

**Statement of Work
Associated with
Implementing Arrangement Number 11

Enhancement and Support Services
For the
Advanced Operational Aviation Weather System**

subject to the
Agreement
between the
American Institute In Taiwan
and the
Taipei Economic and Cultural Representative Office in the United States
for
Technical Cooperation
associated with
Establishment of Advanced Operational Aviation Weather Systems

1.0 Background and Objectives

The Agreement between the American Institute in Taiwan (AIT) and the Taipei Economic and Cultural Representative Office in the United States (TECRO) provides for technical cooperation between the University Corporation for Atmospheric Research (UCAR), as AIT's designated representative, and the Civil Aeronautics Administration (CAA), as TECRO's designated representative. UCAR and CAA will cooperate on the development and establishment of operational aviation weather systems.

The Advanced Operational Aviation Weather System (AOAWS) developed by TECRO's designated representative, CAA, requires up-to-date scientific and technical components in order to provide a high level of service to the aviation community on Taiwan. Most of this science and technology has been developed at UCAR over the past two decades and has been validated in operational environments both in the U.S. and in other countries.

The AOAWS consists of advanced meteorological sensor systems (at airports and within the Taiwan airspace), a communications infrastructure, a product generation component, a system server component that distributes products, and product displays that present the advanced weather information to end users. The AOAWS system components have been integrated to form an operational, turn-key system that serves the

「駐美國臺北經濟文化代表處與
美國在臺協會間航空氣象現代化
作業系統發展技術合作協議」

「航空氣象現代化作業系統強化
及支援計畫」

「第十一號執行辦法」

工作聲明書

中文譯本(2007年9月18日英文版)

1.0 緣起與目標

TECRO及AIT訂定之「臺美航空氣象現代化作業系統發展合作協議」議定了TECRO的指定代表民用航空局，及AIT的指定代表UCAR之間的技術合作條款。民用航空局及UCAR這兩個組織將合力發展並建立航空氣象作業系統。

為提供臺灣航空界高水準的服務，民用航空局航空氣象現代化作業系統(AOAWS)需要先進的科學與技術組件。UCAR在過去二十年間已開發了許多這類提昇航空服務的科技，且在美國及其他國家的實際作業環境中獲得印證。

AOAWS專案包含多項先進技術：機場及臺灣空域內的氣象偵測系統、通訊基礎建設、氣象產品生成組件、傳送氣象資料的伺服系統、及呈現先進氣象資訊給使用者的氣象產品顯示系統。在初期計畫中，上述組件已被整合並構成一元化(turn-key)作業系統來為臺灣航

aviation community. In 2006, a multiyear AOAWS enhancement program began and the enhanced version is now referred to as the AOAWS-ES.

UCAR, as AIT's designated representative, will provide the necessary technology to TECRO and its designated representative, CAA, required to enhance and support the AOAWS-ES system from AIT's designated representative, UCAR, as defined herein.

2.0 Task Descriptions

2.1 Task #1 – System Implementation, Support and Maintenance Services

System administration and software engineering support and maintenance will be provided for the installed AOAWS-ES system (Version 6.x) during 2008. AOAWS-ES components are located at the Taipei Aeronautical Meteorological Center (TAMC), the Songshan Airport (SS) Weather Station and Flight Information Service (FIS), Taiwan Taoyuan International Airport (TIA) Weather Station's Observation facility and Radar Facility, and FIS, Kaohsiung Airport (KH) Weather Station and Flight Information Service (FIS), and the Taipei Area Control Center (TACC).

Defects in the AOAWS-ES System software that arise or develop during this period will be addressed and resolved by AIT's designated representative, UCAR. The Institute for Information Industry (III) will support UCAR with this work. Support and maintenance services cover only software components of the AOAWS-ES. Support and maintenance services for hardware, communication network links, and network components used by the AOAWS-ES that are operated by local telecommunications companies and/or the CAA, TECRO's designated representative, are not covered under this Implementing Agreement. However AIT's designated representative, UCAR, will assist the CAA in troubleshooting hardware and network problems.

TECRO's designated representative, CAA, is responsible for running the AOAWS-ES system. AIT's designated representative, UCAR, will respond as appropriate to help the CAA ensure that the AOAWS-ES system serviceability level remains consistently high. Technical points of contact for UCAR and III staff members for support and maintenance services will be provided to

空界服務。並於2006年開始進行AOAWS系統強化計畫，以下稱為AOAWS-ES系統。

TECRO 及其指定代表民用航空局，將由AIT之指定代表UCAR，提供必要的技術來強化與支援AOAWS-ES系統。

2.0 工作項目說明

2.1 工作項目#1 - 系統執行、支援及維護服務

在2008年期間將提供運行中AOAWS-ES系統(第6.x版)之系統管理、軟體工程支援及維護服務。目前AOAWS-ES軟體元件安裝於臺北航空氣象中心、松山機場之松山航空氣象台和臺北諮詢台、桃園國際機場之桃園航空氣象台觀測室、桃園航空氣象台雷達作業室及桃園諮詢台、高雄機場之高雄航空氣象台和高雄諮詢台以及臺北區域管制中心。

在合約有效期間，AIT的指定代表UCAR將會處理及解決AOAWS-ES系統發生或發現的軟體問題，資策會(III)也將協助UCAR完成此工作項目。本支援及維護服務範圍僅限於AOAWS-ES的軟體元件。根據本執行辦法本項工作不包含AOAWS-ES作業所使用之硬體、通訊網路和通訊設備之支援與維護。這些硬體是屬於當地的電話公司或是TECRO的指定代表民用航空局所維護的，然而當有硬體或網路的問題發生時，UCAR將會盡力協助民用航空局尋求解決辦法。

TECRO的指定代表民用航空局負責AOAWS-ES系統的運作，AIT的指定代表UCAR將提供適切的支援予TECRO的指定代表民用航空局，以確保AOAWS-ES一致的高水準服務。UCAR及III也會提供民用航空局一個負責支援及維護服務

the CAA.

In addition to the support and maintenance work referred to above, UCAR will install the AOAWS-ES Version 7.x, which will include the functionality of the AOAWS-ES Version 6.x plus the new components to be developed during 2008.

Specifically, the following sub-tasks will be carried out for the System Implementation, Support and Maintenance task during 2008:

- Provide general assistance to the CAA in operating the AOAWS including assisting the CAA with any new hardware installation and network configuration changes. UCAR will be responsible for any operating system upgrades to the AOAWS hosts.
- Provide assistance to the CAA in troubleshooting problems with the AOAWS-ES Version 6.x and Version 7.x, if and when they occur.
- Support and maintain installed AOAWS-ES Version 6.x software.
- Install, test and support AOAWS-ES Version 7.x.
- Correct AOAWS-ES Version 6.x and Version 7.x defects, if any that may arise.

Resources Required:

¹Staff:

System installation, maintenance and client support (29 person-weeks) (III)	US\$ 74,000
Software engineering (4 person-weeks) (UCAR)	US\$ 21,000
Travel:	
1 trip @ 1-week	US\$ 10,000
Task # 1 Total	US\$ 105,000

¹ All manpower values are given as person-weeks. Costs reflect UCAR's full loading (for 2008: overhead @ 0.533, benefits @ 0.525, the UCAR fee @ 0.03, and computer service charge of US\$6.15 per hour per UCAR manpower hour) and the fully loaded costs of approved subcontractors.

相關的技術聯絡窗口。

除了上述所提供之支援及維護服務，UCAR將會在2008年期間安裝最新的AOAWS-ES 7.x版，此版本包含原AOAWS-ES第6.x版各項功能，以及2008年期間交付的新軟體元件。

明確的說，在2008年期間，系統執行、支援及維護工作項目將包含執行下列工作細項：

- 提供民用航空局在操作AOAWS時的例行性協助，包括協助民用航空局有關AOAWS新的硬體安裝及網路設定之變更。UCAR將負責AOAWS主機作業系統的升級。
- 提供民用航空局關於AOAWS-ES第6.x版及第7.x版可能發生之疑難問題的協助。
- 支援及維護已安裝的AOAWS-ES第6.x版軟體。
- 安裝、測試及支援AOAWS-ES第7.x版。
- 修訂AOAWS-ES第6.x版及第7.x版可能發生的瑕疵。

資源需求:

¹人力:

系統安裝、維護與客戶端支援(29人週) (資策會)	US\$ 74,000
軟體工程(4人週) (美國大氣科學大學聯盟)	US\$ 21,000
差旅:	
1人次一週	US\$ 10,000
工作項目#1小計	US\$ 105,000

¹ 所有的人力預估以人週計算。費用反應全專職人力(2008年為：53.3%的管共費、52.5%的福利、3%的UCAR費用、以及每小時每使用者\$6.15美元的電腦服務費用)或是被認可的子合約商的費用。

2.2 Task #2 – Advanced AOAWS Web-based Display Systems

Enhancements to the Java-based Multi-dimensional Display System (JMDS) and the Web MDS (WMDS) will be developed based on user feedback.

For 2008, the JMDS development team has the following major tasks: (a) support the Java-based Multi-dimensional Display System (JMDS) software system; (b) continue to obtain user feedback on Version 6.x; (c) add new functionality to the JMDS; and (d) deliver Version 7.x. Work will also commence in 2008 to modernize the WMDS graphical user interface. New WMDS features and functions will be developed based on user feedback. Table 1 lists specific features and functions that are to be added to the AOAWS display systems during 2008. Additional enhancements to the JMDS will be developed, if resources permit after the items in Table 1 are completed.

Table 1: New AOAWS Display Functionality for 2008

Display System: Feature	Notes
JMDS: Implement capability to generate time-series of gridded data. (The user will be able to select a location and obtain a time series for the selected data field at that location.)	Software development work on this feature began in 2007 and will be completed in 2008.
JMDS: Develop and implement a radar-intensity based warning product to warn users when radar echoes are present. The warning criteria will be configurable for reflectivity, location, and area of interest for the warning feature.	UCAR will work with the CAA to define and demonstrate the functions of this new product.
JMDS: Develop and implement capability to display ACARS data.	The ACARS data will be obtained from the AFTN and in a defined format.
Create prototype application to display ASOS/AWOS data from Songshan, TIA, and KH Airports.	Develop prototype display pop-up window that emulates the CAA's present system.
JMDS: Develop and implement function that allows users to filter which METARs are displayed based on the observed weather criteria reported in the METARs.	UCAR will work with the CAA to define and demonstrate the functions of this new product.
JMDS: Integrate WAFS (symbolic) products into JMDS.	

2.2 工作項目#2 – 先進的AOAWS Web-based 顯示系統

將根據使用者意見來發展針對 Java-based 多元化氣象產品顯示系統(JMDS) 以及網頁版多元化氣象產品顯示系統(Web MDS : WMDS) 的強化功能。

2008年，JMDS開發小組有下列主要工作項目：(a)支援Java-based 多元化氣象產品顯示系統(JMDS) 軟體系統；(b)持續取得第6.x版的使用者意見；(c)於JMDS上增加新功能；(d)交付第7.x版。WMDS圖形使用者界面現代化工作也將在2008年開始。將根據使用者意見發展新的WMDS面貌和功能。表格1列出在2008期間將新增到「AOAWS顯示系統」的具體特性和功能。在完成表格1中的工作項目後，若資源允許，將發展JMDS額外的強化功能。

表格1：2008年新的AOAWS顯示功能

顯示系統：特性	註釋
JMDS：實作產生時間序列網絡數據資料的功能 (使用者將能夠選擇特定地點，並在該地點對所選取的數據資料區域取得時間序列)。	關於此特性的軟體發展工作從2007年開始，且將於2008年完成。
JMDS：發展及實作依雷達強度為基準的警示產品，以便雷達收到回應訊號時能警告使用者。警示標準可依反射能力的臨界值、位置以及關注的區域設定為警示特性。	UCAR與民用航空局一同合作以確定並驗證此新產品的功能。
JMDS：發展及實作顯示ACARS數據資料的能力。	ACARS資料將以確定的格式從AFTN取得。
建立離型應用系統以顯示從松山、桃園國際機場及高雄機場取得的ASOS或AWOS數據資料。	開發離型系統顯示，此彈跳式視窗顯示系統將模仿民用航空局之現行系統。
JMDS：發展及實作允許使用者根據METARs報告中所觀測的天氣標準以篩選欲顯示METARs項目的功能。	UCAR與民用航空局一同合作以確定並驗證此新產品的功能。

JMDS: Develop and implement function that allows users to input an ICAO location ID and the display center will change to that location.	UCAR will work with the CAA to define and demonstrate the functions of this new product.
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Specifically, the following sub-tasks will be carried out on the Advanced Web-based Display Systems task during 2008:

- Support JMDS Version 6.x.
- Respond to user feedback and as appropriate provide and develop enhancements to address issues raised by the users.
- Update JMDS users manual. Provide a link to this manual from the JMDS.
- Implement, test, release and deliver JMDS Version 7.x.

Resources Required:

Staff:

Software engineering (38 person-weeks) (UCAR)	US\$ 192,000
Software engineering (15 person-weeks) (III)	US\$ 39,000
Travel:	
2 trips @ 1-week	US\$ 20,000
Task # 2 Total	US\$ 251,000

2.3 Task #3 – Refinement and Implementation of Improved Icing and Turbulence Products

During 2007, the WRF modeling system became operational as part of the AOAWS and the AOAWS icing and turbulence products were ported from the MM5 system to the WRF system based on the current understanding of the configuration and performance of the WRF system. During 2008, the AOAWS WRF-based icing and turbulence products will be evaluated to assess their performance. In addition, the WRF configuration will change in 2008 and finer grid resolutions will be generated: (1) 27 km, (2) 9 km, and (3) 3 km. AIT's designated representative, UCAR, will assess the overall performance of the AOAWS

JMDS:整合 WAFS (符號的) 產品到 JMDS。	
JMDS:發展及實作允許使用者輸入一個國際民用航空組織(ICAO)機場代碼,顯示中心將切換成該位置的功能。	UCAR與民用航空局一同合作以確定並驗證此新產品的功能。

明確的說,在2008年期間,先進的Web-based 顯示系統工作項目,將執行下列的工作細項:

- 支援JMDS第6.x版本。
- 回應使用者意見,並對使用者反應的議題依可行性提供適當強化功能。
- 更新JMDS使用者手冊。使用者將可從JMDS連結到該手冊。
- 實作、測試、發表及交付JMDS第7.x版。

資源需求:

人力:

軟體工程(38人週)(美國大氣科學大學聯盟)	US\$ 192,000
軟體工程(15人週)(資策會)	US\$ 39,000
差旅:	
2人次各一週	US\$ 20,000
工作項目#2小計	US\$ 251,000

2.3 工作項目#3 - 精進及實作積冰和亂流產品的強化工作

在2007年期間,WRF模式系統成為AOAWS的一部份。根據目前對WRF系統的設定及效能的了解,AOAWS積冰及亂流產品的輸入資料從由MM5系統擷取轉換成由WRF系統擷取。在2008年期間,AOAWS WRF-based積冰及亂流產品將被評估以便鑑定其效能。除此之外,在2008年,WRF將改變設定值並使用下列更精細的網格解析度:(1) 27公里,(2) 9公里和(3) 3公里。AIT的指定代表UCAR

WRF-based icing and turbulence products as well as the impact of the new grid spacing. Feedback from TECRO's designated representative, CAA, along with pilot reports will be used to assess the performance of the icing and turbulence products. Feedback gained from this evaluation will be used to improve the performance of the icing and turbulence products. UCAR will evaluate the size and intensity of the predicted icing and turbulence regions to determine if the product is performing as expected. The icing and turbulence product improvements will be documented and implemented as part of AOAWS Version 7.x.

Specifically, the following sub-tasks will be carried out on the Refinement and Implementation of Improved Icing and Turbulence Products task during 2007:

- Collect and analyze icing and turbulence products from the AOAWS.
- Evaluate the performance of the AOAWS WRF-based icing and turbulence products using pilot reports and CAA feedback.
- Design, develop, and implement icing and turbulence algorithm improvements.
- Document changes to the icing and turbulence algorithms.
- Support the enhanced icing and turbulence products.

Resources Required:

Staff:

Project Scientists (13 person-weeks) (UCAR)	US\$ 70,800
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Task # 3 Total	US\$ 70,800

2.4 Task #4 – Data and System Testing and Integration

The most significant data system tasks in 2008 will involve WRF configuration changes from the 3-domain configuration with a 45km/15km/5km grid spacing to a 3-domain configuration with 27km/9km/3km grid spacing. These changes will result in data file size and quantity changes and require changes in downstream

將評估AOAWS WRF-based積冰及亂流產品的整體效能以及對新網格間距的影響。從TECRO的指定代表民用航空局來的使用者意見與飛航報告將被用來評估積冰及亂流產品的成效。此評估結果將被參考以用來改進積冰及亂流產品的效能。UCAR將藉由評估所預測的積冰及亂流區域中的尺寸和強度來確定產品是否有預期的表現成績。積冰及亂流產品的改善工作將會被記錄起來並實作為AOAWS第7.x發行版的一部份。

明確的說，在2008年期間，精進及實作積冰和亂流產品的強化工作項目，將執行下列工作細項：

- 從AOAWS收集並分析積冰及亂流產品。
- 藉由飛航報告和民用航空局使用者意見，評估AOAWS WRF-based積冰及亂流產品的成效。
- 設計、開發及實作積冰及亂流演算法的改善。
- 記錄積冰及亂流演算法的改變。
- 支援強化的積冰及亂流產品。

資源需求:

人力:

專案科學家(13人週) (美國大氣科學大學 聯盟)	美金 70,800 元
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工作項目#3小計	美金 70,800 元

2.4 工作項目#4 - 數據資料及系統測試與整合

2008年最顯著的數據資料系統工作項目，將包括WRF的網格間距設定從45公里/15公里/5公里的3網域配置變更為27公里/9公里/3公里的3網域配置。這些變更將造成數據資料檔案大小及數量的改變，並

AOAWS processes. UCAR will provide an assessment on the data volume and the communication bandwidth and indicate where system changes may be required. The AOAWS WAFS-based gridded data product will be completed in 2007, so the focus in 2008 will be on developing software to: a) encode the WAFS (non-gridded) BUFR data, b) convert it to the internal AOAWS SPDB format, and c) display the WAFS products on the JMDS display system.

Specifically, the Data and System Testing and Integration sub-tasks for 2008 include:

- Update AOAWS data distribution processes to handle the new WRF configuration (27km/9km/3km) data files.
- Modify and test the JMDS and WMDS product generation processes as necessary to handle WRF configuration changes. This includes adding icing and turbulence products to domain 1.
- Develop software to ingest ASOS/AWOS data from Songshan, TIA, and KH Airports.
- Develop software to ingest ACARS data from AFTN into AOAWS.
- Complete and test the WAFS-based products using BUFR (symbolic) data, convert the BUFR data to the internal AOAWS SPDB format, and display the WAFS symbolic products on the JMDS.
- Refine AOAWS-ES system operator manuals in PDF format suitable for both printing and on-line browsing. Provide a link to the manuals from suitable AOAWS web pages.

Resources Required:

Staff:

Software engineering (27 person-weeks) (UCAR) US\$ 141,400

且需要更改下傳的AOAWS程序。UCAR將提供針對數據資料量以及傳輸頻寬的評估，並指出系統需要更改的部分。AOAWS WAFS-based網格數據資料產品將在2007年完成，因此，2008年將集中發展軟體，以便a) 編譯WAFS (非網格) BUFR數據資料；b) 轉換上述數據資料為AOAWS內部的SPDB格式；c) 在JMDS顯示系統上顯示WAFS產品。

明確的說，在2008年，數據資料及系統測試與整合包含下列工作細項：

- 更新AOAWS數據資料分派程序以處理新的WRF設定(27公里/9公里/3公里) 資料檔。
- 必要時，修改及測試JMDS及WMDS的產品產生程序，以配合WRF設定的變更。此部份包括加入積冰及亂流產品到第一網域範圍。
- 開發軟體以從松山、桃園國際機場及高雄機場擷取ASOS或AWOS的數據資料。
- 開發軟體以從AFTN擷取ACARS的數據資料並載入AOAWS。
- 使用BUFR (符號的) 數據資料測試完成 WAFS-based的產品，轉換BUFR數據資料成為內部AOAWS SPDB格式，並在JMDS上顯示WAFS符號產品。
- 依PDF格式，修飾AOAWS-ES系統操作手冊，以適合列印及線上瀏覽。並透過適切的AOAWS網頁提供對此手冊的連結。

資源需求:

人力:

軟體工程(27人週)
(美國大氣科學大學聯盟) 美金141,400元

Travel:

2 trips @ 1-week US\$ 20,000**Task # 4 Total US\$ 161,400**

差旅:

2人次各一週 美金20,000元工作項目#4小計 美金 161,400元**2.5 Task #5 – Mesoscale Model Forecast System Enhancement and Upgrade**

A major component of the AOAWS-ES is the numerical weather prediction (NWP) system upon which the forecasts are based. A major change occurred during 2006 when the AOAWS weather forecast model MM5 was transferred from running on the VPP5000 HPC (high performance computer) to the IBM HPC. During 2007, the Weather Research and Forecast (WRF) model was adopted for operational use and at this time, the AOAWS began utilizing the WRF model. The WRF-Var data assimilation system was also implemented as part of the WRF system.

During 2008, the modeling team of AIT's designated representative, UCAR, will continue to support the WRF model and work on the development of the WRF-based modeling system enhancements. The first task will be to provide support, maintenance, and assistance to the WRF model development group. This will include collaboration on model evaluation and resolving model-related questions. Second, UCAR will assist in the upgrading of WRF and WRF-Var to more recent release versions when the schedule for such upgrades permits. The work will include coordination with the WRF model development group on software configuration and troubleshooting problems that arise. A third task is to examine the impacts of new data types, using WRF-Var, on model performance. UCAR will coordinate with the WRF model development group on such analysis and will make recommendations regarding the incorporation of the data. UCAR will coordinate with the WRF model development group both before and during the period when new data sources are brought into WRF.

Fourth, UCAR will investigate physical process schemes and parameterizations to determine those most suitable for the Taiwan region. This will involve looking at test cases and/or real-time output to better understand scheme performance. UCAR shall make recommendations on any schemes identified that differ from those used operationally. UCAR will not be able to make a full determination of the optimal physical schemes until the system is running routinely

2.5 工作項目#5 - 中尺度模式預報系統強化及升級

AOAWS-ES 的一個主要元件是預報所根據的數值天氣預報 (NWP) 系統。在2006年期間，有一個重大的變化，在VPP5000 HPC (高性能計算機) 上執行的AOAWS天氣預報模式MM5轉移到IBM HPC上。在2007年期間，AOAWS開始使用天氣研究及預報(WRF)模式以執行作業。WRF-Var資料同化系統也被實作為WRF系統的一部份。

在2008年期間，AIT指定代表UCAR的模式小組將繼續支援WRF模式以及WRF-based模式系統功能強化的發展工作。第一個工作項目將是對WRF模式開發團隊提供支援、維護和協助。這將包括在模式評估上協同運作以及解決模式相關問題。其次，當升級的時程允許時，UCAR將協助升級WRF和WRF-Var到最新釋出的版本。本項工作將包括與WRF模式開發團隊協調關於模式、軟體設定和疑難排解所產生的問題。第三項工作項目是檢查使用WRF-Var這種新資料型態對模式效能的影響。UCAR將在這類分析上與WRF模式開發團隊協調並將關於資料的結合提出建議。在新的資料引入到WRF之前及引入後，UCAR將與WRF模式開發團隊進行協調。

第四項，UCAR將探討物理處理和參數化方法，以確定那些是最適用於臺灣地區的方法。這將包含查看測試範例及(或)即時輸出資料以能夠更理解使用這些方法的成果，UCAR將提出任何不同於已作業中的方法的使用建議。在系統例行運作並有數個個案研究被記錄之前，UCAR將無法對物理處理方法最佳

and several case studies have been captured. UCAR expects to be able to make an informed decision for this optimization process in the fourth quarter of 2008.

UCAR's fifth task will be to modify the AOAWS model display system based on user feedback. This will include modifying graphics and products as necessary in light of the CAA's use of the WRF output. The final modeling task will be to port the AOAWS tropical cyclone bogussing scheme to the WRF system.

The following sub-tasks will be carried out for the Mesoscale Model Forecast System Enhancement and Upgrade task during 2008:

- Provide assistance to maintain the operational WRF model, including addressing problems reported by CAA personnel.
- Assist in upgrading of WRF and WRF-Var versions.
- Investigate impacts of new observational data sources on model using WRF-Var.
- Investigate model physical process schemes and parameterizations for the Taiwan region and generate recommendations.
- Modify model display system based on user feedback.
- Port AOAWS tropical cyclone bogus scheme to the operational WRF.

Resources Required:

Staff:

Software engineering (12 person weeks) (UCAR)	US\$ 28,000
Modeling Scientists (62 person-weeks) (UCAR)	US\$ 240,800
Travel:	
2 trips @ 1 week each	US\$ 20,000
Task # 5 Total	US\$ 288,800

2.6 Task #6 – Project Management, Document Preparation, Training Facilitation

化做出完全的確認。UCAR 期望能夠在2008年第四季對這最佳化過程做有根據的決定。

UCAR的第五項工作項目將是基於使用者意見修改AOAWS模式顯示系統。這將包含根據民用航空局使用WRF的輸出需求來修改圖形和產品。最後的模式工作項目將把AOAWS虛擬的 (bogussing) 熱帶氣旋方法 植入到WRF系統。

在2008年期間，中尺度模式預報系統強化及升級工作項目，將執行下列工作細項：

- 協助維護運作中的WRF模式，包括解決由民用航空局人員所回報的問題。
- 協助WRF及WRF-Var版本的升級。
- 探討模式WRF-Var使用新觀測資料來源所造成的影響。
- 探討適用於臺灣地區的模式物理處理方法與參數化方法，並提供建議。
- 根據使用者意見修改模式顯示系統。
- 植入AOAWS的熱帶氣旋虛擬(bogus)方法到運作中的WRF。

資源需求:

人力:

軟體工程(12人週) (美國大氣科學 大學聯盟)	美金28,000元
模式科學家(62人 週)(美國大氣科 學大學聯盟)	美金240,800元
差旅:	
2人次各一週	美金20,000元
工作項目#5小計	美金 288,800元

2.6 工作項目#6 - 專案管理、文件準備及教育訓練安排

The following sub-tasks will be carried out by the project management team during 2008:

- Carry out general project management, such as planning, budgeting, technical consultations with team members, and tracking progress.
- Prepare monthly and quarterly progress reports.
- Prepare plans for training personnel of TECRO's designated representative, CAA, as applicable, and facilitate the training.
- Obtain and review user feedback on the AOAWS-ES Version 6.x.
- Respond to routine requests from the CAA.
- Administer project sub-contracts.
- Participate in AOAWS-ES-related meetings.

Some of these tasks will be carried out by the Institute for Information Industry (III), the sub contractor of AIT's designated representative, UCAR, on behalf of UCAR.

Resources Required:

Staff:

General Project Management (9 person-weeks) (UCAR)	US\$ 45,000
Taiwan Project Management (8 person weeks) (III)	US\$ 28,000
Travel:	
2 trips @ 1 week each	US\$ 20,000
Task # 6 Total	US\$ 93,000

3.0 Deliverables

AOAWS-ES Quarterly Report #1 15 April 2008

AOAWS-ES Quarterly Report #2 15 July 2008

AOAWS-ES Quarterly Report #3 15 October 2008

AOAWS-ES Quarterly Report #4 1 December 2008

在2008年期間，專案管理團隊將執行下列工作細項：

- 執行日常專案管理，像是規劃、預算分配、與團隊成員技術協商以及進度追蹤。
- 準備每月及每季的進度報告。
- 準備TECRO指定代表民用航空局人員的訓練計畫及協助安排解決受訓人員之需求。
- 取得並檢視AOAWS-ES 第6.x版的使用者意見。
- 回應來自民用航空局的例行性要求。
- 管理本計畫的子合約分包商。
- 參與AOAWS-ES的相關會議。

此工作項目之部分工作將由AIT指定代表UCAR的子合約分包商資訊工業策進會(資策會)與UCAR共同分擔。

資源需求:

人力:

日常專案管理(9人週) (美國大氣科學大學聯盟)	美金45,000元
臺灣專案管理(8人週)(資策會)	美金28,000元
差旅:	
2人次各一週	美金20,000元
工作項目#6小計	美金 93,000元

3.0 交付項目

AOAWS-ES 第一 15 April 2008
季報告

AOAWS-ES 第二 15 July 2008
季報告

AOAWS-ES 第三 15 October 2008
季報告

AOAWS-ES 第四 01 December 2008
季報告

Draft IA#11 Acceptance Plan 15 July 2008

AOAWS-ES Version 7.x 1 December 2008
Software Release (source code)

AOAWS-ES Version 7.x User 1 December 2008
Manual

AOAWS-ES Version 7.x 1 December 2008
Operator Manual

JMDS Version 7.x Release 1 December 2008
(source code)

WMDS Version 7.x Release 1 December 2008
(source code)

WRF Release (source code) 1 December 2008

Icing and Turbulence Product 1 December 2008
Assessment Report

Year-End Acceptance Meeting 1 December 2008

4.0 Budget Summary

Task #1	System Support and Maintenance Services	\$ 105,000
Task #2	Advanced AOAWS Display Systems	\$ 251,000
Task #3	Icing and Turbulence Assessment	\$ 70,800
Task #4	Data and System Integration	\$ 161,400
Task #5	WRF Model Development	\$ 288,800
Task #6	Project Management	\$ 93,000

Implementing Arrangement #11 Contract Total
US\$ 970,000

IA#11 驗收計畫 15 July 2008
草案

AOAWS-ES 第 01 December 2008
7.x 版軟體 (原始
程式碼)

AOAWS-ES 第 01 December 2008
7.x 版使用手冊

AOAWS-ES 第 01 December 2008
7.x 版操作手冊

JMDS 第 7.x 版 (原 01 December 2008
始程式碼)

WMDS 第 7.x 版 01 December 2008
(原始程式碼)

WRF (原始程式 01 December 2008
碼)

積冰與亂流產品 01 December 2008
評估報告

年終驗收會議 01 December 2008

4.0 預算概要

工作項系統支援及維護美金105,000 目#1 服務
工作項先進的AOAWS顯美金251,000 目#2 示系統
工作項積冰與亂流評估 美金 70,800 目#3
工作項資料及系統整合 美金161,400 目#4
工作項WRF模式發展 美金288,800 目#5
工作項專案管理 美金 93,000 目#6
第十一號執行辦法合約美金970,000 總計