研究活動

・アジアモンスーンと梅雨

世界人口の半数近くがアジアモンスーンの影響を受ける地域で生活しており、豊かな水資源の恩恵を受ける反面、深刻な自然災害を被ることも多いため、モンスーンを含めた水環境を理解することが重要な課題になっています。

アジアモンスーンの形成には、チベット高原が深く関わっていることを多くの研究で示していましたが、アジアモンスーンの一部である梅雨については数値モデルの再現性の問題から未解明な部分も多くありました。そのため、気象モデルを用いてチベット高原の影響や偏西風との相互作用について調査し、梅雨前線の形成メカニズムを明らかにしました。また、GPS を用いた可降水量の観測と気象モデル実験から、モンスーン期のチベット高原への水蒸気輸送メカニズムを解明しました。

近年は衛星観測データが整備され、様々な現象が明らかになっていますが、人の手の及ばない高山地域は未知の部分が多く残っています。特にチベット高原はその周囲に与える影響が極めて大きく、アジア各地で頻発する豪雨災害に対応する上でも、現地観測の重要性はさらに大きくなると予想されます。

・森林伐採や灌漑などによる地域気候への影響

深刻化する森林伐採や砂漠化、灌漑が地域気候に与える影響を調査するために、インドシナ半島や中国黄河流域に地域気候モデルを適用して感度実験を実施しました。研究の結果、降水量の長期減少傾向は森林伐採の影響に加えて熱帯擾乱の襲来数の影響が大きいこと、灌漑地域が雲形成分布に大きな影響を与えていることが解明されました。地域の気候を形成する要因は多くあり、森林伐採などの人による自然の改変がどのくらい影響を与えるのか、定量的に評価するのは難しいですが、想定できる限りの様々な原因を一つ一つ検討し、影響評価を行うことが今後も必要になると思われます。

・地域温暖化の地域気候への影響

温暖化予測では全球気候モデルが用いられていますが、現在の計算機能力では解像度に限界があり、地域の気候再現の不確実性が問題となっています。そのため、不確実性を軽減するために考案された領域気象モデルによるダウンスケーリングの検証を行い、計算領域を適切に設定することで、手法が有効であることを明らかにしました。

冬季の日本海側と太平洋側では気候が大きく異なることから、地域詳細の評価が不可欠になります。厳冬期の気候値や極端現象（豪雪）の温暖化による影響調査を目的として、過去気候変動の再現や擬似温暖化手法による地域ごとの統計評価を実施し、ダウンスケーリングの適用限界を明らかにしました。

さらに、地方自治体（富山県）と連携し、温暖化予測情報を誤解のないように分かり

やすく伝えるための手法の開発に取り組んでいます。

現在実施中の研究課題

・原発事故に伴う放射性物質の拡散過程を含む水循環過程の解明

2011 年 3 月 11 日の東北地方太平洋沖地震に伴い福島第一原子力発電所で発生した深刻な原発事故によって、大量の放射性物質が放出され、広範囲に放射能汚染が発生しました。一部は河川等に流出し、水道水源に到達して浄水から放射性物質が検出されました。また、食品からも放射性物質が検出されました。持続可能な水利用のためには、水源の水が利用に適しているかどうかを的確に診断予測する技術が不可欠です。本研究課題では、放射性物質の移流拡散過程を含む水循環プロセスの解明と、水道取水源への到達を推計するシミュレータの構築を目標としています。

・過去 2000 年間の日本の気候調査とその再現

Research achievement

Ａ）Peer review papers

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C）Book

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