Australian Government
Department of the Environment and Heritage

Dr Kathleen Dermody
Secretary
Senate Foreign Affairs, Defence and Trade Committee
Suite S1.57
Parliament House
CANBERRA ACT 2600

Dear Dr Dermody

Thank you for the opportunity to make this submission to the Senate Inquiry into Australia's relationship with China, which is attached for your consideration.

As was requested in your initial call for submissions, our nominated contact officer is Kerry Smith, Director, International Section (kerry.smith@deh.gov.au or 02 6274 1171).

Several documents attached to this submission have been marked as confidential, and therefore should not be put online as a part of the Department's submission. We have received legal advice from DFAT that a Memorandum of Understanding signed between two countries cannot be made public unless agreed to by both parties or where it is stated in the document that it will be public. None of these documents have this agreement. The Department is, however, happy for the submission itself and attachments not marked confidential to be posted online.

We look forward to the outcomes of this Senate Inquiry.

Yours sincerely

Phillip Glyde
First Assistant Secretary
Policy Co-ordination and Environmental Protection Division

17 March 2005

Inquiry into Australia's relations with China

This submission consists of an overview of the Environment and Heritage portfolio's current bilateral relationship with China

1. The submission includes information provided by the Australian Bureau of Meteorology (BOM), an executive agency of the Environment and Heritage portfolio.

2. The portfolio has a considerable range of engagements with China. We have seven memoranda of understanding (MOUs) and one treaty with China on issues ranging from climate change, cultural heritage and conservation of migratory birds to cooperation on meteorology and Antarctic collaboration (copies of MOUs/agreements are at Attachment A). A list of the portfolio's recent and current activities with China is at Attachment B.

3. The portfolio's bilateral cooperation with its Chinese counterparts is consistent with, and in part delivered under the following medium-term cooperation agreements:

- *Memorandum of Understanding Between The National Environmental Protection Agency of the People's Republic of China and the Department of the Environment, Sport and Territories of Australia on Environmental Cooperation (April 1995).*
  - *Environmental Action Plan between the Department of Environment and Heritage of Australia and The State Environmental Protection Administration of the People's Republic of China (11 May 2000).*

- *Memorandum of Understanding between the Government of Australia and the Government of the People's Republic of China on Climate Change Activities (August 2004).*

- *Agreement between the Government of Australia and the Government of the People's Republic of China for the Protection of Migratory Birds and their Environment (CAMBA) (20 October 1986).*

- *Memorandum of Understanding between the Australian Bureau of Meteorology and the China Meteorological Administration in the Field of Meteorological Science and Technology (26 March 1985).*

- *Memorandum of Understanding between the State Administration of Cultural Heritage of the People's Republic of China, EA and the Australian Heritage Commission on Cultural Heritage Cooperation. (Beijing 26 November 1999)*

- *Memorandum of Understanding between the Australian Antarctic Division (AAD) and the Chinese National Antarctic Research Expedition (CHINARE) on a cooperative program of surface meteorological measurements in East Antarctica using automatic weather stations (December 2001).*

- *Memorandum of Understanding between the Polar Research Institute of China and the Australian Antarctic Division on cooperation on the management of Antarctic science data (October 2002)*

- *Memorandum of Understanding between the Polar Research Institute of China, the Australian Antarctic Division and the University of Newcastle, Australia on cooperation on the use of and data sharing of Magnetometer (11 July 2000).*

4. The main agency in China with responsibility for environment issues is the State Environmental Protection Administration (SEPA), a ministerial level authority directly under the State Council responsible for environmental protection in China. SEPA's main responsibilities include formulation of national policies, laws and administrative regulations, plans and reports on environmental protection, environment standards and related science and technology, nature conservation, pollution control, nuclear and radiation safety and environment assessment.

5. The Environmental Cooperation Action Plan, following on from the MOU with SEPA, provides for a China Australia Joint Committee on Environmental Cooperation. Two meetings of the Joint Committee have been convened to date in November 2001 and March 2004 in Canberra.

6. Other principal counterpart agencies whose responsibilities coincide with elements of our portfolio are: National Reform and Development Committee (NDRC), the State Forestry Administration (SFA), the State Administration of Cultural Heritage (SACH), the China Meteorological Administration (CMA) and the Chinese National Antarctic Research Expedition (CHINARE). Specific areas of cooperation with China undertaken by the portfolio are detailed below.

Climate Change relations

7. The Australian Government is committed to pursuing a global response to climate change that is environmentally effective, economically efficient and involves all major emitters, including developing countries. China is the largest developing country greenhouse emitter and the world's second largest greenhouse emitter behind the United States. The major driver behind China's emissions profile is its burgeoning economic and industrial growth that has fuelled a significant increase in energy demand and use of fossil fuels.

8. In working towards an effective global response to climate change, the Government is pursuing a multi-pronged domestic and international climate change strategy that includes action at multilateral, regional and bilateral levels. At the bilateral level, Australia has formed strong, mutually beneficial and practical action-focused partnerships with a number of key countries such as China, the United States, New Zealand, Japan, and the European Union.

9. The relationship on climate change with China took its first major step in a meeting in Beijing in September 2003 to discuss opportunities for cooperation. It was acknowledged that both countries had geographical and economic features in common that suggested that cooperation on climate change would provide mutual benefits. For example, both countries have large land masses with significant agricultural and forestry sectors. In addition, both economies are highly dependent on fossil fuels and highly vulnerable to the impacts of climate change.

10. Having identified key areas of commonality and mutual interest, the *Joint Declaration on Bilateral Cooperation on Climate Change* was signed in September 2003 and a program of climate change activities began. In August 2004, the relationship took a further significant step forward with the signing of the *MOU on Climate Change Activities*, by the Minister for Foreign Affairs, Mr Alexander Downer, and Vice Chairman of China's National Development and Reform Commission, Mr Liu Jiang. The MOU outlines a framework for joint cooperation between Australia and China in the following areas:

- Climate change science, including detection, analysis, prediction, and uncertainty
- Climate change policies and measures
- Climate change impacts and adaptation
- Greenhouse gas inventories and projections
- Technology cooperation
- Capacity building and public awareness
- Renewable energy and energy efficiency

The bilateral climate change partnership with China is focused on delivery of practical climate change projects that are of mutual benefit to both countries. There are currently six projects under the Partnership that focus on emissions measurement and analysis, agricultural and land management and the development and implementation of climate change policies (Attachment C). Further projects under the Partnership are likely to be announced in the coming months.

Australia and China recognise that our practical projects and broader bilateral cooperation on climate change must be built on the foundation of sustainable development. Enhancing food, water and energy security is a priority for China, and maintaining strong economic growth is an important objective for both China and Australia. Through the bilateral partnership, Australia is identifying ways to assist China to achieve its sustainable development objectives in a less greenhouse intensive manner.

The emissions intensity of the Australian economy has decreased in recent years as Government efforts to decouple emissions growth from economic growth have begun to take effect. Through our bilateral partnership, Australia is sharing its experiences and expertise in this area, to help China prepare for the significant growth in energy demand it will face over the coming decades. China is a significant trading partner with Australia and its growing energy demand represents a large potential market for Australian greenhouse technologies, products and expertise, particularly in areas related to the

management of greenhouse gas emissions. Through our bilateral cooperation, we are strengthening and deepening commercial links with China and facilitating participation by industry, business and the scientific community in climate change initiatives. Examples of where these business-to-business links are being formed are:

- *Renewable energy* - China will spend around 40 billion Australian dollars on renewable energy over the next 15 years as it increases the share of renewable energy in its total energy mix from one per cent to ten per cent by 2020. Australia has an excellent reputation in a range of renewable energy expertise and technology, including wind energy, photovoltaics, solar hot water, waste-to-energy conversion and hydro power systems. Australia's renewable energy industry is well placed to assist China meet its growing renewable energy needs.

- *Coal mine methane* – China is currently the world's largest coal producer and the biggest emitter of coal mine methane, a potent greenhouse gas. The extraction and use of this resource for electricity generation would reduce greenhouse emissions, improve mine safety and improve China's energy security. There is significant potential for Australian technology exports and investment to China in this area as Australia is a world leader in coal mine methane extraction and use technologies.

- *Agriculture* – Agriculture is an important export sector and source of emissions for Australia and China. Bilateral cooperation is focusing on developing more robust farming systems to reduce greenhouse gas emissions, improve food security and productivity, and improve the capacity of farmers to adapt to the impacts of climate change.

While the examples listed above are evidence of the type of practical work that is being progressed under our bilateral partnership, they also highlight how Australia's trade, economic and environmental interests can converge through climate change initiatives. Our experience has shown that bilateral cooperation, in tandem with multilateral action, can provide an effective mechanism to simultaneously reduce greenhouse emissions, promote economic benefits and develop business opportunities.

Conservation of Migratory Birds

11. The China Australia Migratory Bird Agreement (CAMBA) was signed at Canberra, 20 October 1986 and entered into force on 1 September 1988. Australia places a high value on the relationship which has arisen between Australia and China through the Agreement.

12. Consultative meetings are held between the portfolio and China's State Forestry Administration (SFA) every two years. Cooperation between the Parties has resulted in increased awareness of the importance of protecting migratory birds and their habitats. China has committed to the ongoing development of the flyway site networks for conservation of migratory waterbird habitat and restated recognition of the value of migration studies through the colour-flagging project. This project will involve demonstration of Australian techniques for capture, handling and marking of migratory

shorebirds, and will allow recording of movements of these birds across the East Asian - Australasian Flyway.

13. Opportunities exist for strengthening relations with China on the conservation of migratory birds through exchange of information and through various conservation activities such as migration and habitat research, public awareness and training programs. The next round of bilateral meetings will be held in northern China in late 2005.

14. China also participated in a recent meeting, in the Republic of Korea, to discuss the future of regional cooperation through a Partnership under a World Summit on Sustainable Development (WSSD) Type II initiative for the "Conservation and Sustainable Use of Sites of International Importance to Migratory Waterbirds in East-Asia, South East Asia and Australasia". To date, analysis of waterbird counts has identified over 100 sites of international importance for migratory waterbirds in China. Australia therefore considers it important that China participates in the Partnership.

Meteorology

15. Australia, mainly through the Australian Government Bureau of Meteorology, has a long history of close cooperation with China in the field of meteorology since 1972 (see 1993 Report of Parliamentary Inquiry into Australia's relations with China, Bureau of Meteorology submission). In addition to cooperation under the auspices of the World Meteorological Organization (WMO), the Bureau has had an MOU with the China Meteorological Administration (CMA) since 26 March 1985. This MOU has been renewed a number of times and is still valid and active. A "Review of Australia-China bilateral relations in meteorology since 1985", published in *WMO Bulletin* in January 2004, is at Attachment D.

The last session of the Joint Working Group under the MOU with CMA was held in Beijing and Guangzhou in May 2004. Important current bilateral activities include:

- Collaboration in meteorological satellites – China's latest launch of geostationary meteorological satellite FengYun-2C occurred in October 2004; Australia continues to operate a Turn Around Ranging Station at Crib Point, Victoria, for the positioning of FY-2C;
- Collaboration in atmospheric chemistry mainly through Australia's Cape Grim Baseline Air Pollution Station in Tasmania and the Chinese Global Atmosphere Watch Baseline Observatory at Waliguan in Qinghai Province;
- Collaboration in Antarctic meteorology, including regular meteorological data exchange and occasionally staff exchange between stations of Australia and China in the Antarctic;
- Training of Chinese meteorologists in support of Beijing 2008 Olympic Games – apart from transferring meteorological support technology and experience gained at Sydney 2000 Olympics, the Bureau will invite Chinese

forecasters to observe its meteorological support to the Commonwealth Games in Melbourne in 2006;
- Joint research on climate change science under the Australia-China Bilateral Cooperation Program on Climate.

16. The Bureau and CMA also cooperate in climate modelling research under the Asia Pacific Economic Cooperation (APEC) umbrella. Australia, China, Hong Kong China and Chinese Taipei are participants of the APEC Climate Center (APCC) Member Working Group. The Bureau has also implemented a few minor commercial hydrometeorological projects in China, mainly in connection with flood management for the Yangtze River under China's Ministry of Water Resources.

Heritage

17. The portfolio and the former Australian Heritage Commission (AHC) have been participating in an international collaborative project with the Getty Conservation Institute to help develop cultural heritage practice in China. The project partners have developed *Principles for the Conservation of Heritage Sites in China*, based on the Australian Burra Charter and adapted for China.

18. The portfolio is participating with its international partners in an implementation phase of the China Principles, developing Master Plans at two World Heritage listed sites, Mogao Grottoes and Chengde Imperial Mountain Resort and Outlying Temples. The Master Plans will be presented as models for implementation at heritage sites in China at the 14th International Council on Monuments and Sites (ICOMOS) General Assembly, to be hosted by China at Xi'an in October 2005.

19. China has some of the world's most significant cultural heritage. China is aware of the economic benefits of cultural tourism which is expanding rapidly, fuelled by the domestic market and international visitors. The portfolio is strategically placed to build on its well developed links with the Chinese cultural heritage industry, strengthening and deepening Australia's cultural links with China.

Return of Fossils to the People's Republic of China

20. . In 1989 Australia ratified the 1970 *UNESCO Convention on the Means of Prohibiting the Illicit Import, Export and Transfer of Ownership of Cultural Property* following the passage of the *Protection of Movable Cultural Heritage Act 1986* (PMCH Act), which was passed to give the Convention force in Australian law. China is also a signatory to the Convention.

21. The PMCH Act allows Australia to respond to requests from foreign countries to seize and repatriate objects of their cultural property that have been exported in contravention of their laws relating to cultural heritage.

22. In 2003 the Portfolio received advice from the Chinese Embassy that the export of fossils is illegal except in cases where a temporary export permit is issued. The Chinese authorities only issue temporary permits to allow fossils to leave China for the purpose of exhibition or scientific research. The correspondence also contained a formal request that Australia seize any fossils of Chinese origin and return them to the Chinese authorities.

23. Since 2003 a number of fossils of Chinese origin have been seized by the AFP, as Inspectors under the PMCH Act, including some 1300 fossils believed to be worth A$4-5 million seized in Western Australia. A number of these seized fossils were handed back to the Chinese Ambassador, her Excellency Madam Fu Ying, on 21 June 2004 by the Minister for Justice and Customs, Senator the Hon Chris Ellison, acting on behalf of the then Minister for the Environment and Heritage, the Hon Dr David Kemp MP.

24. Investigations into other instances of the illicit Chinese fossil trade in Australia are continuing.

Collaboration on Antarctic programs

25. Australia enjoys high level engagement with China on Antarctic affairs. Since initial contact between the two national Antarctic programs in the late 1970s, Australian cooperation with China in Antarctica has evolved to be characterised by strong and continuous logistic and scientific collaboration. There are regular meetings between the countries' Antarctic operational and scientific agencies, most recently in January 2005 when the AAD hosted a visit of officials from the Chinese Antarctic Administration.

Scientific Collaboration:

26. China and Australia have more than 20 years of close collaboration in Antarctic research. Both China and Australia have research interests in the biology, oceanography and glaciology of the Prydz Bay region of East Antarctica. The parallel national research interests have been undertaken within a framework of bilateral collaboration through the Scientific Committee on Antarctic Research (SCAR), including a Chinese Research Fellow working at AAD under a SCAR Fellowship.

27. The main current areas of cooperation are glaciological and oceanographic research in the Lambert Glacier Basin and the Amery Ice shelf regions, Antarctic sea ice research, data management and Antarctic automatic weather stations (AWS). The major aim of the cooperative program under the *MOU on a cooperative program of surface meteorological measurements in East Antarctica using automatic weather stations* between AAD and the Chinese National Antarctic Research Expedition is to share the technological and logistical capability of China and Australia in order to increase meteorological observations from over the Antarctic ice sheet using AWS. Australia and China currently operate three such AWS collaboratively, with two deployed under this program in the 2004/05 season. Both of these were Australian-built and deployed by the Chinese expedition in the Australian Antarctic Territory. Both are now returning data, with one from Dome A, which at over 4000m is at the highest point of the Antarctic plateau.

28. Further agreements between AAD and the Polar Research Institute of China include the *MOU on Cooperation and the Management of Antarctic Science Data* and the *MOU*, which also includes the University of Newcastle, on cooperation between the three institutes (no title) regarding space physics data research undertaken at Davis and Zhongshan stations.

Logistics Collaboration:

29. The Chinese station Zhongshan is located in relatively close proximity to the Australian station Davis. As such, Australia enjoys a very good relationship at the operational level with China in the Antarctic. AAD has provided support to Chinese Antarctic expeditions by occasionally supplying berths for individual expeditioners to and from the Prydz Bay region. AAD has provided the Chinese program with more substantial helicopter support and cargo delivery services. In addition, Australia provides general operational support, including engineering and medical advice between Davis and Zhongshan stations and a telecommunications link between the two stations for the passing of mutually beneficial data on meteorological and other research projects. Opportunities have also been identified to further extend operational collaboration.

AGREEMENT BETWEEN THE GOVERNMENT OF AUSTRALIA AND THE GOVERNMENT OF THE PEOPLE'S REPUBLIC OF CHINA FOR THE PROTECTION OF MIGRATORY BIRDS AND THEIR ENVIRONMENT

The Government of Australia and the Government of the People's Republic of China (hereinafter referred as the Contracting Parties),

Considering that birds constitute an important element in the natural environment and are also important natural resources of great value in carrying on scientific, cultural, artistic, recreational and economic activities;

Recognising the existence of special international concern for the protection of migratory birds;

Noting the existence of bilateral and multilateral agreements for the protection of migratory birds;

Considering that many species of birds that are known to be migratory occur in Australia and in the People's Republic of China;

Desiring to co-operate in the protection of migratory birds and their environment,

Have reached the following Agreement as a result of friendly discussions:

Article I

1. In this Agreement, the term "migratory birds" means:

   (a) Birds for which there is reliable evidence of migration between the two countries from the recovery of bands or other markers; and

   (b) Birds which are jointly determined by the competent authorities of the Contracting Parties to migrate between the two countries on the basis of published reports, photographs and other information.

However, migratory birds known to have been introduced by man to either country shall be excluded.

2. (a) The species recognised as migratory birds in accordance with paragraph 1 of this Article are listed in the Annex to this Agreement.

   (b) The competent authorities of the Contracting Parties shall, from time to time, review the Annex. If they consider it necessary, the Contracting Parties may amend it by mutual arrangement.

(c) The Annex shall be considered amended ninety days after the date upon which each Party informs the other in a diplomatic note that it accepts the amendments.

Article II

1. Each Contracting Party shall prohibit the taking of migratory birds and their eggs.

However, exceptions to that prohibition may be permitted in accordance with the laws and regulations in force in each country in the following cases:

(a) for scientific, educational propagative or other specific purposes not inconsistent with the objectives of this Agreement;

(b) for the purpose of protecting persons or property;

(c) during hunting seasons established in accordance with paragraph 3 of this Article; and

(d) to allow the hunting and gathering of specified migratory birds or their eggs by the inhabitants of specified regions who have traditionally carried on such activities for their own food, clothing or cultural purposes, provided that the population of each species is maintained in optimum numbers and that adequate preservation of the species is not prejudiced.

2. Each Contracting Party shall prohibit any sale, purchase or exchange of migratory birds or their eggs, whether they are alive or dead, or of the products thereof or their parts, except those taken in accordance with paragraph 1 of this Article.

3. Each Contracting Party may establish seasons for hunting migratory birds taking into account the maintenance of annual reproduction required for the survival of those birds.

Article III

1. Each Contracting Party shall encourage exchanges of data and publications regarding research on migratory birds.

2. The Contracting Parties shall encourage the formulation of joint research programs on migratory birds.

3. Each Contracting Party shall encourage the conservation of migratory birds, especially those species in danger of extinction.

Article IV

Each Contracting Party shall endeavour, in accordance with its laws and regulations in force, to:

(a) establish sanctuaries and other facilities for the management and protection of migratory birds and also of their environment; and

(b) take appropriate measures to preserve and preserve and enhance the environment of migratory birds.

In particular, each Contracting Party shall:

(i) seek means to prevent damage to migratory birds and their environment, and

(ii) endeavour to take such measures as may be necessary to restrict or prevent the importation and introduction of animals and plants which are hazardous to the preservation of migratory birds and their environment.

Article V

Upon the request of either of the Contracting Parties, the Contracting Parties shall hold consultations regarding the operation of this Agreement.

Article VI

1. This Agreement shall enter into force on the day upon which both Contracting Parties have notified each other that their respective constitutional and other requirements necessary to give effect to this Agreement have been complied with. It shall remain in force for fifteen years and shall continue in force thereafter until terminated in accordance with the provisions in paragraph 2 of this Article.

2. Either Contracting Party may, by giving one year's notice in writing, terminate this Agreement at the end of the initial fifteen year period or at any time thereafter.

IN WITNESS WHEREOF the undersigned being duly authorized thereto by their respective Governments, have signed this Agreement.

Done in duplicate, at Canberra on Twenty October, 1986 in the English and Chinese languages, both texts being equally authentic.

Susan Ryan
For the Government of

Dong Zhiyong
For the Government of the People's Republic of

Australia China

Eighty one species covered by the Agreement are -

1. Streaked Shearwater	*Puffinus leucomelas (Calonectris leucomelas)*
2. Sooty Shearwater	*Puffinus griseus*
3. Leach's Storm-petrel	*Oceanodroma leucorhoa*
4. White-tailed Tropic-bird	*Phaethon lepturus*
5. Red-footed Booby	*Sula Sula*
6. Brown Booby	*Sula leucogaster*
7. Great Frigatebird	*Fregata minor*
8. Andrew's Frigatebird	*Fregata andrewsi*
9. Least Frigatebird	*Fregata ariel*
10 Cattle Egret	*Bubulcus ibis (Ardeola ibis)*
11. Great Egret	*Egretta alba*
12. Eastern Reef Egret	*Egretta sacra*
13. Yellow Bittern	*Ixobrychus sinensis*
14. Glossy Ibis	*Plegadis falcinellus*
15. Garganey	*Anas querquedula*
16. Northern Shoveler	*Anas clypeata*
17. White-bellied Sea-eagle	*Haliaeetus leucogaster*
18. Sarus Crane	*Grus antigone*
19. Red-legged Crake	*Rallina fasciata*
20. Corncrake	*Crex crex*
21. Pheasant-tailed Jacana	*Hydrophasianus chirurgus*
22. Painted Snipe	*Rostratula benghalensis*
23. Grey Plover	*Pluvialis squatarola*
24. Lesser Golden Plover	*Pluvialis dominica*
25. Ringed Plover	*Charadius hiaticula*
26. Little Ringed Plover	*Charadius dubius*
27. Mongolian Plover	*Charadius mongolus*
28. Large Sand-Plover	*Charadius leschenaultii*
29. Caspian Plover	*Charadius asiaticus*
30. Little Curlew	*Numenius borealis (Numenius minutus)*
31. Whimbrel	*Numenius phaeopus*
32. Eurasian Curlew	*Numenius arquata*
33. Eastern Curlew	*Numenius madagascariensis*
34. Black-tailed Godwit	*Limosa limosa*
35. Bar-tailed Godwit	*Limosa lapponica*
36. Redshank	*Tringa totanus*
37. Marsh Sandpiper	*Tringa stagnatilis*
38. Greenshank	*Tringa nebularia*
39. Wood Sandpiper	*Tringa glareola*
40. Common Sandpiper	*Tringa hypoleucos*
41. Grey-tailed Tattler	*Tringa incana (Tringa brevipes)*
42. Terek Sandpiper	*Xenus cinerus (Tringa terek)*

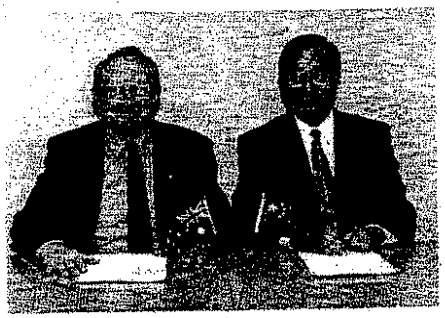
43. Ruddy Turnstone	*Arenaria interpres*
44. Asian Dowitcher	*Limnodromus semipalmatus*
45. Latham's Snipe	*Capella hardwickii (Gallinago hardwickii)*
46. Pin-tailed Snipe	*Capella stenura (Gallinago stenura)*
47. Swinhoe's Snipe	*Capella megala (Gallinago megala)*
48. Red Knot	*Calidris canutus*
49. Great Knot	*Calidris tenuirostris*
50. Red-necked Stint	*Calidris ruficollis*
51. Long-toed Stint	*Calidris subminuta*
52. Sharp-tailed Sandpiper	*Calidris acuminata*
53. Dunlin	*Calidris alpina*
54. Curlew Sandpiper	*Calidris ferruginea*
55. Sanderling	*Crocethia alba (Calidris alba)*
56. Broad-billed Sand-piper	*Limicola falcinellus*
57. Ruff	*Philomachus pugnax*
58. Red-necked Phalarope	*Phalaropus lobatus*
59. Grey Phalarope	*Phalaropus fulicarius*
60. Oriental Pratincole	*Glareola maldivarum*
61. Pomarine Jaeger	*Stercorianus pomarinus*
62. White-winged Tern	*Chlidonias leucoptera*
63. Black Tern	*Chlidonias niger*
64. Caspian Tern	*Hydroprogne tschegrava (Hydroprogne caspia)*
65. Common Tern	*Sterna hirundo*
66. Black-naped Tern	*Sterna sumatrana*
67. Bridled Tern	*Sterna anaethetus*
68. Little Tern	*Sterna albifrons*
69. Lesser Crested Tern	*Thalasseus bengalensis (Sterna bengalensis)*
70. Common Noddy	*Anous stolidus*
71. Oriental Cuckoo	*Cuculus saturatus*
72. White-throated Needletail	*Hirundapus caudacutus*
73. Fork-tailed Swift	*Apus pacificus*
74. Barn Swallow	*Hirundo rustica*
75. Greater Striated Swallow	*Hirundo striolata*
76. Yellow Wagtail	*Motacilla flava*
77. Yellow-headed Wagtail	*Motacilla citreola*
78. Grey Wagtail	*Motacilla cinerea*
79. White Wagtail	*Motacilla alba*
80. Great Reed-warbler	*Acrocephalus arundinaceus*
81. Arctic Willow Warbler	*Phylloscopus borealis*

A review of Australia-China bilateral relations in meteorology since 1985

By John ZILLMAN[1] and QIN Dahe[2]

Dr J.W. Zillman and Mr Zou Jingmeng, 1995

Dr J.W. Zillman and Mr Wen Kegang, 1998



Dr J.W. Zillman and Dr Qin Dahe, 2001

Background

The Australian Bureau of Meteorology (hereinafter referred to as the "Bureau") and the China Meteorological Administration (hereinafter referred to as "CMA") signed a Memorandum of Understanding (MOU) on cooperation in the field of meteorological science and technology on 26 March 1985. Since that time, active bilateral activities have been carried out under the direction of a Joint Working Group (JWG), the last (10th) session of which was held in Melbourne,Australia, in December 2001. This JWG is co-chaired by the Australian Director of Meteorology and the Administrator of the CMA.

In 1989, the JWG co-chairpersons (Dr John Zillman and Mr Zou Jingmeng) simultaneously published in China and Australia (in *Australian Physicist*, Volume 26, 235-240) the first review of this bilateral cooperation, entitled "Australia-China cooperation in meteorology". At JWG-10, it was decided that a second review paper should be published in appropriate Chinese and Australian journals and the *WMO Bulletin*, to compare parallel developments in meteorology in the two countries during the past 17 years.

Common challenges and opportunities

Since the mid-1980s, both Services have undergone rapid changes in response to global and national challenges. Although both the Bureau and CMA were able to adapt themselves and maximize opportunities to their best advantage, they experienced moments of hardship caused by international and domestic influences, such as economic globalization, staff reductions and legal processes.

During the past 17 years, CMA has been directly under the State Council of China. But it was only in July 2002 that the Bureau became a self-contained Executive Agency in the Australian Government system.

1 Former Director, Australian Bureau of Meteorology

2 Administrator, China Meteorological Administration

TABLE 1
Comparison of the developments in meteorology in China and Australia

China Meteorological Administration (CMA)	Australian Bureau of Meteorology
• Advanced science and technology—This was the vehicle to modernize meteorological service in China and improve its operational skills and capabilities—especially in the 1990s, when the CMA took advantage of several major large-scale projects to establish a relatively modern operational meteorological system within its infrastructure.	• Advanced science and technology—After several years of service reductions and operational difficulties, the findings of the March 1996 Review of the Operation of the Bureau of Meteorology, and the Government's subsequent response to its recommendations, provided a foundation for restoring the integrity and stability of the Bureau's operations and for major improvements in essential services and systems through advanced science and technology.
• Natural disaster prevention and mitigation—In this area, the CMA implemented the following three major projects: a new-generation weather radar network, meteorological satellites, and mesoscale disastrous weather monitoring and warning systems. The new-generation Doppler weather radar network started in 1998. Its objective was to deploy about 120 S-band or C-band Doppler weather radars throughout China, so that the network could effectively monitor and warn the public against hazardous weather events. In the 1990s, CMA sped up the construction of meteorological satellite systems that would be long-lived and function stably. So far, CMA has launched four polar orbiters and two geostationary satellites. A meteorological satellite application operational system has been commissioned, composed of the National Meteorological Satellite Centre, three ground stations located in Beijing, Guangzhou and Wulumuqi, and a turnaround ranging station in Australia. Since the late 1980s, China began to construct four operational pilot bases for conducting mesoscale weather experiments: in the Beijing-Tianjin-Hebei, Central China, Yangtze River Delta and Pearl River Delta regions. By utilizing automatic meteorological observing methods, optical visibility observing techniques, Doppler radar surveillance, and wind profiling technology, the systems overcame the weakness of the conventional observing network.	• Natural disaster prevention and mitigation—Despite improvements in natural disaster prevention and mitigation, loss of life from hazardous weather events continued to occur, such as during the 1998 Sydney-Hobart Yacht Race and the Sydney Hailstorm of 1999. Upgrading of the observing and computing infrastructure of the Bureau has continued, such as the provision of a Doppler radar in Sydney and the installation of a mesoscale network for nowcasting. The high-resolution numerical models proved to be indispensable for forest fire fighting operations during the El Niño years, especially December 2001 and the summer of 2002/2003.
• The telecommunication leap—With the volume of meteorological data rapidly increasing as a	• The telecommunication leap—Efficient telecommunication is vital to the collection and

result of the construction of meteorological information acquisition and dissemination systems, the telecommunication system within China became an intolerable bottleneck. The CMA therefore decided in the 1990s to adopt satellite communication using VSAT. This project started in 1993 and the system went into operation in 1999, comprising a VSAT hub station, 30 provincial information control centres, more than 350 city-level information management stations, and 2 000 one-way receiving stations. In 1998, the CMA started to construct regional network systems, data retrieval and mass storage systems, in order to establish a complete meteorological information infrastructure.

- Meeting the demands for more accurate weather and climate forecasts—CMA has created a Numerical Weather Prediction (NWP)-based interactive data-processing and analysing system, a short-term climate prediction system and an associated high-performance computer system. In 1991, the first NWP model (T42) was introduced and put into operation. The current global medium-range NWP model is T213L31 (approximately 60-km horizontal resolution). The high-resolution limited area heavy rain forecasting model (HLAFS, 0.5° horizontal resolution) and typhoon track model (approximately 50-km horizontal resolution) have been used since 1996. The MM5-based mesoscale model with a higher resolution of 6 km began its operational run in 1999 and produced 36-hour forecasts on a trial basis. Starting in 1997, CMA developed a new-generation man-machine interactive processing system (MICAPS). In 1995, the National Climate Centre was set up in China. In 1999, CMA started to make efforts in build a Short-Term Climate Prediction System (STCPS) capable of producing monthly, seasonal and annual climate-prediction products. Starting in the mid-1990s, CMA turned to the installation and application of massive high-performance parallel computing facility, while making full use of the existing vector supercomputers, hence a multiple high-performance computing environment was created.
- Sophistication in meteorological services—CMA has built a four-level decision-making meteorological service system: at national,

distribution of meteorological and related data and products. In 1996/1997, the Australian Meteorological Data and Information Service System (AMDISS) commenced operation. Significant progress has also been achieved with the further development of the Australian Integrated Forecast System. With the rapid growth in community use of information from the national weather radar network, the Bureau's Website became firmly established in 20012002 as the most frequently assessed government Website in Australia.

- Meeting the demands for more accurate weather and climate forecasts—To enhance the numerical weather prediction capability, the Bureau's computers were progressively upgraded. After a series of upgrades in supercomputing, the Bureau acquired two NEC SX-5 supercomputers by 2001/2002 with a combined total of 32 processors, each capable of eight gigaflops, giving a peak rate of 256 gigaflops, along with 224 gigabytes of memory and more than two terabytes of associated disc storage space. The 29-level Global Analysis and Prediction (GASP) model was run with triangular wave number T239 truncation (approximately 85-km horizontal resolution). The Limited Area Prediction System (LAPS) had a grid spacing of 0.375° (about 37 km), but several meso-LAPS systems operated to provide finer-scale predictions for sub-areas of the larger Australian region domain down to about 12 km (a few even at 5 km around Sydney and Melbourne in test mode).
- Sophistication in meteorological services—In 1997/1998, the Bureau completed and promulgated its Service Charter for the

provincial, city and county levels. It also provides specialized meteorological services, e.g. for the Yangtze River Three-Gorge Hydropower Project and to the power companies using a national lightning detection system. For the public, CMA has set up a TV weather service, a telephone automatic answering system and an Internet weather service system.

- Budget and staff numbers—As the programmes increased, the budget provided by the Chinese Government increased from US$ 50 million in 1985 to US$ 275 million in 2001 (i.e. 5.5 times). However, through administrative restructuring and operational reorganization, the total staff of CMA was downsized from 64 401 in 1985 to 55 182 in 2001.
- Revenue-making capacity—CMA formally began its paid special meteorological services in 1985. Consistent with the promulgation of the Meteorological Law of the People's Republic of China in 1999 and China's joining the World Trade Organization in 2001, CMA strengthened its cost-recovery and revenue-making capacity and further
- International and inter-agency cooperation—Adhering to the policy of reform and opening-up, CMA continues to strengthen bilateral and international cooperation, with bilateral cooperative relationships with more than 10 countries for more than 10 years. CMA has also strengthened its inter-sector and inter-disciplinary cooperation within the country, e.g. with the Ministry of Water Resources, the Ministry of Agriculture, the Chinese Academy of Sciences and the China Seismological Administration and related universities.

Community. This is a public statement of the Bureau's role in providing essential services to the Australian community and and the commitment of its staff to doing so to the highest professional standards. Tailored forecasts and services were also provided to meet the sophisticated demands of specialized users.

- Budget and staff numbers—The Bureau of Meteorology budget increased from A$ 80 million in 1985/1986 to A$ 213 million in 2001/2002 (i.e. 2.7 times). However, there were 500 staff less in 2001/2002 than the 1 800 a quarter of a century earlier.

- Revenue-making capacity—In July 1990, the Bureau formally established its Special Services Unit to provide specialized meteorological and related services on a commercial basis and to stimulate the build-up of private sector meteorology in Australia expanded the scope of its commercial services.

- International and inter-agency cooperation—As of 2002/2003, the Bureau has had international protocols on cooperation in meteorology with eight countries. Internally, it regularly consults with national organizations of the Commonwealth and State governments, academic institutions and the private sector.

A comparison of the developments in meteorology between the two countries under eight common headings is given below. These headings are:

- Advanced science and technology;
- Natural disaster prevention and mitigation;
- The telecommunication leap;
- Meeting the demands for more accurate weather and climate forecasts;
- Sophistication in meteorological services;
- Budget and staff numbers;
- Revenue-making capacity;
- International and inter-agency cooperation.

During this period, technical cooperation between CMA and the Bureau played an important role in the development of meteorology in both countries. There were altogether 283 exchange visits, involving 84 Bureau officers and 199 CMA staff (see Tables II and III).

It is evident from these tables that the top priority for exchange activities is in the area of meteorological satellites. For CMA, the area of meteorological support to the Olympic Games is also gaining importance as the 2008 Beijing Olympic Games approach. Through these bilateral activities, optimal benefits were achieved on both sides.

Conclusion

Since the signing of the MOU between CMA and the Bureau in 1985, significant advances in meteor-

TABLE II
Bureau officers on exchange to CMA

No.	Technical cooperation area
17	Meteorological satellites
10	Numerical Weather Prediction
7	Global Atmosphere Watch
11	Tropical meteorology and tropical cyclones
2	Antarctic meteorology
4	Education and training
11	Climate and climate change
1	Meteorological support to Olympic Games
21	Others

TABLE III
CMA officers on exchange to the Bureau

No.	Technical cooperation area
28	Meteorological satellites
18	Numerical Weather Prediction
4	Global Atmosphere Watch
13	Tropical meteorology and tropical cyclones
2	Antarctic meteorology
5	Education and training
7	Climate and climate change
26	Meteorological support to Olympic Games
96	Others

ology have occurred in China and Australia, thanks, to a significant extent, to the enhancement made through bilateral technical cooperation between the two Services, especially in the area of meteorological satellites. As co-chairpersons of the JWG, we view, with great satisfaction and pride, the excellent progress made during the past 17 years, and look forward to a bright future of mutually beneficial cooperation between Chinese and Australian meteorology.

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