1号项目技术服务合同
TECHNICAL SERVICE CONTRACT OF PROJECT SCOPE OF WORK
NO. 001

Between

中 国 海 洋 大 学
<u>Ocean University of China</u>
中华人民共和国山东省青岛市
Qingdao, Shandong Province
People's Republic of China

与
AND

<u>Texas A&M University</u>
美国德克萨斯州 College Station
College Station, Texas
United States of America

签署日期：<u>2016</u> 年 <u>12</u> 月 <u>5</u> 日
Date: <u>5 December, 2016</u>

本文件为1号项目（PSW1）的技术服务合同，是在中华人民共和国山东省青岛市于首页所标日期由以下双方签署：

This Technical Service Contract of Project Scope of Work 1 ("PSW1) is signed on the date set forth on the first page in Qingdao, Shandong Province, People's Republic of China, and made between the Parties defined below:

甲方（委托方）	:	中国海洋大学
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乙方（受托方）	:	美国德州农工大学
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1.0 引言
1.0 RECITALS

甲乙双方同意甲方委托乙方鉴于此项目内容尽最大努力向甲方提供技术服务支持，并提出以下条款。在此份 PSW1 技术服务合同中，"一方"是指甲方或乙方，"双方"是指甲方和乙方。

Party A and B agree that Party A entrusts Party B to provide technical service to Party A on a best efforts basis, regarding this project and conclude the following clauses. In this PSW1, "one Party" shall refer to Party A or B, and "both Parties" refer to Party A and B.

2.0 定义
2.0. DEFINITIONS

除非文义另有所指，下列词语和表达应具有以下含义：

Unless the context otherwise requires, the following words and expression shall have the following meanings:

        "TAMU" 是指 Texas A&M University, College Station, Texas 。

        "TAMU" means Texas A&M University, College Station, Texas.

        "OUC" 是指 中国海洋大学。

        "OUC" means Ocean University of China.

3.0 技术服务委托事项
3.0 TECHNICAL SERVICE ENTRUSTED MATTERS

3.1 背景介绍
3.1 Background

OUC 和 TAMU 的共识是地球自然资源的可持续性和自然过程与人类之间的紧密联系是未来几十年全球面临的显著性挑战。为了提升我们对气候系统自然变化和气候系统受人为强迫产生的变化的预测能力，以及提升对这些变化带来的更深入影响的预测能力，双方机构都积极参与了一系列重要问题的研究，这些研究主要是为了能更好的在全球尺度和区域尺度上理解复杂地球系统过程并对其进行数值模拟而进行的。发展区域耦合模式可以增强我们对小尺度地球系统过程的认识，这对于降尺度气候预测和预估是极其重要的，OUC 和 TAMU 在这方面有共同的兴趣利益。TAMU 已经与 OUC 一起成功将区域耦合模式应用于多个区域来研究气候变化的重要影响，例如中国边缘海、黑潮、西太黑潮延伸体区域以及西部大西洋的墨西哥湾区域等。OUC 和 TAMU 计划将这个区域地球系统模式与共同地球系统模式（CESM，一个完全耦合的、由相关科研共同体社区维护开发的、网格覆盖全球的地球系统模式，提供了对过去、现在及未来地球系统和气候状态的最先进的计算机数值模拟）进行整合。这两个模式的整合要由一个研究联合体来完成，这个研究联合体的建立将有益于地球系统和气候系统研究。这不仅对 OUC 和 TAMU，同时也对除美国之外的更广泛的研究团体有利。

OUC and TAMU share the understanding that the sustainability of Earth's natural resources and the interfaces between natural processes and humankind are significant global challenges for the next several decades. Both institutions are actively engaged in research on pressing issues pertaining to the understanding and modeling of complex Earth system processes at both global and regional scales in order to improve our capability to predict natural and forced variability of

the climate system and its impact. Both OUC and TAMU share a common interest in development of a regional coupled model to improve the understanding of small-scale Earth system processes that are critically important for downscaling-scale climate predictions and projections. Together with the Ocean University of China (OUC), TAMU has successfully applied the regional modeling approach to several regions of climatic importance, such as the Chinese Marginal Seas and the Kuroshio along with its extension region in the western Pacific and the Gulf of Mexico in the western Atlantic sector. OUC and TAMU desire to integrate this regional earth system model with the Community Earth System Model (CESM) - a fully-coupled community, global Earth system model that provides state-of-the-art computer simulations of the Earth's past, present, and future Earth system and climate states. The unification of the two modeling approaches require a research alliance which will be beneficial to Earth system and climate research, not only for OUC and TAMU, but also for the broader research community in the US and abroad.

3.2 合作范围
3.2 <u>Area of Cooperation</u>

OUC 与 TAMU 不但有双博士学位项目的成功合作，还已经有数十年富于成果的学术研究上的合作。最近，OUC 和 TAMU 已经通过协议备忘录（MOA）所述研究合作的补充范围扩大了双方的互动，而正是 MOA 通过 TAMU 德州气候研究中心（TCCS）提供了 PSW1（本文）的框架与合作基础。

OUC and TAMU have a rich multi-decadal academic collaboration through a successful dual Ph.D. degree program between the TAMU Department of Oceanography and the Ocean University of China. More recently, OUC and TAMU have expanded their interactions through implementation of a MOA for research collaboration. This recent MOA provides the framework for this Project Scope of Work (PSW1) and collaboration through the TAMU Texas Center for Climate Study (TCCS).

TAMU 与 OUC 的科学家之间合作的目的是提高区域地球系统对全球气候变化响应的预测与影响评估能力；使其结果能够在为了提高地球生命质量所做的决策过程中服务，使决策者可以得到更加有效的科学数据和信息支持。

This collaboration between Scientists at TAMU and OUC, is for the purpose of improving the predictability and impact assessment of regional Earth system response to global climate variability and change for use by decision makers for the betterment of Life on Earth.

此次合作的总体目标是开发一套多尺度模拟方法，该方法通过组合全球和区域地球系统模式，并整合现有的观测资料从而在不同的时空尺度上对区域地球系统变化提供高品质高精度的数值模拟、提供预报预测及提供假设式情影实验下的数值模拟结果。合作的具体目标包括开发、应用和评估基于多尺度方法的区域耦合模型和资料同化系统两个部分。

The overall mission of this collaboration is to develop a multi-scale modeling approach by combining global and regional Earth system models and integrating existing observations for delivering high-quality and accurate simulations, predictions and projections of regional Earth system changes at various space and time scales. The objective of this collaboration is to develop, apply and validate the multi-scale modeling approach in regional coupled model as well as a data assimilation system.

3.3 目前 OUC 和 TAMU 就双方合作事宜已经有一份于 2016 年 7 月全部生效的 MOA，根据 MOA 第 1.6 节的内容，该 PW1 应该被纳入并成为 MOA 的一部分，且受 MOA 条款的制约；该 PW1 在 MOA 项目下对特定工作的履行有授权。

There is now in full force and effect between the Parties through a Memorandum of Agreement (MOA) for Collaborations between OUC) and TAMU with an effective date of July, 2016. Pursuant to Section 1.6 of the MOA, this PW1 shall be incorporated into and become part of the MOA and shall be governed by the terms of the MOA. This PW1 is made to authorize performance of certain work on a Project under that MOA.

3.4 甲方委托乙方通过最大努力开展活动并达到附件 1 中所明确的内容。

Party A entrusts Party B to use best efforts to conduct activities to attain the deliverables identified in Attachment 1.

3.5 甲方同意在附件 1 中明确的交付内容应当用于科研和教学目的，任何机构和科学家可以在明确提及出处的情况下自由使用其数据。

Party A agrees that the deliverables identified in Attachment 1 shall be used for the purpose of scientific research and education and any institute or scientist can use the data freely with acknowledgement.

3.6 任何由此项目产生的商业项目需要包括 OUC 和/或 TAMU 在内，且需要事先由 OUC 和 TAMU 出具书面批准。

Commercial developments, if resulting from this project would consist of collaborations by OUC and/or TAMU. These developments would require prior written approval of both OUC and TAMU.

4.0 技术服务具体内容、要求、方式和工作进度安排：
4.0 TECHNICAL SERVICE CONTENTS, REQUIREMENTS, METHODS AND SCHEDULES

4.1 技术服务内容
4.1 Technical Service Contents

德州气候研究中心（TCCS）组织：TCCS 建立于 1993 年，主要职能是发起、鼓励和支持气候相关的研究、教育、服务及推广项目，其工作重点持续着眼于各种改善生活质量的活动上。TCCS 的四个基本目标包括：1）完成气候相关问题的基础研究；2）培训下一代气候研究工作队伍；3）给政府部门和有关气候变化影响的私营部门提供咨询和协助；4）作为一个关注过去、现在和未来气候变化的服务中心做公众宣传。TCCS 为两所大学（TAMU 和 OUC）提供了合作框架，通过该 PSW1 建立了 OUC 与 TAMU 之间的合作，并提供了 TAMU 与 NCAR 以及 OUC 与合作的补充协议。本文件是 TAMU 和 OUC 之间 PSW1 技术合同的阐述和声明，PSW1 是现有 TAMU-OUC 合作协议的一部分。

Texas Center for Climate Study (TCCS) Organization – TCCS was established in 1993 to initiate, encourage, and support climate related programs in research, education, service and outreach. Emphasis continues to be placed on activities that may improve the quality of life. Four fundamental goals of TCCS include: 1) complete fundamental research on climate related issues;

2) train the next generation work force in climate studies; 3) provide advice and assistance to agencies, other government units and the private sector regarding the effects of climate change; and 4) to serve as a focus for public outreach concerning past, present and future climate change. TCCS provides the framework for the collaboration between two universities (TAMU and OUC) and as is established through this PSW1 between TAMU and OUC with supplementary agreements between TAMU and NCARThis particular document presents the PSW 1 between TAMU and OUC as part of the existing TAMU-OUC MOA.

4.1.1 TAMU 将在 OUC 参与下，负责项目协作的领导工作。

4.1.1 TAMU will take the lead in the coordination of the project with input from OUC

4.1.2 OUC 和 TAMU 的代表至少每季度进行一次电话会议，以审查每年的成果交付进度；每次讨论的摘要会分发给与会者和相应的行政人员。

4.1.2 Representatives from OUC and TAMU will teleconference [at a minimum] quarterly to review progress towards meeting annual deliverables. A summary of each discussion will be circulated to participants and appropriate administrators.

4.1.3 建立一个顾问组，以进行监督和项目指导；该顾问组由 TAMU、OUC、NCAR 和 QNLMST 代表以及至少两名外部成员组成。

4.1.3 An advisory group will be established to provide oversight and project guidance. This advisory group will consist of representatives from TAMU, OUC, NCAR, and QNLMST and will include a minimum of two external members.

5.0 技术成果交付
5.0 TECHNICAL DELIVERABLES

5.1 TAMU 技术交付
5.1 TAMU Technical Deliverables

5.1.1. 模式技术进展
5.1.1. Modeling Technology Development

模式技术发展当前的主要目标是实现区域范围的高分辨率长时间尺度气候模拟和季节到年际时间尺度的天气气候预测，实现此目标需要非常优异的数值模拟能力和数值模式产品。我们预计这一目标将在本项目执行过程中逐步完成，并在项目的不同阶段交付以下模式产品：

A major goal of the modeling technology development is to provide state-of-the-art modeling capability for high-resolution climate simulations and seasonal to inter-annual predictions at regional scales. We expect that this effort will be completed incrementally during the course of the project and the following modeling products will be delivered at different stage of the project:

5.1.1.1 首先要发展一个新版本的 CESM，使得可以在其中进行"区域模式"的相关设置。在这个区域模式中，CESM 会利用类似其目前全球版本中的方法将 WRF、ROMS 和 CLM 进行耦合，以便用户可以进行完全耦合的区域气候模拟。这个区域 CESM（R-CESM）将被完全记录、配置和验证。

5.1.1.1 A new version of CESM that allows a configuration in "regional mode" will be first developed. In this regional mode, CESM will couple WRF, ROMS and CLM in a similar manner as in its current global version, so that users can perform fully coupled regional climate simulations. This Regional CESM (R-CESM) will be fully documented, configured and validated.

5.1.1.2 发展一个在不同 CESM 组件中的组件内驱动框架（ICDF），在粗分辨率的全球组件与更高分辨率的内嵌组件之间建立新的更先进的耦合功能。这个新创建的框架将从一开始就被设计为便于用户将不同区域的高分辨率区域 WRF 和 ROMS 模式嵌入到粗分辨率的全球 CESM 中。

5.1.1.2 An Intra-Component Driver Framework (ICDF) within different CESM components will be developed next to create new and advanced coupling capabilities between coarse resolution global components and higher resolution imbedded components. This newly created framework will be designed from the outset to facilitate users' need for straightforward imbedding of the high-resolution regional WRF and ROMS models over various domains into coarse-resolution global CESM.

5.1.1.3 除非任何意外的延误，最终交付的模式产品是一个原型耦合系统，包括：i)嵌入到粗分辨率 POP 的高分辨率 ROMS；ii)嵌入到粗分辨率 CAM 的高分辨率 WRF。在这个框架内，ROMS 和 POP 以及 WRF 和 CAM 模拟将具有先进的耦合同步能力，可以持续性地通过 ICDF 交换状态变量；来自 ROMS 和 WRF 的高分辨率表面量会通过 CESM 耦合器分别传递给大气和海洋模式组件。该 ICDF 耦合技术将被修改为支持合作研究中的科学目标。

5.1.1.3 **Barring** any unforeseen delays, the final model product to be delivered is a prototype coupled system that embeds i) a high-resolution ROMS into the coarse-resolution, work-horse POP and ii) a high-resolution WRF into the coarse resolution, work-horse CAM. Within such a framework, ROMS and POP as well as WRF and CAM will advance in sync and continuously exchange evolving state variables via the ICDF, while high-resolution surface quantities from ROMS and WRF will be passed to the atmospheric and ocean components, respectively, through the CESM coupler. The ICDF coupling technology will be modified to support the scientific objectives of the collaborative research.

所有模式软件将被开放并在研究团队成员间共享，包括现有的 TAMU 区域耦合气候模式（CRCM）以及新的 R-CESM 和具有 ICDF 功能的 CESM。

All the modeling software will be open and shared among the research team members. This includes the existing TAMU coupled regional climate model (CRCM) as well as the new R-CESM and ICDF enabled CESM.

5.1.2. 模式验证和模式数据的提供

5.1.2. Model Validation and Provision of Model Data Sets

模式开发工作的同时，研究工作将对目前 TAMU 区域耦合气候模式
（CRCM）在季节性到年际时间尺度的后报及预报模拟技巧层面提供的区域
预测信息进行性能评估。注意到目前通过以前版本的 CESM 耦合器将
ROMS 和 WRF 耦合所构成的 TAMU-CRCM 具有相似的物理过程，我们预
计现有的 TAMU-CRCM 可以应用到新的 R-CESM 中。当模式全部开发完成
并经过测试后，我们将切换到 R-CESM。我们设想一个三阶段的方法来完成
这部分的研究工作，以下列出的模式模拟实验将于项目的不同阶段进行实施，
实验产生的的数据会被交付给双方使用：

Parallel to the model development effort, research will be conducted to evaluate
the performance of the existing TAMU coupled regional climate model (CRCM)
in providing regional prediction information with skill on seasonal to inter-annual
time scales in a hierarchy of hindcast and forecast simulations. Noting that the
existing TAMU CRCM consists of ROMS and WRF coupled together through a
previous version of CESM coupling software with very similar physics, we expect
that the results of the existing TAMU CRCM are applicable to the new R-CESM.
We will switch to R-CESM when the model is fully completed and tested. We
envision a three-stage approach to complete this part of research. The following
model simulations will be conducted at different stages of the project and data
sets derived from these experiments will be delivered to both parties:

5.1.2.1 海表温度边界条件分别采用观测数据和预报的 SST 来进行配置海
洋数据的 CRCM 后报实验，但侧边界条件采用相同的大气再分析数据，
其中预报的 SST 来自 NCAR 的 CESM 年代际预报实验。实验的目的是
探究预报 SST 数据的误差对所研究区域上的动力降尺度过程的影响。

5.1.2.1 CRCM hindcast experiments will be carried out in data-ocean
configuration with both observed and predicted SST but using the same lateral
boundary conditions from atmospheric reanalysis. The predicted SST will be
derived from decadal prediction experiments using CESM conducted at
NCAR. The objective is to see how errors in SST forecasts can have an
impact on dynamical downscaling in the study region.

5.1.2.2 在完全耦合的条件下进行 CRCM 后报实验，海洋内部的温度和
盐度恢复到海洋再分析数据和 CESM 的年代际预报数据。实验目的是探
究三维海洋状态估计的不确定性对所研究区域上的降尺度过程的影响。

5.1.2.2 CRCM hindcast experiments will be carried out in a fully coupled
mode with ocean interior temperature and salinity restored to those of an
ocean reanalysis product and of CESM decadal predictions. The objective is
to see how uncertainties in 3-D ocean state estimates can have an impact on
dynamical downscaling in the study region.

5.1.2.3 类似于实验 2），在完全耦合的条件下进行 CRCM 后报实验，但
不同之处在于 WRF 侧边界条件将被更换为 CESM 的年代际预报数据。
这个实验使我们能够对动力降尺度中侧边界条件不确定性的重要性进行
评估。

5.1.2.3 Similar to 2), CRCM hindcast experiments will be carried out in a
fully coupled mode except that the lateral boundary conditions for WRF will

be changed to forecasted conditions from CESM decadal predictions. This will allow us to assess the important of uncertainties in lateral boundary conditions in dynamical downscaling.

在此工作过程中，TAMU 将与 NCAR 合作提供年代际预报模拟数据集，该数据集包含一个以前做的年代际预报预报模拟大集合，和一套新的按照 CMIP6 协议和 2017 至 2018 期间的新的预估情景下的年代际预报模拟。我们会调整数据输出的采样频率以适应区域模式的运行要求。

During the course of this work, TAMU will work with NCAR to provide the necessary data sets from the decadal prediction simulations which contain a large ensemble of historical decadal forecast runs and a new set of decadal prediction simulations following the CMIP6 protocol and the new projection scenarios during the 2017-2018 period. The sampling frequency of the data output will be adjusted to accommodate the requirements for running the regional model.

5.1.3. 教育活动
5.1.3. <u>Educational Activities</u>

TAMU 会由 NCAR 协同主持接待 OUC 教师和博士后的访问，并提供研究生的指导和培训。研究生的指导与培训将会成为 OUC-TAMU 海洋学双博士学位项目的一部分，并且会扩展到大气科学。TAMU 会提供部分资金支持以弥补 OUC 博士后在访问期间的生活费用。

TAMU will be joined by NCAR to host visits of OUC faculty and postdocs, as well as, provide mentoring and training of graduate students. The graduate mentoring and training will be a part of the existing OUC-TAMU Dual Ph.D. degree program in Oceanography and will be extended to include Atmospheric Sciences. TAMU will provide partial financial support to compensate for the living expenses of OUC postdocs during their visit.

5.1.4 项目网站
5.1.4 Project Website

建立一个联合网站并使其成为本合作项目的门户网站。网站的建设以 TAMU 为主导，OUC 进行协助，确保质量保证和质量控制（QA/QC）协议以及图形展示无误，从而提高网站的可用性以及评估和访问。

A joint website will be developed as a portal to this joint collaboration. Website development will be led by TAMU with cooperation and input from OUC to ensure Quality Assurance and Quality Control (QA/QC) protocols and graphical representations to enhance usability, assessment, and access.

5.1.5 经济支持
5.1.5 Financial Support

经济支持参见附件 1 所述。

Financial support as identified in Attachment 1

5.2 OUC 成果交付

5.2 OUC Deliverables

5.2.1 资料同化技术进展

OUC 负责资料同化方案和模块设计的技术开发, 与最后的区域耦合模式一起形成区域耦合资料同化系统(RCESM-CDA)作为一个区域天气气候监测和预报系统最后交付使用. 期望分下列阶段完成系统发展和逐段交付使用:

5.2.1 Data Assimilation Technology Development

OUC will lead the development of data assimilation with the final goal of delivering a state-of-the-art coupled data assimilation module for R-CESM (RCESM-CDA). The RCESM-CDA is a critically important component for making R-CESM as a stand-alone forecast system. We expect that this effort will be completed incrementally during the course of the project and the following modeling products will be delivered at different stage of the project:

5.2.1.1 以 ROMS 为模式基础的海洋资料同化模型设计和调试, 包括海洋观测资料的质量控制程序设计

5.2.1.1 Design of a ROMS-based ocean data assimilation module and observed data quality control

5.2.1.2 以 R-CESM 为基础的大气资料同化模型设计和调试, 包括大气观测资料的质量控制程序设计

5.2.1.2 Design of a R-CESM-based atmosphere data assimilation module and observed data quality control

5.2.1.3 建立在 R-CESM 最后版本基础上, 设计并完成 RCESM-CDA 系统并交付使用

5.2.1.3 Design of coupled data assimilation with the final version of R-CESM, and completing RCESM-CDA system development

5.2.2 资料同化验证和过程研究

OUC 将在 5.1.2 所列的模式验证工作方面与 TAMU 和 NCAR 进行密切合作，并将领导资料同化实验和验证的进行。OUC 将在以下具体方面做出贡献：

5.2.2 Data Assimilation Validation and Process Study

OUC will work closely with TAMU and NCAR in the model validation effort outlined in 5.1.2, and lead data assimilation experiments and verification. In particular, OUC will contribute the following aspect:

5.2.2.1 设计研究区域并为模式验证和分析准备所有历史数据集。

5.2.2.1 Design of the study area and prepare all the historical data sets for model validation and analysis.

5.2.2.2 协助为后报和预报实验准备模式的初始条件和侧边界条件。

5.2.2.2 Assistant with the preparation of model initial conditions and lateral boundary conditions for hindcast and forecast experiments.

5.2.2.3 运行部分预报/后报实验，并参与预报/后报实验的验证分析。

5.2.2.3 Carry out some of the forecast/hindcast experiments and participate in validation analysis of the forecast/hindcast experiments.

另外，OUC 将参加黑潮延伸体区域的关键表面热通量测量并交付相关数据，以进行模式过程研究，以了解该区域海洋中尺度涡与大气的相互作用。

Additionally, OUC will participate and deliver critical surface heat flux measurements in the Kuroshio Extension region for model process study aiming at understanding ocean mesoscale eddy – atmosphere interaction in the region.

所有数据同化软件将被开放并在研究团队成员间共享。All data assimilation software shall be shared in all collaborative parties including OUC, TAMU and NCAR.

5.2.3 项目网站
5.2.3 Project Website
OUC 将参与项目网站的设计与建立，包括维护项目的镜像网站。

OUC will participate in the design and development of the project website, including maintaining a mirrored webserver for the project.

5.2.4 经济支持
5.2.4 Financial Support
经济支持参见附件 1 所述。

Financial support as identified in Attachment 1

6.0 技术服务工作进度安排：
6.0 SCHEDULES FOR TECHNICAL SERVICE
该项目需要至少 3 年完成，以下是项目在没有遭遇任何不可预见的延误情况下的预估时间进度表：

We envision that the project will require at least 3 years to complete. The following is an estimated milestone of project that does not take any unforeseen delays into consideration:

6.1 第 1 年
6.1 Year 1
6.1.1 将最先进的为 CESM 设计的耦合模式技术整合到 TAMU 当前的区域耦合气候模式（CRCM）中，此项技术是基于 CESM 1.1/CPL7 的。在 5.1.1(1)中所述的 R-CRCM 也将被构建、测试、归档并交付。

6.1.1 State-of-the-art global coupled modeling technology designed for CESM will be integrated into TAMU's existing Coupled Regional Climate Model (CRCM), which is built upon CESM 1.1/CPL7. R-CRCM, as described in 5.1.1 (1) will be built, tested, documented and delivered.

6.1.2 基于 R-CRCM 完成一篇学术论文。

6.1.2 Complete a scientific paper on R-CRCM.

6.1.3 ROMS 的同化模块将被建立并测试，此项工作以 OUC 为主导。

6.1.3 Modula Data Assimilation software for ROMS will be developed and tested. This effort will be led by OUC.

6.1.4 完成 5.1.2(1)所述的配置海洋数据的 CRCM 后报实验，重点放在评估 SST 预报误差的影响。完成对 1997/98 厄尔尼诺事件的集合预报实验，以此可以展示模式

对 1997/98 厄尔尼诺事件的区域性影响（包括热带气旋在内）的动力降尺度技巧。集合实验的数据集将被交付。

6.1.4 Complete data-ocean configured CRCM hindcast experiments described in 5.1.2 (1), focusing on the evaluation of impact of SST forecast errors. Ensemble of forecast runs for 1997/98 El Niño events will be completed to demonstrate the skill of dynamical downscaling the regional impact of 1997/98 El Niño, including tropical cyclones. Data sets from the ensemble experiments will be delivered.

6.1.5 在配置海洋数据的 **CRCM** 降尺度研究方面发表一篇学术论文。

6.1.5 Complete a scientific paper on data-ocean CRCM dynamical downscaling study.

6.1.6 TAMU 和 **NCAR** 会主持接待 **OUC** 博士后访问，提供 **TAMU CRCM** 的使用及应用的培训。

6.1.6 TAMU and NCAR will host visits of OUC postdocs, providing training on TAMU CRCM usage and application.

6.1.7 建设并启用项目网站。

6.1.7 Project website will be developed and launched.

6.2 第 **2** 年
6.2 Year 2

   6.2.1 完成对 5.1.1 (2)中所述 CESM ICDF 的开发和验证，这将允许将区域模式组件（如 ROMS）以简单的方式在不同的区域嵌入到 CESM 中。

6.2.1 Complete the development and validation of CESM ICDF as described in 5.1.1 (2). This will allow a regional component model, such as ROMS, to be embedded into CESM in a straightforward manner over various domains.

6.2.2 在现有的 **TAMU CRM** 框架中将同化模块应用于 **ROMS** 和 **WRF** 模式中，并利用 **CRCM** 在研究区域进行同化测试实验，此工作以 **OUC** 为主导。

6.2.2 Implement Data Assimilation modules into ROMS and WRF within the framework of the existing TAMU CRCM framework and perform test DA experiments with the CRCM in the study region. This effort will be led by OUC.

6.2.3 根据 5.1.2 (2)所述，完成完全耦合的 CRCM 后报实验。实验中的海洋内部温度和盐度将以海洋再分析数据和 CESM 的年代季预报数据为目标进行一定程度的控制恢复，1997/98 厄尔尼诺事件将会做为个例研究。

6.2.3 Complete the CRCM hindcast experiments in a fully coupled mode with ocean interior temperature and salinity restored to those of an ocean reanalysis product and of CESM decadal predictions, as outlined in 5.1.2 (2). Again 1997/98 El Niño event will be used as a case study.

6.2.4 在 **CRCM** 后报实验方面完成一篇学术论文。

6.2.4 Complete a scientific paper on the CRCM hindcast experiments.

6.2.5 TAMU 和 **NCAR** 将继续主持接待 **OUC** 博士后访问，提供 **TAMU CRCM** 的使用及应用的培训。

6.2.5 TAMU and NCAR will continue to host visits of OUC postdocs, providing training on TAMU CRCM usage and application.

6.2.6 扩展和维护项目网站。

6.2.6 Project website will be expanded and maintained.

6.3 第 3 年

6.3 Year 3

6.3.1 完成并交付一个原型耦合系统，如 5.1.1 (3)所述，包括：i)嵌入到粗分辨率 POP 的高分辨率 ROMS；ii)嵌入到粗分辨率 CAM 的高分辨率 WRF。在这个框架内， ROMS 和 POP 以及 WRF 和 CAM 将同步推进并不断通过 ICDF 交换状态变量；来自 ROMS 和 WRF 的高分辨率海气界面数据会通过 CESM 耦合器分别传递给大气和海洋模式组件。

6.3.1 Complete and deliver a prototype coupled system that embeds i) a high-resolution ROMS into the coarse-resolution, work-horse POP and ii) a high-resolution WRF into the coarse resolution, work-horse CAM. Within such a framework, ROMS and POP as well as WRF and CAM will advance in sync and continuously exchange evolving state variables via the ICDF, while high-resolution surface quantities from ROMS and WRF will be passed to the atmospheric and ocean components, respectively, through the CESM coupler, as described in 5.1.1 (3).

6.3.2 完成 RCESM-CDA 模块，该项工作以 OUC 为主导。

6.3.2 Develop a coupled Data Assimilation module for R-CESM and complete RCESM-CDA system development. This effort will be led by OUC.

6.3.3 完成 5.1.2 (3)中所述的 CRCM 后报实验，以检测动力降尺度过程中侧边界中的不确定性。

6.3.3 Complete the CRCM hindcast experiments on examining uncertainties in lateral boundary conditions in dynamical downscaling, as described in 5.1.2 (3).

6.3.4 在 5.1.1 (2)所述的 CESM ICDF 的可用的情况下，尝试将 ROMS 嵌入 POP 进行一个原型年代际预测模拟，并将模拟结果与标准 CESM 年代际预测结果进行比较。

6.3.4 Subject to the availability of the CESM ICDF described in 5.1.1 (2), an attempt will be made to perform one prototype decadal prediction simulation with ROMS embedded in POP. This simulation can be compared with the standard CESM decadal prediction runs.

6.3.5 TAMU 和 NCAR 将继续主持接待 OUC 博士后的访问，并提供 TAMU CRCM 的使用及应用方面的培训。

6.3.5 TAMU and NCAR will continue to host visits of OUC postdocs, providing training on TAMU CRCM usage and application.

6.3.6 更新并维护项目网站。

6.3.6 Project website will be updated and maintained.

6.3.7 组织一个研讨会来回顾该项目的所有科研成果。

6.3.7 A workshop will be organized to review all the scientific achievements of the project.

6.4 技术费用及结算

6.4 Technical Service Fees and Settlements

6.4.1 除下列例外以及附件 1 中所述情况，每一方应当为各自在 **MOA** 条例下的任何相关工作及合作费用负责。

6.4.1 Each Party will be responsible for its own costs in connection with all matters relating to any work and collaborations performed under this MOA with the exceptions outlined below and in Attachment 1.

6.4.2. 在本协议下完成的工作将包含间接费用，但不会包含管理费或行政事业性费用。

6.4.2. Work completed under this agreement will include indirect costs, but will not include management or administrative fees.

6.4.3 OUC 和 TAMU 同意，本附件中不包含任何强迫性或解释性条款用于强制任何工作单位提供比本文中所确切描述的内容更多的实际资源。

6.4.3 OUC and TAMU agree that nothing in this addendum shall compel or be interpreted so as to compel any entities to provide more resources than those specifically identified herein.

6.4.4 双方同意，甲方根据附件 1 所述的交付成果向乙方支付总额$1,257,000 美元，甲方向乙方支付的款项将分如下三期：

6.4.4 Both Parties agree that Party A shall pay Party B the total sum of $1,257,000 dollars for the deliverables described in Attachment 1. Party A payment to Party B will be in three installments as follows:

> **6.4.4.1** 一期：自本合同生效之日起 90 个工作日内，甲方向乙方指定帐户支付 6.1.4 条所规定的总额的三分之一，即 USD$419,000。
>
> **6.4.4.1** Installment1: Party A shall pay the sum of USD $419,000, 1/3 of the full payment as stated in Clause 6.1.4 to the account appointed by Party B within 90 working days since the effective date of this Contract.
>
> **6.4.4.2** 二期和三期：甲方将在 2017 年 12 月 15 日和 2018 年 12 月 15 日前，分别向乙方指定账户支付 6.1.4 条所规定的总额的三分之一，即 USD$419,000。
>
> **6.4.4.2** Installment 2: Party A shall pay the sums of USD $419,000, 1/3 of the full payment as stated in Clause 6.1.4 to the account appointed by Party B following receipt of the deliverables agreed to in Attachment 1 before December 15th, 2017 and Installment 3: Party A shall pay the sum of USD $419,000 1/3 of the payment as stated in Clause 6.1.4 to the account appointed by Party B following receipt of the deliverables agreed to attachment 1 before December 15th 2018, respectively.
>
> **6.4.4.3** 在收到款项之日起 30 个工作日内，乙方向甲方提供相应数额的发票。
>
> **6.4.4.3** Party B shall provide a receipt at same amount to Party A within 30 working days from the date of receiving each payment.
>
> **6.4.4.4** 乙方同意贡献 USD $350,000 以实现附件 1 中阐明的支付成果。

6.4.4.4 Party B agrees to contribute USD $350,000 to achieve the deliverables articulated in Attachment 1.

6.4.5

6.4.5

7.0 技术服务成果的交付及验收
7.0 DELIVERY AND INSPECTION OF THIS TECHNICAL SERVICE ACHIEVEMENTS

7.1 技术服务成果的交付形式及交付地点如下：
7.1 Delivery form and locations of this Technical Service Achievements are as follows:

7.2 甲方应指定本合同所述之项目联系人（或该项目联系人指定人员）作为技术服务成果的接收人，项目联系人应在接收技术服务成果后即时向乙方以书面形式做出接收确认，并确定它符合附件 1 中的每个约定。
7.2 Party A shall appointed the project contact (or the officer designated by the project contact therein) as stated herein as the recipient of this agreement. Project contact shall confirm with Party B in writing after he or she receives the deliverables, and confirms that they comply with any specifications as per Attachment 1.

7.3 验收本技术服务成果的方法如下：对于 5.1.1 中的模式技术开发 和 5.2.1 中数据同化技术开发，应该按照相应章节中所列的时间表验收经过完全测试的模型软件。对于 5.1.2 中的模式验证和提供模式数据集以及 5.2.2 中的数据同化验证和过程研究，应该按照相应章节中所列的时间表验收数据集和拟议的模拟的完成情况。对于 5.1.3 中的教育活动，应该按照相应章节所列的时间表验收所有提议进行的培训和指导活动的完成度。
7.3 Method for inspecting and accepting this Technical Service Achievements shall be as followed: For the Modeling Technology Development in 5.1.1 and Data Assimilation Technology Development in 5.2.1, the method for inspecting and accepting should be the delivery of the fully tested model software according to the schedule outlined in these sections. For the Model Validation and Provision of Model Data Sets in 5.1.2 and Data Assimilation Validation and Process Study in 5.2.2, the method for inspecting and accepting should be the delivery of the data sets and completion of the proposed

simulations according to the schedule outlined in these sections. For the Educational Activities in 5.1.3, the method for inspecting and accepting should be the completion of all the proposed training and mentoring activities according to the schedule outlined in these sections.

7.4 技术服务成果的验收时间和地点如下：2017，2018 和 2019 年每年的 12 月 31 日，在 OUC 进行验收。

7.4 Time and location for inspecting and accepting this Technical Service Achievements shall be as followed: December 31, 2017, 2018 and 2019 at OUC.

7.5 甲方具有 30 天的周期来对技术服务成果进行验收，以确定其是否符合上述以及附件 1 中约定的条款。甲方有权在检查期内以任何适当的方式就技术服务成果与上述以及附件 1 中约定的条款间的任何不一致提出索赔。如果双方确认了索赔的真实性，乙方应及时更正其技术服务成果。甲方应在乙方纠正问题并重新提交技术服务成果后的 30 个工作日内对成果进行检查。

7.5 Party A shall have a 30 day period of inspection to examine the Technical Service Achievements to determine if they conform to the requirements specified above and in Attachment 1. Party A is entitled to make claims on any inconsistence between this Technical Service Achievements and the requirements specified above and in Attachment 1 in any appropriate manner within the period of inspection. If both Parties confirm that the claim is true, Party B shall promptly correct this Technical Service Achievements. Party A shall inspect this Technical Service Achievements within 30 working days after Party B has corrected the issue and resubmit this Technical Service Achievements.

8.0 甲方权利、义务、声明及保证
8.0 RIGHTS, OBLIGATIONS, DISCLAIMERS AND WARRANTS OF PARTY A

8.1 甲方有权要求乙方提供符合本合同约定要求的技术服务成果供甲方用于本合同第 2.2 和 2.3 条约定的范围及用途。

8.1 Party A is entitled to request Party B to provide this Technical Service Achievements complying with the requirements of this Contract for Party A's purpose

8.2 甲方有权在乙方提供技术服务的过程中向乙方提出任何合理的建议供乙方参考。

8.2 Party A is entitled to provide any advice to Party B's during the period that Party B provides technical services.

8.3 甲方应按时、足额向乙方支付本合同约定的报酬。

8.3 Party A shall promptly and fully make payment to Party B as agreed under this Contract.

8.4 甲方应为乙方的技术服务工作提供充分的协助和支持，在合理时间内包括根据技术服务需要可以提供给乙方的技术资料及工作条件。在乙方提供技术服务的过程中，对于乙方提出的新的技术资料和工作条件提供的要求，甲方应尽所有合理商业努力及时予以满足，以保证技术服务工作的顺利推进。未经双方书面确认，乙方不得以甲方未及

时充分提供所需技术资料和工作条件为由顺延技术服务成果的交付日期。

8.4 Party A shall provide adequate assistance and support to the Party B regarding technical services, including providing Party B with the technical materials and working conditions. To ensure the progress of technical services goes smoothly, the Party A shall use all reasonable efforts to satisfy Party B's requirements on new technical materials and working conditions during the period that Party B provides technical services. Without the mutual written confirmation, Party B shall not defer the delivery date of this Technical Service Achievements on the basis that Party A does not sufficiently and promptly provide technical materials and working conditions.

8.5 甲方保证向乙方提供技术资料、工作条件或其他必要的协助和支持，且不存在任何权利瑕疵，其有充分权利向乙方提供且不会侵犯任何第三方的知识产权等合法权益。

8.5 Party A warrants will provide technical materials, working conditions and other necessary assistance and support without any defects of right and he have the full rights to provide them to Party B, who will not knowingly infringe intellectual property rights and other legitimate rights and interests of any third party.

9.0 乙方权利、义务、声明及保证
9.0 <u>RIGHTS, OBLIGATIONS, DISCLAIMERS AND WARRANTS OF PARTY B</u>

9.1 乙方有权要求甲方为乙方进行技术服务工作提供任何必要的协助和支持。

9.1 Party B shall be entitled to request Party A to provide necessary assistance and support for the purpose of Party B's work of technical services.

9.2 乙方有权要求甲方按时、足额支付本合同约定的技术服务报酬。

9.2 Party B is entitled to request Party A to make full and timely payment as the technical services remuneration under this Contract.

9.3 在技术服务工作进行中，乙方应每季度以书面或口头形式与甲方进行有关技术服务工作进度的沟通。

9.3 During the course of technical service, Party B shall communicate with Party A in written or oral on the progress of the technical service work on a quarterly basis.

9.4 技术服务工作进行中及技术服务成果验收合格后，乙方为完成本协议约定的技术服务工作而购置的硬件设备均自始归乙方所有。

9.4 During the course of technical service and after the Party A has inspected and accepted this Technical Service Achievements, Party B shall own all the equipment purchased for the purpose of the technical service as agreed in this Contract.

9.5 乙方保证其是合法设立并有效存续的独立法人；其有资格从事本合同项下之合作，而该合作符合其经营范围之规定；其授权代表已获得充分授权可代表其签署本合同；其有能力履行其于本合同项下之义务，并且该等履行义务的行为不违反任何对其有约束力的法律文件的限制，也不会侵犯任何第三方的权益；其在履行本合同的过程中将遵守所有适用的法律法规。

9.5 Party B warrants that it is legally established and validly existing independent legal entity. It is qualified to cooperate under this Contract and such cooperation shall be in line with its business scope. Its authorized representative has been fully authorized to sign this Contract. It has full ability to the best of its knowledge to perform its obligations under this Contract and such performance of obligations under this Contract does not violate any restrictions in any binding legal document and does not knowingly infringe any third party rights. Party B shall comply with all applicable laws and regulations during performing this Contract.

10.0 保密
10.0 <u>CONFIDENTIALITY</u>

10.1 本合同下的"保密信息"是指：在为达到本合同合作目的进行评估、磋商、谈判、合作的过程中，一方（简称"披露方"）向另一方（简称"接收方"）提供的任何有关披露方（含披露方客户）业务、财务、技术等方面的非公开的商业信息或专有信息，包括但不限于有关数据、技术资料、软件源代码等任何非公开信息及其中所含或者与之相关的任何及所有知识产权。双方同意，因访问对方实验室、科研场所和其它设施所得到的资料构成保密信息；有关项目进展和状态的任何信息也属于保密信息范畴。保密信息可以为书面或口头形式，如为书面形式应在显著位置清晰标有"保密"字样（或类似文字），如为口头形式应在口头披露后 30 天内以书面形式确认为保密信息。

10.1 "Confidential information" under this Contract means any business, financing, and technology and other non-disclosure business information and proprietary information disclosed by a party (the "Disclosing Party") to the other (the "Receiving Party") for the purpose of assessment, cooperation, consultation, negotiation and cooperation under this Contract, including but not limited to any non-public information about the data, technical data, software source code, etc. and any related intellectual property right. Both Parties agree that information arising from access to the other party's laboratories, research facilities and other places constitutes confidential information. Any information about the project progress and status also falls into the scope of confidential information. Confidential information may be written or verbal form. If they use writing form, they shall mark "confidential" words (or similar words) in a prominent position. If they use verbal form, written confirmation should be given within 30 days after oral disclosure.

10.2 保密信息应不包括以下信息：

 10.2.1 在披露方向接收方披露前已公开的信息，或在披露后，非因接收方的违约行为而公开的信息；

 10.2.2 接收方能够证明，披露方向其披露前，其已通过合法方式知悉并有权处置的信息；

 10.2.3 接收方从对披露方不负保密义务的第三方通过合法方式获得的信息，或者未使用披露方的保密信息，由接收方独立开发出来的信息；

 10.2.4 披露方在本协议其他条款中或通过其他书面方式同意接收方进行特别披露或使用的信息。

10.2 Confidential information shall not contain the following information:

 10.2.1 Information which has been disclosed before the Disclosing Party discloses to the Receiving Party, or after the Disclosing Party discloses to the Receiving Party, but not

because of the breach from the Receiving Party;

10.2.2 Information that the Receiving Party can prove they legally obtain them and have the right to dispose them before the Disclosing Party discloses;

10.2.3 Information that the Receiving Party obtained from a third party who does not assume confidential obligation, or independently develop without using disclosing information from Disclosing Party;

10.2.4 Information that are specially authorized by the Disclosing Party in other provisions of this Contract or other written permission to use or disclose by the Receiving Party.

10.3 如果司法部门或有关行政机构根据有关法律法规要求接收方披露保密信息，接收方应在收到该等强制性要求后立即通知披露方，并应尽可能在法律允许的范围内采取对披露方影响最小的方式对披露相关保密信息。

10.3 If any judicial or relevant administrative entity requests the Receiving Party to disclose confidential information in accordance with relevant laws and regulations, the Receiving Party shall, after receiving such mandatory request, immediately notify the Disclosing party and shall take the way that has the minimal impact on the Disclosing Party to disclose confidential information.

10.4 接收方同意，将采取保密措施，防止保密信息的泄露，该等保密措施的充分程度不低于接收方对自己拥有的相同或类似的保密信息采取的保密措施的充分程度。

10.4 The Receiving Party agrees to take security measures to prevent the disclosure of confidential information. The extent of these security measures shall be no less than the extent of the security measures taken by the Receiving Party on their own same or similar confidential information.

10.5 接收方同意，在不应影响本合同的正常履行的情况下，一旦披露方书面要求其归还保密信息，接收方应立即向披露方归还自披露方处获得的所有保密信息的原件、复印件、摘要以及任何包含保密信息的文件或资料，但接收方可以在其文件中安全保留一份副本，仅用于记录本合同规定的义务。

10.5 Receiving Party agrees that, provided that it will not affect the normal performance of this Contract, once the Disclosing Party requests the Receiving Party to return the confidential information, the Receiving Party shall immediately return all confidential information obtained from the Disclosing Party, including original, copy, summary and any document or folder that contains confidential information except the Receiving Party may securely retain one copy in its files solely for record purposes of its obligations under this Contract.

10.6 本合同有效期内及终止后，本保密条款仍具有法律效力，其有效期至本合同终止后两年时止。

10.6 Before or after the expiration of this Contract, this confidential provision shall have still legal effect until two years after the expiration of this Contract.

11.0 协议期限与终止
11.0 **<u>EXPIRATION AND TERMINATION OF AGREEMENT</u>**

11.1 本合同自双方法定代表人或授权代表签署并加盖公章或合同专用章之日起生效，至本合同项下全部权利义务履行完毕时终止。

11.1 This Contract shall take effect when the legal representatives or authorized representatives of both Parties sign and stamp with the official seal or contract seal and terminate when all the rights and obligations of this Contract have been performed.

11.2 本合同可通过如下方式提前终止：

11.2.1 双方书面协商一致终止本合同的，本合同自协商终止之日起解除；

11.2.2 一方进入破产申请或清算程序的，另一方有权终止本合同，本合同自该有权终止方发出书面通知之日起解除；

11.2.3 按照本合同第 11 条的规定一方解除本合同的；

11.2.4 本合同约定的一方有权提前解除本合同的其他情形。

11.2 This Contract may be terminated at an earlier stage in following situations:

11.2.1 Both Parties agree to terminate this Contract in writing and this Contract shall terminate on the date when they reach the agreement

11.2.2 When one Party enters bankruptcy filing or liquidation proceedings, the other party is entitled to terminate this Contract. This Contract shall terminate on the date when the entitled party gave written notice;

11.2.3 One Party terminate this Contract in accordance with Clause 11 of this Contract;

11.2.4 Other situations where one Party shall be entitled to terminate this Contract at an earlier stage as agreed.

11.3 无论何种原因导致本合同提前终止，双方均应在本合同终止后 60 个工作日内完成有关款项结算事宜。甲方应偿还乙方在研究期间发生的所有费用和不可撤销的承诺，直至终止日期。如果提前终止，乙方同意偿还甲方在终止时已收到但仍未动用的任何资金，但需要用于支付不可取消的义务的资金除外。

11.3 No matter what the reason for early termination of this Contract, both Parties shall within 60 working days after the termination of this Contract complete the payment settlement issues. Party A shall reimburse Party B for all costs and non-cancelable commitments incurred in the performance of the Research up to the date of termination. Upon early termination, Party B agrees to reimburse Party A, any funds that have been received but remain unexpended at the time of termination, except for those funds needed to pay for non-cancelable obligations.

11.4 本合同的终止并不影响本合同中涉及保密、知识产权、违约责任、适用法律与争议解决条款的效力。

11.4 Termination of this Contract does not affect the intellectual property, confidentiality, breach of contract, the applicable law and the effectiveness of dispute resolution terms involved in this Contract.

11.5 不论何种原因本合同终止的，不应影响双方于本合同终止日之前根据本合同已产生的权利和义务。

11.5 No matter what the reason for termination of this Contract, it shall not affect the rights and obligations of both Parties arising from this Contract prior to the date of termination of this

Contract.

12.0 不可抗力
12.0 FORCE MAJEURE

12.1 "不可抗力"是指受影响一方不能控制的、无法预料或即使预料也不能避免的且于本合同签订日期后出现的及妨碍该方完全或部分履行本合同的任何事件。该等事件包括但不限于水灾、火灾、旱灾、台风、地震或其它自然灾害、大规模流行性疾病、罢工、骚动、暴乱及战争（不论曾否宣战）、政府行为、国家政策的突然变动等。

12.1 "Force majeure" means all events which are beyond the control of the Parties, and which are unforeseen, or if foreseen, unavoidable, and which prevent total or partial performance by any Party of this Contract. Such events shall include but shall not be limited to any floods, fires, droughts, typhoons, earthquakes or other natural disasters, large-scale epidemics, strikes, civil commotion, riots and war (whether they have been declared or not), government actions, sudden changes in national policy.

12.2 如果本合同任何一方受该不可抗力事件影响而未能履行其义务，该义务的履行在不可抗力事件引起的延误期内应予以中止。

12.2 If any event of force majeure occurs, to the extent that the contractual obligations of one Party to this Contract cannot be performed as a result of such event, such contractual obligations shall be suspended during the period of delay caused by force majeure.

12.3 宣称发生不可抗力的一方应尽可能在最短的时间内通过传真、邮件或其它当时可使用的最的方式将不可抗力事件通知另一方，告知另一方该事件的性质、发生日期、预计持续时间等细节，以及该事件阻碍通知方履行其于本合同项下的义务的程度和对本合同可能产生的影响，以减轻可能给对方造成的损失，并在事件发生后十五个工作日内以书面形式向另一方提供发生不可抗力事件及其持续时间的适当证据。宣称其履行协议受不可抗力影响的任何一方应尽一切合理的努力消除或减轻不可抗力事件的影响。

12.3 The Party declaring force majeure shall promptly inform the other Party through fax or email or other fast method about the force majeure event and nature, date of occurrence, estimated duration and other details, and also inform that to what the extent of the performance of this Contract was prevented by the force majeure and what is the impact on this Contract, in order to reduce the loss suffered by the other party, and shall furnish appropriate evidence of the occurrence and duration of the force majeure to the other party. The Party declaring force majeure shall use all reasonable endeavors to minimize the consequences of the force majeure.

12.4 一方因不可抗力不能履行本合同的，根据不可抗力的影响，该方部分或者全部免除责任，但适用法律另有规定的除外。

12.4 If one party is unable to perform the contract due to the force majeure, according to the impact of force majeure, that Party's partial or total liability shall be waived unless the applicable law regulates otherwise.

13.0 违约责任

13.0 **BREACH OF CONTRACT**

13.1 甲方逾期支付本合同项下约定的报酬的，合同工期相应延迟；甲方逾期 2 个月未支付完毕其应支付的本合同项下约定报酬的，乙方有权发出书面通知单方解除合同，合同自书面通知发出之日起解除。

13.1 If Party A defers remuneration under this Contract, the contract period shall be correspondingly postponed. If Party A fails to pay full remuneration under this Contract within 2 months, Party B is entitled to give notice to terminate this Contract unilaterally. This Contract shall be terminated on the date of serving notice.

13.2 如甲方未经乙方事先书面同意单方面停止履行本合同的，乙方已收取的报酬不再退还。

13.2 If Party A unilaterally terminates this Contract without any written permission from Party B, Party B is entitled to reserve the remuneration which it has already received.

13.3 除上述特别约定外，任何一方违反本协议的其它规定，在守约方发出敦促纠正该等违约行为的书面通知后 7 个工作日内，若违约方仍未采取纠正或补救措施时，守约方有权发出书面终止通知以解除本协议，本协议自守约方发出书面终止通知之日起解除。

13.3 In addition to these special agreement, if any party breaches other provisions of this Contract and fails to rectify or take remedial measures within 7 working days after non-defaulting party urged to rectify such breach by giving written notice, non-defaulting party is entitled to terminate this Contract by written notice. This Contract shall be terminated on the date of serving written notice.

13.4 甲方同意，如甲方依据本合同下其验收合格的技术服务成果做出决策并予以实施所造成的损失，乙方不承担任何责任。

13.4 Party A agrees, if Party A inspects and accepts this Technical Service Achievements in accordance with this Contract and makes decisions and execution of that decision as a result of any damages, Party B shall not be liable.

13.5 除上述特别约定外，甲乙双方任何一方违反本合同下的任何保证、承诺或义务而给守约方造成成本、费用损失以及其他任何损失，违约方应对该等损失承担责任。守约方有权采取一切法定的和约定的法律救济措施以获得赔偿；且任何一方违反本合同的其它规定，在守约方发出敦促纠正该等违约行为的书面通知后 7 个工作日内，若违约方仍未采取纠正或补救措施时，守约方有权发出书面终止通知以解除本合同。无论何种情形下，甲方于本合同下承担的违约赔偿总额应不超过乙方已向甲方实际支付的款项的总和。

13.5 In addition to these special agreement, any party breaches any warranties, commitment or obligation as a result of costs, expenses and any other loss to non-defaulting party, the defaulting party shall be liable for any such loss. Non-defaulting party is entitled to take any legal or agreed remedies to be compensated. If any party breaches other provisions of this Contract and fails to rectify or take remedial measures within 7 working days after non-defaulting party urged to rectify such breach by giving written notice, non-defaulting party is entitled to terminate this Contract by written notice. Whatever the case, the total compensation by Party A under this Contract shall not exceed the sum of payment already

paid from Party B to Party A.

14.0 适用法律及和争议解决
14.0 <u>APPLICABLE LAW AND DISPUTES RESOLUTION</u>
14.1

14.1 对于发生在美国的活动，本协议应受到美国联邦及德州政府相关法律法规约束和解释。对于发生在中国的活动，本协议应受到中华人民共和国相关法律法规约束和解释。如果对备忘录有争议，德克萨斯 A&M 大学和中国海洋大学将首先尝试通过双方合作谈判来解决问题。凡因本合同引起的或与本合同有关的争议，包括存在、效力、解释、执行、违反或终止；任何不能让双方满意的争端若得不到解决，当事人可以自由行使其他所有合法公平的权利。

14.1 As to activities taking place in United States, this Agreement shall be governed and interpreted by relevant federal law, Texas state law, and governmental regulations. As to activities taking place in China, this Agreement shall be governed and interpreted by the relevant laws and regulations of the People's Republic of China. If a dispute about the MOA arises, TAMU and OUC will initially attempt to resolve the issue through bilateral collaboration and negotiation. If a dispute is not resolved, the parties are free to exercise all other legal and equitable right.

15.0 项目联系人
15.0 <u>PROJECT CONTACT</u>
15.1 双方确定，在本合同有效期内，甲方指定__［林霄沛］__为甲方项目联系人，乙方指定__［Professor Ping Chang］__为乙方项目联系人。

15.1 Both parties agree, before the expiration of this Contract, Party A shall appoint ［Xiaopei Lin］ as the project contact of Party A, and Party B shall appoint <u>Professor</u> Ping Chang as the project contact of Party B.

15.2 双方项目联系人应承担以下责任：
    15.2.1 本合同下技术服务工作需求、内容和分歧的沟通协调；
    15.2.2 协调本合同项目服务工作资料的收集；
    15.2.3 技术服务成果的接收及其确认；
    15.2.4 技术服务成果的验收合格确认；
    15.2.5 本合同下一方通知、需求或请求等书面文件的递送和收取；
15.2 Both project contact shall assume the following responsibility:
    15.2.1 Communicating and coordinating on work requirements, content and differences of technical services;
    15.2.2 Coordinating and collecting working data of project services;
    15.2.3 Receiving and confirming of this Technical Service Achievements;
    15.2.4 Inspecting and confirming of this Technical Service Achievements;
    15.2.5 Serving and receiving notice, demand or request or other written document under

this Contract;

15.3 不允许单方面更改合同。对不影响预算和时间节点的修订可以由项目负责人相互批准，批准必须以书面形式进行。

15.3. Unilateral changes to the contract are not allowed. Refinement of the SOW that do not alter the budget or timelines can be mutual approved by the Project PIs. Approval must be in writing.

16.0 其它
16.0 Miscellaneous

16.1 本合同已包含了双方对本合同所述主题事项的全部理解，双方此前就本合同所述双方合作事项达成的任何口头和书面的约定均由本合同所替代，但保密协议（如有）除外；如本合同任何约定与保密协议（如有）条款相冲突的，均以本合同约定为准。

16.1 This Contract embodies the entire understanding of both Parties hereto and this Contract shall supersede all other oral or writing agreements reached by both Parties, except the confidential agreement, if any. If there is any conflict between this Contract and confidential agreement, this Contract shall prevail.

16.2 甲方可在本合同履行过程中提出变更技术服务内容的要求，但需经乙方书面同意，且如该等变更要求影响具体服务工作进度安排和报酬的，双方应协商确定变更后的服务工作进度安排和报酬及其支付方式，并签署补充协议作为本协议之附件，上述协商期间暂停计算本合同下的乙方提供技术服务工作的工期。

16.2 During the performance of this Contract, Party A is entitled to modify the requirements of technical services only with the permission of Party B. Where such modification affects the progress of technical services and payment, both Parties shall negotiated to modify the progress of technical services and payment and payment method after modification and sign supplementary agreement as the attachment of this Contract. The period of negotiation shall suspend the calculation of technical services period by Party B under this Contract.

16.3 未经另一方书面同意，任何一方不得转让其在本合同下的任何权利或义务，否则不发生法律效力。但在任一方发生控制权变更的情况下，

16.3 Without the written permission of the other party, each party shall not assign or transfer any of its rights or obligations hereunder.

16.4 本合同任何一方对于其权利的放弃或对于对方责任的豁免均应以书面方式作出。任何一方未能及时行使本合同项下的权利不应被视为放弃该权利，也不影响该方在未来行使该权利。

16.4 Any rights or obligation under this Contract may be waived or exempted by each party only with the written consent. Failure to exercise the rights under this Contract shall neither be treated as waiving the right, nor affecting or impairing the exercise of the right in the future.

16.5 如本合同的任何条款被相关权力机关依照中国法律或德州法律认定为无效或不可执行，此条款应视为自始即不存在；本合同其他条款不受影响，仍具有有效性和可执行性。

16.5 If any provision of this contact is or becomes illegal, invalid or unenforceable in any respect

under the laws of Peoples' Republic of China or the State of Texas, it shall be treated not existing from the start. The remaining provision will not be affected or impaired and they are still valid and enforceable.

16.6 附件 1 是本协议的一部分，与本协议其它部分具有同等法律效力。

16.6 Attachment 1 is part of this Agreement, and has equal legal effect similar to other parts of this agreement.

16.7 本合同正本一式肆份，甲方执有叁份，乙方执有壹份，具有同等法律效力。
（以下无正文）

16.7 This Contract is made out of four copies. Three copies are held by the Party A and one is held by Party B. Four copies have equal legal effect.

16.8 该 PSW1 的任何修改，包括项目协调人的身份变化，只能由签署该 PSW1 的双方按照现有的 TAMU-OUC MOA 进行书面修订以确认生效。

16.8 Any change to this PSW 1, including the identity of the Program coordinator(s), will be made effective only by written amendment of this PSW 1 signed by the Parties in accordance with the existing TAMU-OUC MOA.

16.9 由合作所得的数据/模式将在两年（除非由双方书面特别指定或由适定法律予以公开商定的期限）内被视为专有机密数据，起始时间于最初开发日期开始计算。从最初开发日期两年（或另行约定的时限）后，由本项合作所得数据/模式将不再为专有机密，会向公众开放。

16.9 The data/models from these collaborations would be considered proprietary and confidential data for two years or as otherwise agreed from the date of initial development unless specified and agreed upon by the Parties in writing or otherwise required to be disclosed by applicable law. Following two years or the otherwise agreed upon time period from the initial development, data / models from the specific collaboration will cease to be proprietary and confidential and will be open to public access.

16.10 TAMU 得到的研究结果可以预见到将会正常发表并广泛地与科学界共享，因此这些结果将希冀构成所谓的"基础研究"。"基础研究"由国际武器贸易条例（ITAR，22 CFR 部分 120-130 页）和出口管制条例（EAR，15 CFR 部分 730-774 页）定义。如果任何一方透露任何出口管制条例禁止的机密，披露方需以文字形式在披露的同时警示接收方。在此同时，如果披露方需要受出口管制物品的收据，接收方将对披露方提出相关建议。任何一方不得在违反美国出口管制条例的情况下出口或再出口任何美国原产的技术、软件或产品，以及直接由本协议下工作所产生的的技术、软件或产品。

16.10 The Results of the Research obtained by TAMU are expected to be ordinarily published and shared broadly with the scientific community, and therefore are expected to constitute "fundamental research" as defined under the International Traffic in Arms Regulations (ITAR, 22 CFR Sections 120-130) and the Export Administration Regulations (EAR, 15 CFR Sections 730-774). If either Party discloses any Confidential Information that is subject to export control, the disclosing Party will alert the receiving

Party in writing at the time of disclosure, at which time the receiving Party will advise the disclosing Party if it desires to take receipt of the export-controlled materials. Neither Party shall export or re-export any United States-origin technology, software, or products, or the direct products of that technology, software or products under this Agreement, in violation of United States export control regulations.
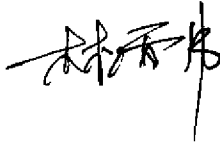
甲 方：　中国海洋大学
（盖章）
Party A: **Ocean University of China**
(Stamp)

法定代表人或授权代表签字：
Signed by Legal Representative/Authorized Person:

项目负责人签字：
Signature by Project Leader:

乙 方：美国德克萨斯农工大学
（盖章）
Party B: **Texas A&M University**
Carol J. Cantrell
Senior Associate Vice President for Research Administration

法定代表人或授权代表签字：
Signed by Legal Representative/Authorized Person:

项目负责人签字：
Signature by Project Leader: