do número de horas em que a humidade da folha é superior a 75%* |
| **T<7 ac** | *acumulado anual do número de horas, desde o início de Outubro até ao final Abril, em que a temperatura do ar é inferior a 7ºC* |

Nota: Os dados apresentados podem ser utilizados, desde que seja feita referência à Direcção Regional de Agricultura do Algarve, como entidade obtentora dos mesmos.

*DRAALG - Direcção Regional de Agricultura do Algarve - Apartado 282, Patacão, 8001-904 FARO - Tel: 289 870 700 - Fax: 289 816 048 - E-mail: avisos@draalg.min-agricultura.pt*

***Fig.15 Monthly spreadsheet data of a meteorological station.***

Together, with the *"Gabinete de Informação Geográfica (GIG)"* (Geographic Information Cabinet) of the *"DRAALG"*, the monthly and annual meteorological data are available in the internal net of this office. Using the Geomedia software (fig. 28), it is possible to interact with another kind of data as: the geographic characteristics, military maps, water areas, vegetation areas, etc.

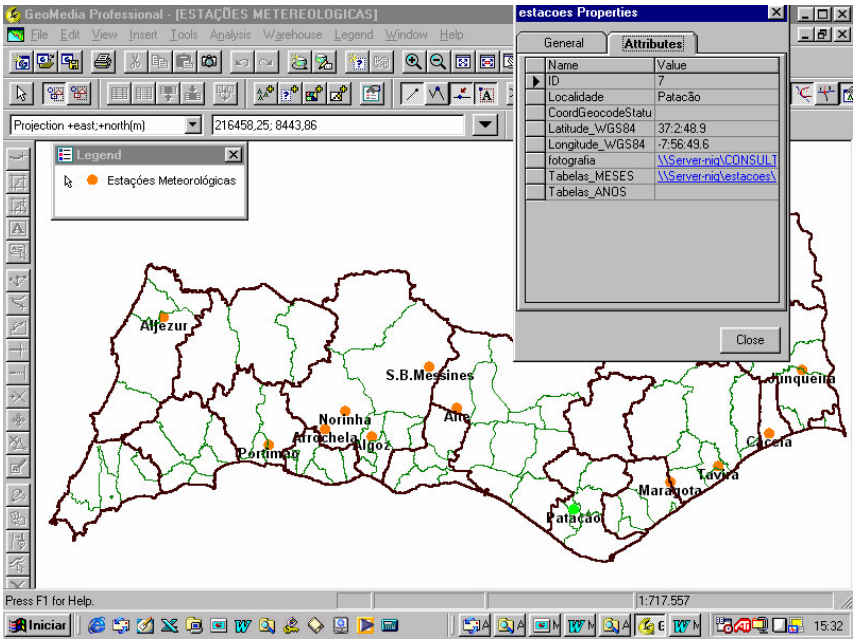
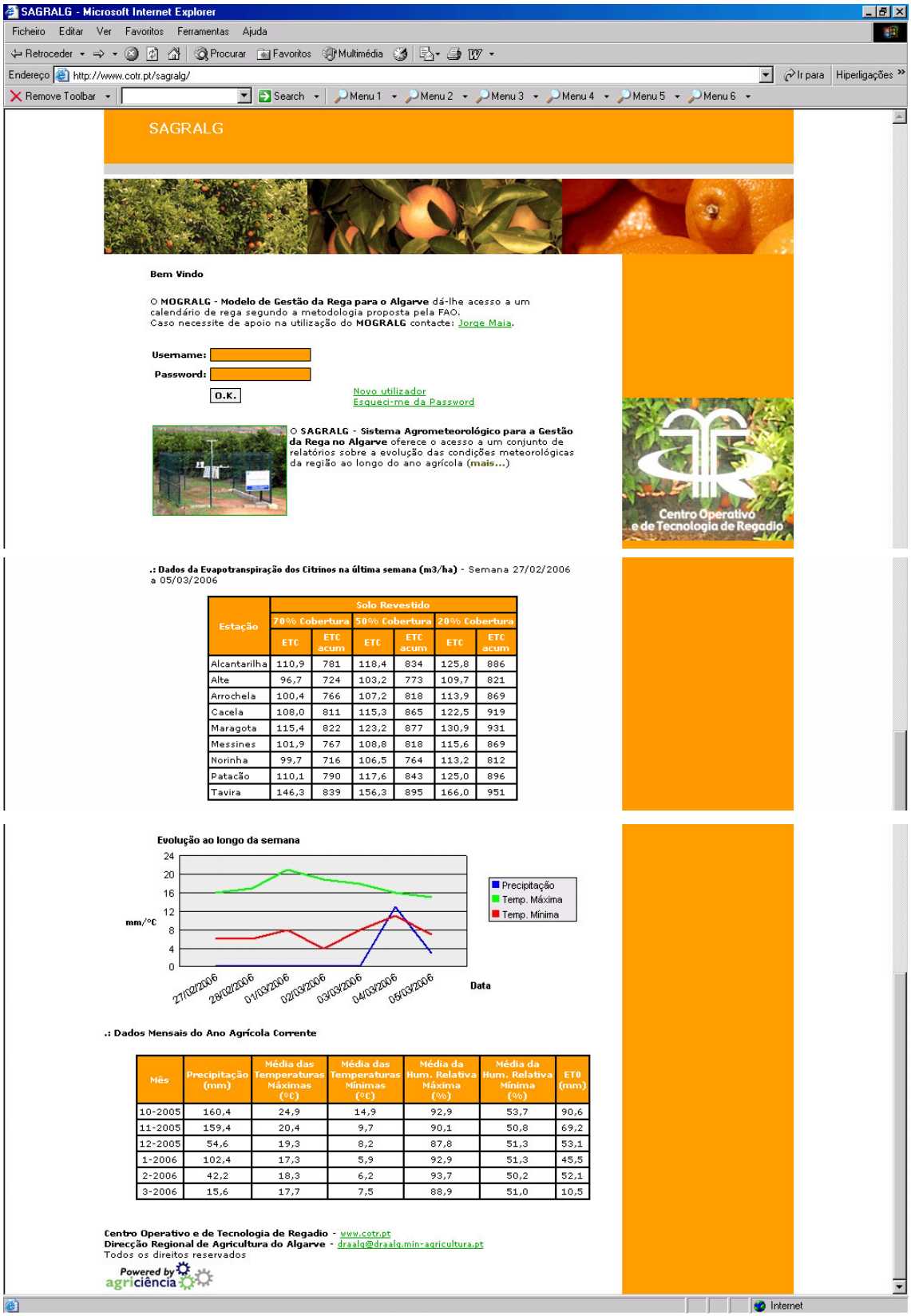


***Fig.16 Geomedia software, used in the GIG.***

As an example of contribution with other entities, we can mention, in the scope of the Project Interreg III A - "Agronomical and Environmental Optimization in the Use of the Irrigation Water", the existence of a protocol of contribution between *"DRAALG"* and *"Centro Operativo e de Tecnologia de Regadio (COTR)"* (Operative Center of Irrigation Technology), for emission of acknowledgments of irrigation (calculated values of evapotranspiration in some cultures) on a web page (fig.17).
In development, is being made the creation of a national database, in the headquarters of the *"Direcção Geral de Protecção das Culturas (DGPC) / Serviço Nacional Avisos Agrícolas (SNAA)"* (Main Administration of Culture Protection / National Agricultural Forecast and Warning Service). The information will be treated for application in forecast models of some enemies of the cultures (mildew of the grapevine, pear tree scab, etc...). With this important tool it will be possible to widen the models of forecast to other enemies, including pests (the fly of the olive, etc.), since for that the models should be tested. All these data will go to be available in a web page that already exists (fig. 18).

## 5. FUTURE PERSPECTIVES

Being considered as a Service of public utility that is in a phase of consolidation of the structures, equipment and formation of staff, in a future perspective, we would like to continue the consolidation / harmonization and innovation of this net in technical terms and equipment (communications, protections, storage of data, installation of new sensors, etc), human specialization and procedures. The installation of more stations of this nature, in strategical places, in order to cover of, in the best possible form, the Region of the Algarve in agrometeorological terms, is also a possible measure to be taken.




| Estação | Solo Revestido | | | | | |
|---|---|---|---|---|---|---|
| | 70% Cobertura | | 50% Cobertura | | 20% Cobertura | |
| | ETC | ETC acum | ETC | ETC acum | ETC | ETC acum |
| Alcantarilha | 110,9 | 781 | 118,4 | 834 | 125,8 | 886 |
| Alte | 96,7 | 724 | 103,2 | 773 | 109,7 | 821 |
| Arrochela | 100,4 | 766 | 107,2 | 818 | 113,9 | 869 |
| Cacela | 108,0 | 811 | 115,3 | 865 | 122,5 | 919 |
| Maragota | 115,4 | 822 | 123,2 | 877 | 130,9 | 931 |
| Messines | 101,9 | 767 | 108,8 | 818 | 115,6 | 869 |
| Norinha | 99,7 | 716 | 106,5 | 764 | 113,2 | 812 |
| Patacão | 110,1 | 790 | 117,6 | 843 | 125,0 | 896 |
| Tavira | 146,3 | 839 | 156,3 | 895 | 166,0 | 951 |

| Mês | Precipitação (mm) | Média das Temperaturas Máximas (°C) | Média das Temperaturas Mínimas (°C) | Média da Hum. Relativa Máxima (%) | Média da Hum. Relativa Mínima (%) | ETO (mm) |
|---|---|---|---|---|---|---|
| 10-2005 | 160,4 | 24,9 | 14,9 | 92,9 | 53,7 | 90,6 |
| 11-2005 | 159,4 | 20,4 | 9,7 | 90,1 | 50,8 | 69,2 |
| 12-2005 | 54,6 | 19,3 | 8,2 | 87,8 | 51,3 | 53,1 |
| 1-2006 | 102,4 | 17,3 | 5,9 | 92,9 | 51,3 | 45,5 |
| 2-2006 | 42,2 | 18,3 | 6,2 | 93,7 | 50,2 | 52,1 |
| 3-2006 | 15,6 | 17,7 | 7,5 | 88,9 | 51,0 | 10,5 |

***Fig.17 Partial view of the SAGRALG (Agrometeorological System for the Irrigation Management in Algarve) web page. - http://www.cotr.pt/sagralg/***

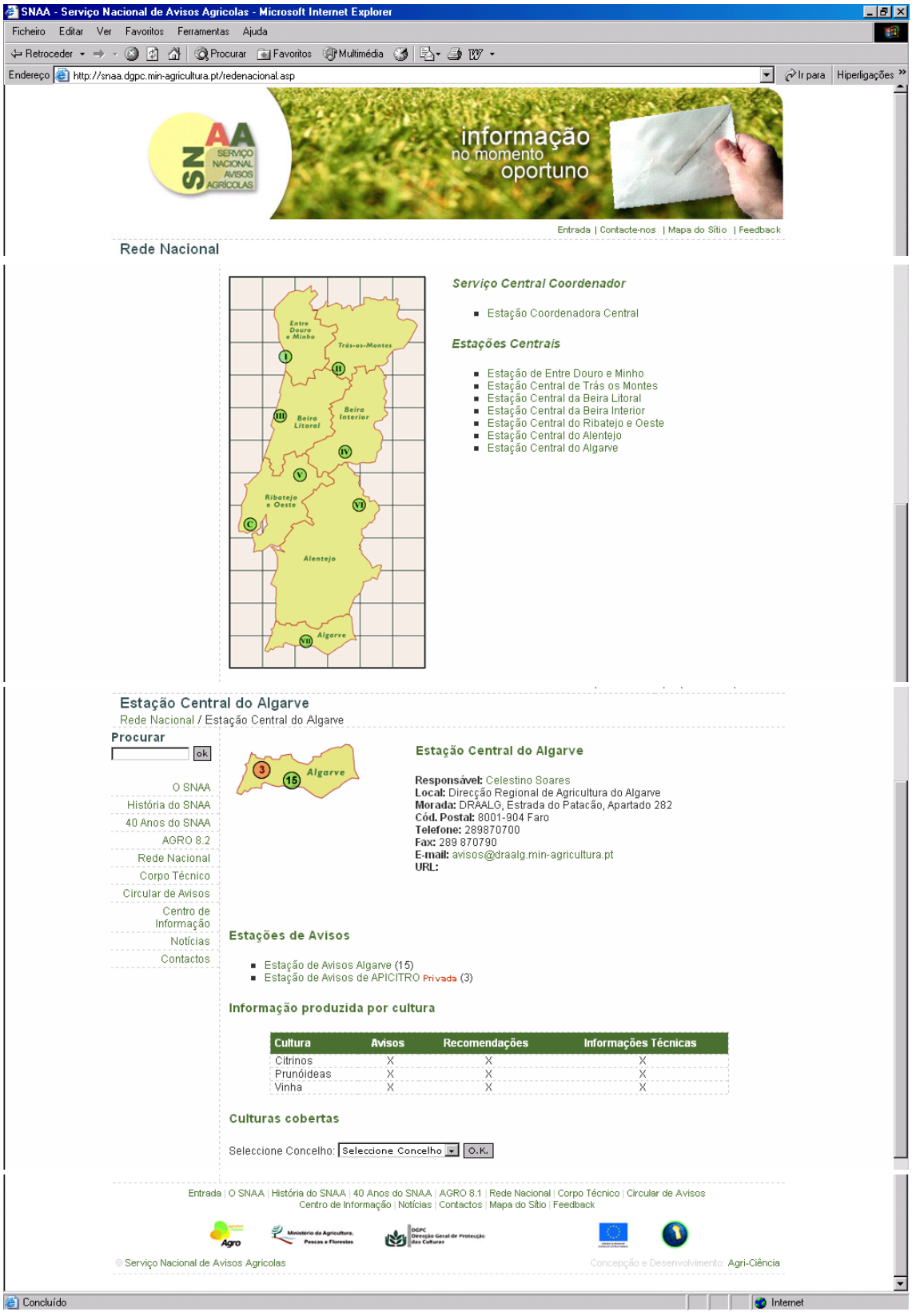



*Fig.18 Partial view of the SNAA web page. - http://snaa.dgpc.min-agricultura.pt*